PLANNING COMMISSIONERS

PATRICIA KORZEC
Chairperson

ALVIN DEJOHNETTE
Vice Chairperson

JEFFREY SIMS
Commissioner

CITY OF MORENO VALLEY
DECEMBER 3, 1984

RAFAEL BRUGUERAS
Commissioner

OMAR COBIAN
Commissioner

VACANT
Commissioner

VACANT
Commissioner

PLANNING COMMISSION
Regular Meeting

Agenda

Thursday, January 27, 2022 at 7:00 PM

Teleconference Meeting
Pursuant to Assembly Bill No. 361

The public may observe the meeting and offer public comment as follows:

STEP 1
Install the free Zoom App or visit the free Zoom website at https://zoom.us/

STEP 2
Get meeting ID number, password and on the list to speak by emailing zoom@moval.org or calling (951) 413-3206, no later than 5:00 p.m. on the day of the Planning Commission Meeting.

STEP 3
Select Audio Source
Computer Speakers/Microphone or Telephone

STEP 4
Public comments may be made via Zoom during the meeting, the Chairperson will explain the process for submitting public comments.

ALTERNATIVE
If you do not wish to make public comments, you can view the meeting on Channel MVTV-3, the City's website at www.moval.org or YouTube.

CALL TO ORDER

ROLL CALL

PLEDGE OF ALLEGIANCE

APPROVAL OF AGENDA

PUBLIC COMMENTS PROCEDURE

During the public comment period for each item, as well as during the public comment period for items not on the agenda, the clerk will call upon each person who is on the Zoom application that has requested to speak. Each member of the public wishing to speak will have a maximum of 3 minutes to speak on any agenda item, except for the applicant for entitlement. The Commission may establish an overall time limit for comments on a particular Agenda item. Members of the public must direct their questions to the Chairperson of the Commission and not to other members of the Commission, the applicant, the Staff, or the audience. Those wishing to speak should follow the teleconference procedures. If you are absent at the time your name is called, you will forfeit the opportunity to speak on the items.

PUBLIC COMMENTS

CONSENT CALENDAR

All matters listed under Consent Calendar are considered to be routine and non-controversial, and may be enacted by one roll call vote. There will be no discussion of these items unless a member of the Planning Commission requests that an item be removed for separate action.

NON-PUBLIC HEARING ITEMS

No items for discussion.

PUBLIC HEARING ITEMS

1. Case: PEN21-0311 – Conditional Use Permit for a Planned Unit Development
PEN21-0135 – Tentative Tract Map No. 38123

Applicant: D.R. Horton

Property Owner: Winco Holdings, Inc. and Equitable Moreno Valley II Partnership

Representative: Megan Kay Whieldon, D.R. Horton Los Angeles Holding Company, Inc.

Location: Northeast corner of Lasselle Street and Alessandro Boulevard

Case Planner: Kirt A. Coury

Council District: 3

Proposal:	The Application requests approval of the following entitlements: 1) Conditional Use Permit for a Planned Unit Development and 2) Tentative Tract Map 38123 to subdivide a 33.57-acre site into one hundred and seventy-seven (177) single-family lots.

OTHER COMMISSION BUSINESS

No items for discussion.

STAFF COMMENTS

PLANNING COMMISSIONER COMMENTS

ADJOURNMENT

Planning Commission Regular Meeting, Thursday, February 10, 2022 at 7:00 P.M., City of Moreno Valley, City Hall Council Chamber, 14177 Frederick Street, Moreno Valley, CA 92553.

CITY OF MORENO VALLEY
DECEMBER 3, 1984

PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 27, 2022

CONDITIONAL USE PERMIT FOR A PLANNED UNIT DEVELOPMENT AND TENTATIVE TRACT MAP NO. 38123 FOR A 177 LOT SINGLE-FAMILY RESIDENTIAL SUBDIVISION ON 33.57 GROSS ACRES.

Case:	PEN21-0311 – Conditional Use Permit for a Planned Unit Development PEN21-0135 – Tentative Tract Map No. 38123
Applicant:	D.R. Horton
Property Owner:	Winco Holdings, Inc. and Equitable Moreno Valley II Partnership
Representative:	Megan Kay Whieldon, D.R. Horton Los Angeles Holding Company, Inc.
Location:	Northeast corner of Lasselle Street and Alessandro Boulevard
Case Planner:	Kirt A. Coury
Council District:	3
Proposal:	The Application requests approval of the following entitlements: 1) Conditional Use Permit for a Planned Unit Development; and 2) Tentative Tract Map 38123 to subdivide a 33.57-acre site into one hundred and seventy-seven (177) single-family lots.

SUMMARY

The applicant, D.R. Horton, submitted a Tentative Tract Map (TTM 38123) to subdivide 33.57 gross acres into one hundred and seventy-seven (177) single-family lots and six lettered lots with associated amenities and public improvements, and a Conditional Use Permit for a Planned Unit Development. The Planned Unit Development is required by

the standards of the Downtown Center zoning designation to address development standards for detached residential housing on the periphery of the Downtown Center designation.

PROJECT DESCRIPTION

The Project consists of a Conditional Use Permit for a Planned Unit Development and a Tentative Tract Map. The tract map excludes two acres at the northeast corner of Lasselle Street and Alessandro Boulevard, reserved for future development under the Downtown Center designation.

Planned Unit Development

The Downtown Center (DC) District allows for detached single-family developments, approved through a Planned Unit Development, on the periphery of the Downtown Center (DC) District. A Planned Unit Development (PUD) was prepared to establish development standards and design guidelines for the tract required by the Downtown Center (DC) District. A PUD provides greater innovation in housing development, such as a variation in lot sizes, setbacks, and amenities not found in standard housing tracts.

The proposed PUD provides guidelines for various architectural styles that meet or exceed City-wide design standards in the Municipal Code. All development within the tract must meet the standards stated in the PUD, including plotting, setbacks, open space areas, and architecture.

The development includes two different product types: 1) Skylar Place on the western portion of the tract, which are in the range of 4,500 square feet; and 2) Windsong on the easterly portion of the tract, which is slightly larger and average around 5,000 square feet. Both Skylar Place and Windsong include four different footprints and elevations with four elevation types, which exceeds the required footprints/elevations identified in the Municipal Code for single-family residential projects.

The proposed PUD also includes a community park with a shade structure and picnic tables. The larger turf area and a concrete walkway are intended to be utilized for exercise uses. The applicant will fully construct the community park (including all park site amenities) and then be dedicated to the City for maintenance. The park is intended to serve the residents of the proposed Project and residents in the surrounding neighborhoods.

Tentative Tract Map

Tentative Tract Map 38123 will subdivide the 33.57-acre site into one hundred and seventy-seven (177) single-family lots, subject to the provisions of the proposed PUD. The map will also include the associated interior streets, a 1.85-acre park site, a water quality basin (Lot A), underground utilities, street improvements, and off-site sewer improvements as required.

The residential lots range in size from 4,210 square feet (Lot 45) to 9,606 (Lot 61). The average lot size for Skylar Place is 5,215 square feet, and the average lot size for Windsong is 5,624 square feet. Lots in the western portion of the site (Skylar Place) generally are in the range of 4,500 square feet in size. The lots in the easterly portion (Windsong) are slightly larger, on average around 5,000 square feet in size.

It should be noted that the proposed map identifies a not a part (NAP) commercial lot at the southwest corner of the project site. The site is designated as a future commercial lot. The commercial parcel will be reviewed under a future separate entitlement process.

With the approval of the Tentative Tract Map, the Project would meet the applicable objectives of the Conditional Use Permit for the Planned Unit Development.

Surrounding Area

The approximately 33.57-acre site is generally located at the northeast corner of Alessandro Boulevard and Lasselle Street. The parcel is roughly rectangular in shape with frontages along Lasselle Street, Bay Avenue, Alessandro Boulevard, and Darwin Drive.

Surrounding land uses to the north and east include single-family residences within the Residential 5 (R5) District. The property to the immediate West between Lasselle Street and Timo Street is vacant and zoned Corridor Mixed Use (COMU) District, allowing commercial and residential uses. Additionally, to the West is developed between Timo Street and Bay Avenue, with single-family residences in the Residential 5 (R5) District.

The two parcels to the south are currently vacant; however, the eastern parcel is entitled to construct an apartment project. Both parcels are within the Downtown Center (DC) District.

Access/Parking

The Project will be accessed from two main entry points (Streets “A” and “F”) along Lasselle Street; two points (Street “H” and an extension of Barbados Lane) along Darwin Drive; and one point (Street “G”) along Bay Avenue.

Consistent with the City’s parking requirements, all residences within the development will include a two-car garage along with an uncovered parking area in the driveways, as well as on-street parking.

Design/Landscaping

The Planned Unit Development guidelines include four building footprints for each of the two products (Skylar Place and Windsong) with four different building styles, Spanish, Traditional, Craftsman, and Tuscan. Each of the four different building styles will have three color combinations to provide interest among the housing types.

Each lot will have a front-facing garage with a minimum setback of twenty feet. Each lot will have a minimum rear yard setback of ten feet. The minimum separation between structures is ten feet, with a minimum of five feet to any property line.

All front yards will be landscaped per the City's Landscape Requirements and the Planned Unit Development Guidelines. All community landscaping will be designed per the PUD and maintained by the required Homeowners Association (HOA).

The Project also includes a 1.85-acre park that will primarily serve the local neighborhood, including adjoining developed residential areas.

REVIEW PROCESS

All appropriate outside agencies have considered the Project part of the standard review process. The Project was reviewed by the Project Review Staff Committee as required by the Municipal Code. Following subsequent revisions and reviews by staff, the Project was determined to be complete.

ENVIRONMENTAL

An Initial Study was prepared by Helix Environmental Planning, Inc. in compliance with the California Environmental Quality Act (CEQA) and the CEQA Guidelines. The Initial Study examined the potential impacts of the proposed Project. The Initial Study/Mitigated Negative Declaration (IS/MND) provides information supporting the finding that a Mitigated Negative Declaration serves as the appropriate CEQA documentation for the proposed Project. With the implementation of the proposed mitigation measures, the proposed Project will not have a significant effect on the environment. Technical studies prepared in support of the IS/MND include Air Quality – GHG, Cultural Resources Survey Report, Hydrology Report, Noise Assessment Study, Biological Resources, and a Traffic Impact Analysis. Copies of the appendices to the IS/MND can be accessed from the link attached to this staff report. The documents can be reviewed at City Hall during operating hours.

Mitigation measures are recommended for the proposed Project in the following areas: Air Quality, Biological Resources, Noise, Greenhouse Gas, and Tribal Cultural Resources are incorporated in the Mitigation Monitoring and Report Program. The measures for cultural resources are included to address input from the Tribal governments. The measures are intended to ensure that potential cultural resources that might be discovered are protected. However, these measures are not required to address a known significant impact. Based on the Initial Study and the proposed mitigation measures, the Project will not cause substantial impacts or environmental damage.

The public comment period for Notice of Availability for the Initial Study/Mitigated Negative Declaration began on December 23, 2021, and ends on January 12, 2022, which satisfies the required 20-day review period. Should comments regarding the Project be received prior to the Planning Commission, they will be provided at the public hearing.

NOTIFICATION

Consistent with the City Municipal Code provisions, public notice was sent to all property owners of record within 600’ of the project site, posted on the project site, and published in the local newspaper.

REVIEW AGENCY COMMENTS

Staff has coordinated with outside agencies where applicable, as is the standard review process with these development applications.

STAFF RECOMMENDATION

a. Staff recommends that the Planning Commission **APPROVE** Resolution No. 2022-06, and thereby:

    1. **APPROVE** the Initial Study/Mitigated Negative Declaration prepared for Conditional Use Permit for a Planned Unit Development (PEN21-0311) and Tentative Tract Map No. 38123 (PEN21-0136) on file with the Community Development Department, incorporated herein by this reference, which was completed in compliance with CEQA and the CEQA Guidelines, and reflects that the Planning Commission reviewed and considered the information contained in the Initial Study/Mitigated Negative Declaration, and exercised its independent judgment and analysis of the proposed Project’s potential environmental impacts; and

    2. **ADOPT** the Mitigation Monitoring and Reporting Program prepared for the Project, consists of Conditional Use Permit (PEN21-0311) and Tentative Tract Map No. 38123 (PEN21-0136) pursuant to CEQA and the CEQA Guidelines.

b. That the Planning Commission **ADOPT** Resolution No. 2022-07, attached hereto, and thereby:

    1. **APPROVE** Conditional Use Permit (PEN21-0311) for a Planned Unit Development based on the Recitals, Evidence contained in the Administrative Records and Findings as set forth in Resolution No. 2022-07.

c. That the Planning Commission **ADOPT** Resolution No. 2022-08, attached hereto, and thereby:

    1. **APPROVE** Tentative Tract Map No. 38123 (PEN21-0136) based on the Recitals, Evidence contained in the Administrative Records, and Findings set forth in Resolution No. 2022-08.

Prepared by: Kirt Coury Contract Planner	Approved by: Sean P Kelleher Planning Division Manager

ATTACHMENTS

To view large attachments, please click your “bookmarks” on the left hand side of this document for the necessary attachment.

1. Resolution No. 2022-06 - MND/ IS
2. Exhibit A to Resolution 2022-06 - MND/IS
3. Appendix A - Air Quality GHG Report
4. Appendix B - Biological Report
5. Appendix C - Cultural Resources
6. Appendix D - Geotechnical Evaluation Darwin Site
7. Appendix D - Geotechnical Evaluation Winco Site
8. Appendix E - Paleontological Assessment
9. Appendix F - WQMP
10. Appendix G - Hydrology Report
11. Appendix H - Noise Study
12. Appendix I - Traffic Impact Analysis
13. Exhibit B to Resolution 2022-06 - NOA to Adopt MND
14. Exhibit C to Resolution 2022-06 - MMRP
15. Resolution No. 2022-07 - Conditional Use Permit
16. Exhibit A to Resolution No. 2022-07 - Conditions of Approval
17. Resolution No. 2022-08 - Tentative Tract Map
18. Exhibit A to Resolution No. 2022-08 - Conditions of Approval
19. Planned Unit Development for Tract Map 38123
20. Tentative Tract Map 38123 exhibit
21. Aerial Map

RESOLUTION NUMBER 2022-06

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, CERTIFYING A MITIGATED NEGATIVE DECLARATION AND APPROVING A MITIGATION MONITORING AND REPORTING PROGRAM FOR TENTATIVE TRACT MAP 38123 AND CONDITIONAL USE PERMIT FOR A PLANNED UNIT DEVELOPMENT LOCATED AT THE NORTHEAST CORNER OF LASSELLE STREET AND ALESSANDRO BOULEVARD (APN(s) 487-470-025, 487-470-028, 487-574-001, AND 487-574-002)

WHEREAS, the City of Moreno Valley ("City") is a general law city and a municipal corporation of the State of California, and the lead agency for the preparation and consideration of environmental documents for projects that are subject to requirements of the California Environmental Quality Act (CEQA[1]) and CEQA Guidelines[2]; and

WHEREAS, D. R. Horton, ("Applicant"), is seeking approval for the development of a one hundred and seventy-seven (177) lot, single-family residential development on 33.57 acres, including approval of the following entitlements: a Tentative Tract Map 38123 (PEN21-0136) with associated amenities and public improvements, and a Conditional Use Permit (PEN21-0311) for a Planned Unit Development ("Project") located at the northeast corner of Lasselle Street and Alessandro Boulevard (APN(s) 487-470-025, 487-470-028, 487-574-001, and 487-574-002) ("Site"); the tract map excludes two acres at the northeast corner of Lasselle Street and Alessandro Boulevard, which is reserved for future development under the Downtown Center designation; and

WHEREAS, Planning Division Staff completed an environmental assessment for the proposed Project, and, based on the assessment, decided to prepare an Initial Study ("IS") and Mitigated Negative Declaration ("MND") in accordance with Section 6 (Negative Declaration Procedures) of the City's Rules and Procedures for the Implementation of the California Environmental Quality Act and the requirements of the CEQA Guidelines Sections 15070 – 15075; and

WHEREAS, a Notice of Intent to Adopt a Mitigated Negative Declaration was duly noticed and circulated for public review for 20 days commencing December 23, 2021, ending January 12, 2022; and

WHEREAS, in conformance with CEQA, a Mitigation Monitoring and Reporting Program ("MMP") that includes a program for reporting on and monitoring Project mitigation measures was prepared for the proposed Project and circulated with the Mitigated Negative Declaration; and

WHEREAS, on January 27, 2022, a duly noticed public hearing was conducted by the Planning Commission to consider a recommendation to the City Council that the Mitigated Negative Declaration and the Mitigation Monitoring and Reporting Program and approval of the proposed Project at which time the Planning Commission considered the

Attachment: Resolution No. 2022-06 - MND/ IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

---

[1] Public Resources Code §§ 21000-21177

[2] 14 California Code of Regulations §§15000-15387

Initial Study, Mitigated Negative Declaration and the Mitigation Monitoring and Reporting Program, together with any comments received during the public review process and the responses prepared; and

WHEREAS, at the conclusion of the public hearing, in the exercise of its own independent judgment, the Planning Commission determined that the Mitigated Negative Declaration and the Mitigation Monitoring and Reporting Program were appropriate as all environmental impacts of the Project with mitigation measures are below a level of significance. There is no substantial evidence supporting a fair argument that the Project will significantly affect the environment.

NOW, THEREFORE, THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. Recitals and Exhibits

That the foregoing Recitals and attached exhibits are true and correct and are hereby incorporated by this reference.

Section 2. Evidence

That the Planning Commission has considered all of the evidence submitted into the Administrative Record for the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program, including, but not limited to, the following:

(a) Mitigated Negative Declaration/Initial Study prepared for the proposed Project, attached hereto as Exhibit A;
(b) Notice of Intent to Adopt a Mitigated Negative Declaration, attached hereto as Exhibit B;
(c) Mitigation Monitoring and Reporting Program attached hereto as Exhibit C;
(d) Staff Report prepared for the Planning Commission's consideration and all documents, records, and references related thereto, and Staff's presentation at the public hearing;
(e) Testimony, comments, and correspondence from all persons, including the Applicant and representative, provided at, or prior to, the public hearing.

Section 3. Findings

That based on the content of the foregoing Recitals and the Evidence contained in the Administrative Record as set forth above, the Planning Commission makes the following findings:

(a) That the City has independently reviewed, analyzed, and considered the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program, and the whole record before it (including the Initial Study and comments received) and, based on the foregoing, the Planning Commission hereby finds that all environmental impacts of the proposed Project, with mitigation measures, are below a level of significance and there is no substantial evidence supporting a fair argument that the Project will have a significant effect on the environment;

(b) That the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program have been completed in compliance with CEQA and are consistent with the City's Rules and Procedures for the Implementation of the California Environmental Quality Act;

(c) That the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program represent the independent judgment and analysis of the City as the lead agency for the proposed Project; and

(d) That the Mitigated Negative Declaration and Mitigation Monitoring Plan are adequate to serve as the required CEQA environmental documentation for the proposed Project.

Section 4. Adoption

That based on the foregoing Recitals, Administrative Record, and Findings, the Planning Commission hereby adopts the Mitigated Negative Declaration attached hereto as Exhibit A and the Mitigation Monitoring and Reporting Program attached hereto as Exhibit C.

Section 5. Repeal of Conflicting Provisions

That all the provisions as heretofore adopted by the Planning Commission that conflicts with the provisions of this Resolution are hereby repealed.

Section 6. Severability

That the Planning Commission declares that, should any provision, section, paragraph, sentence or word of this Resolution be rendered or declared invalid by any final court action in a court of competent jurisdiction or by reason of any preemptive legislation, the remaining provisions, sections, paragraphs, sentences or words of this Resolution as hereby adopted shall remain in full force and effect.

Section 7. Effective Date

That this Resolution shall take effect immediately upon the date of adoption.

Section 8. Certification

That the Secretary of the Planning Commission shall certify to the passage of this Resolution.

PASSED AND ADOPTED THIS 27th day of January, 2022.

CITY OF MORENO VALLEY
PLANNING COMMISSION

____
Patricia Korzec, Chairperson

Attachment: Resolution No. 2022-06 - MND/ IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

ATTEST:

Sean P. Kelleher,
Planning Official

APPROVED AS TO FORM:

Steven B. Quintanilla,
Interim City Attorney

Exhibits:
Exhibit A: Mitigated Negative Declaration/Initial Study
Exhibit B: Notice of Intent to Adopt a Mitigated Negative Declaration
Exhibit C: Mitigation Monitoring and Reporting Program

Exhibit A

MITIGATED NEGATIVE DECLARATION / INITIAL STUDY/

Exhibit B

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

Exhibit C

MITIGATION MONITORING AND REPORTING PROGRAM

HELIX
Environmental Planning

Tentative Tract Map 38123 Residential Project

Initial Study/Mitigated Negative Declaration

December 2021 | 00239.00028.001

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road
Suite 150
Irvine, CA 92618

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Tentative Tract Map 38123 Residential Project

Initial Study/Mitigated Negative Declaration

Prepared for:
City of Moreno Valley
14177 Frederick Street
Moreno Valley, CA 92552

Prepared by:
HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

December 2021 | 00239.00028.001

This page intentionally left blank

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
ALUCP	Airport Land Use Compatibility Plan
AQMP	Air Quality Management Plan
BMPs	Best Management Practices
BUOW	burrowing owl
CalEEMod	California Emissions Estimator Model
CalGreen	California Green Building Standards
CARB	California Air Resource Board
CAP	Climate Action Plan
CASSA	Criteria Area Species Survey Area
CBC	California Building Code
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFG	California Fish and Game
CH_4	methane
CRPR	California Rare Plant Rank
CNPS	California Native Plant Society
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
dB	decibels
DBESP	Determination of Biologically Equivalent or Superior Preservation
DPM	diesel particulate matter
DTSC	Department of Toxic Substances Control
EIC	Eastern Information Center
EMWD	Eastern Municipal Water District
EOP	Emergency Operations Plan
GHG	greenhouse gas
HANS	Habitat Acquisition and Negotiation Strategy
HCP	Habitat Conservation Plan
HELIX	HELIX Environmental Planning, Inc.
LCFS	Low Carbon Fuel Standard
LDMF	Local Development Mitigation Fee
L_{EQ}	Noise Equivalent
LOS	level of service

LST	Localized Significance Threshold
MBTA	Migratory Bird Treaty Act
MLD	Most Likely Descendant
MRZ	Mineral Resource Zone
MSHCP	Multiple Species Habitat Conservation Plan
MVFD	Moreno Valley Fire Department
MVPD	Moreno Valley Police Department
MVUSD	Moreno Valley Unified School District
NAHC	Native American Heritage Commission
NEPSSA	Narrow Endemic Plant Species Survey Area
NOx	nitrogen oxides
NO2	nitrogen dioxide
N_2O	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NSLU	noise-sensitive land use
OPR	Office of Planning and Research
O_3	ozone
PA	Project Archaeologist
PI	principal investigator
PM	particulate matter
PPV	peak particle velocity
RCA	Regional Conservation Authority
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SB	senate bill
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SKR	Stephens' kangaroo rat
SO2	sulfur dioxide
SRA	source receptor area
SSC	State Species of Concern
STC	Sound Transmission Class
SWRCB	State Water Resource Control Board
SWPPP	Storm Water Pollutant Protection Plan
TACs	toxic air contaminants
TCR	Tribal Cultural Resources
TIA	Transportation Impact Analysis
USEPA	U.S. Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Service
WRCOG	Western Riverside Council of Governments
WQMP	Water Quality Management Plan
VOCs	volatile organic compounds
VMT	vehicle miles traveled

1.0 INTRODUCTION

1.1 INITIAL STUDY INFORMATION SHEET

1.	Project title:	Tentative Tract Map 38123 Residential Project
2.	Lead agency name and address:	City of Moreno Valley, 14177 Frederick Street Moreno Valley, CA 92552
3.	Contact person and phone number:	Sean P. Kelleher, Senior Planner (951) 413-3215
4.	Project location:	Moreno Valley, CA
5.	Project sponsor's name and address:	D.R. Horton. 2280 Wardlow Circle, Suite 100, Corona, CA 92878
6.	General plan designation:	Downtown Center
7.	Zoning:	Downtown Center

8. Description of project:

The project is located within the City of Moreno Valley (City), in western Riverside County. The site is bordered by Bay Avenue along the north, Darwin Drive along the east, Alessandro Boulevard on the south, and Lassalle Street on the west. The project site consists of two adjacent properties: the approximately 17.6-acre "Skylar Place" property (APN 487-470-025) on the west and the approximately 17.9-acre "Windsong" property (APN 487-470-028) on the east. See Figure 1, *Regional Location*, Figure 2, *USGS Topography*, and Figure 3, *Aerial Photograph*.

The proposed project intends to develop a residential tract within the two adjacent parcels (see Figure 4, *Site Plan*, and Figure 5, *Tentative Tract Map*). Surrounding land uses include single family residential neighborhoods to the north, undeveloped open space to the south, and a combination of undeveloped land and single-family residences to the east and west. Overall, the project consists of the construction of 177 single-family homes divided between the two properties, with 84 lots situated on the Skylar Place property and the remaining 93 lots on the western Windsong property. Residential home sizes range from a minimum 1,378 square feet (SF) to 2,435 SF. Site development would include the grading and construction of single-family residential lots, a water quality basin, an approximately two-acre park, underground utilities, street improvements, and off-site sewer improvements. The off-site areas proposed for new storm drains are shown in Figure 4. As shown in Figure 4, all off-site storm drain improvements would be conducted within the right-of-way (ROW). The vacant lot in the southwest corner of the Skylar Place property is not part of the project and is designated for future commercial uses. Vehicular access to the project site would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. A series of internal drives would provide access throughout the two properties and to the residences.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center. This designation allows for residential uses, including single-family homes. Topographically, site elevations range from approximately 1,626 feet above mean sea level (amsl) located in the north-northeast edge of the site and lowest ground elevation of 1,585 feet amsl towards the southwestern corner. Surface drainage is to the south-southwest. Both properties are currently vacant but have been graded and/or previously disturbed by past activities and are currently regularly disked and/or mowed for fire prevention.

Project construction is assumed to occur over an approximately 3-year, 2-month period starting in May 2022. Construction activities include grading (possibly with blasting), installation of underground utilities and infrastructure, paving, construction of residences, and architectural coating (e.g., painting). The project would not require demolition, as the site is currently vacant and undeveloped. Site preparation (e.g., grubbing) would be included in the grading. During grading, approximately 180 truckloads per day of material would be exported over 15 days, generating approximately 5,400 one-way truck trips. Blasting may be required during grading if conventional equipment is unable to efficiently remove areas of rock. Blasting is assumed to occur up to one day per week during grading. All other construction activities on the project site would be halted while explosives are prepared and detonated.

9. Surrounding land uses and setting:

Surrounding land uses include single-family residential neighborhoods to the north, undeveloped open space to the south and a combination of undeveloped land and single-family residences to the east and west (see Figure 3).

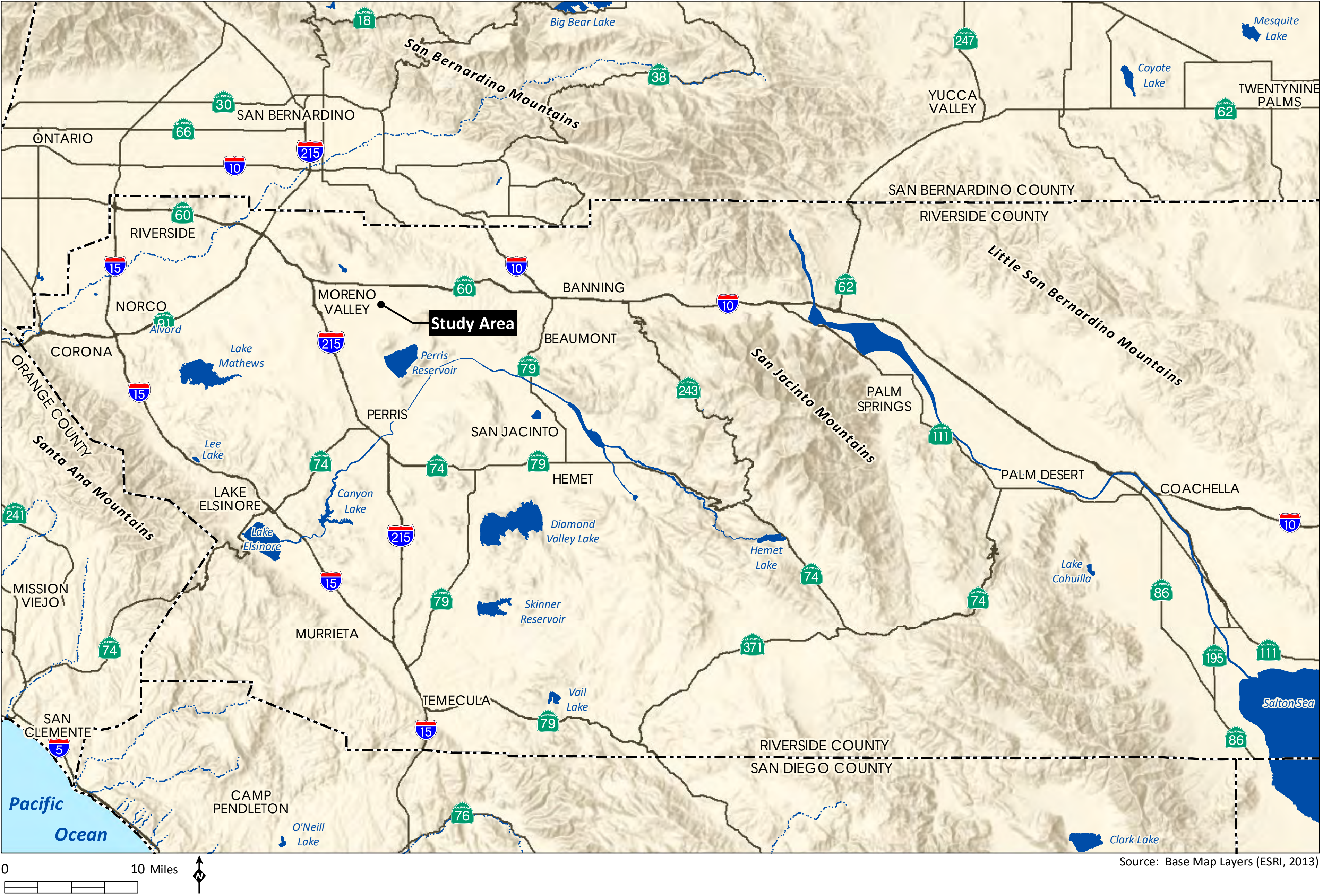
10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement:

- State Water Resource Control Board (SWRCB)
- California Department of Fish and Wildlife (CDFW)
- Western Riverside County Regional Conservation Authority

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code Section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

HELIX contacted the Native American Heritage Commission (NAHC) on February 23, 2021, for a Sacred Lands File search and a list of Native American contacts for the Project site and vicinity. The NAHC completed its search and responded on March 4, 2021. The Sacred Lands File search did not identify any known sacred lands or Native American cultural resources are within the Project site or the surrounding vicinity. Letters were sent to Native American representatives and interested parties identified by the NAHC on March 11, 2021. Native American correspondence is included in the attached Cultural Resources Survey (HELIX 2021c).

Tentative Tract Map 38123



Source: Base Map Layers (ESRI, 2013)

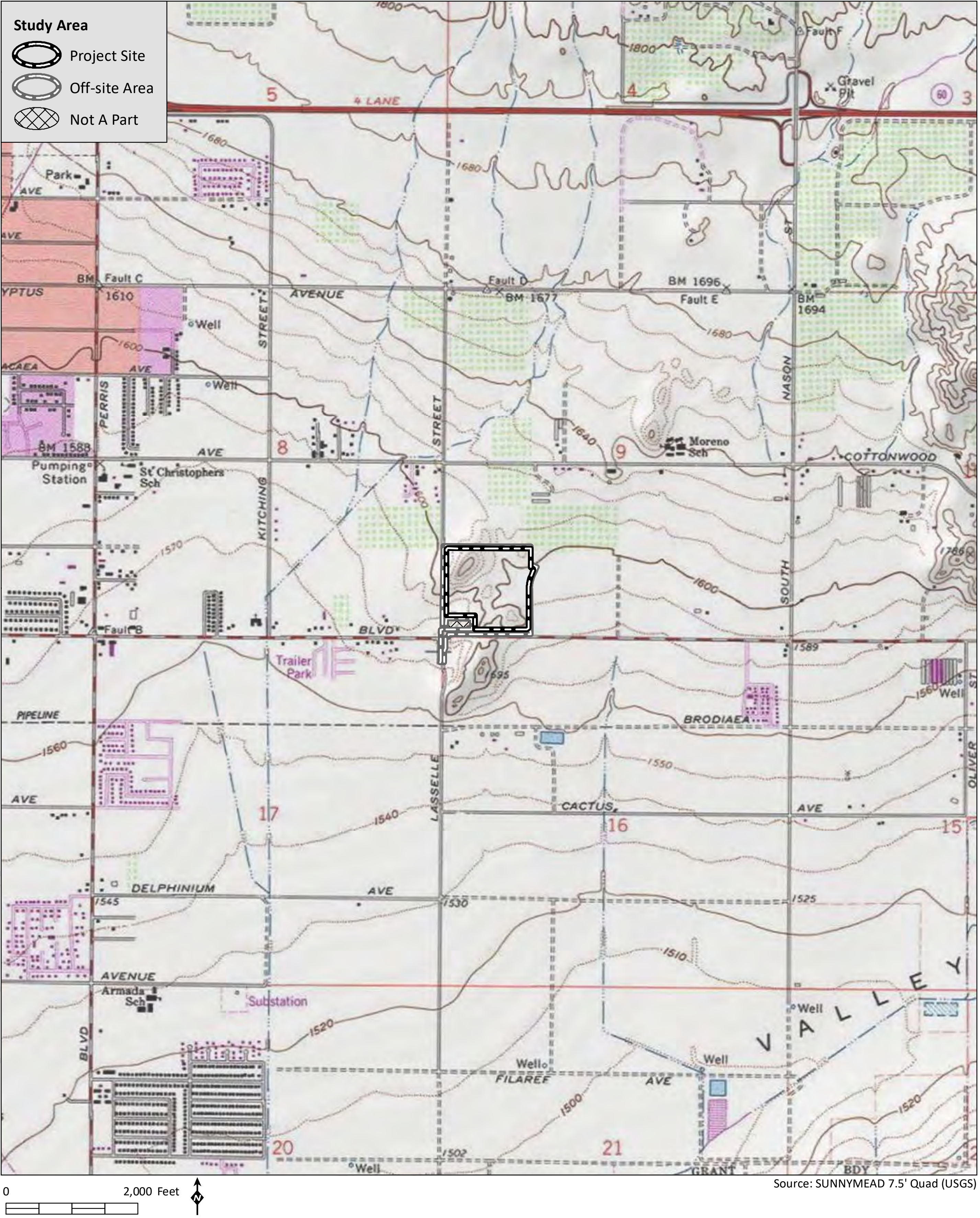
I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\ISMND\Fig1_Regional.mxd 00239.28.1 10/24/2021 - SAB

HELIX
Environmental Planning

Regional Location

Figure 1

Tentative Tract Map 38123



Source: SUNNYMEAD 7.5' Quad (USGS)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\ISMND\Fig2_USGS.mxd 00239.28.1 10/24/2021 - SAB

HELIX
Environmental Planning

USGS Topography

Figure 2

Tentative Tract Map 38123

Source: Aerial (Maxar, 2019)

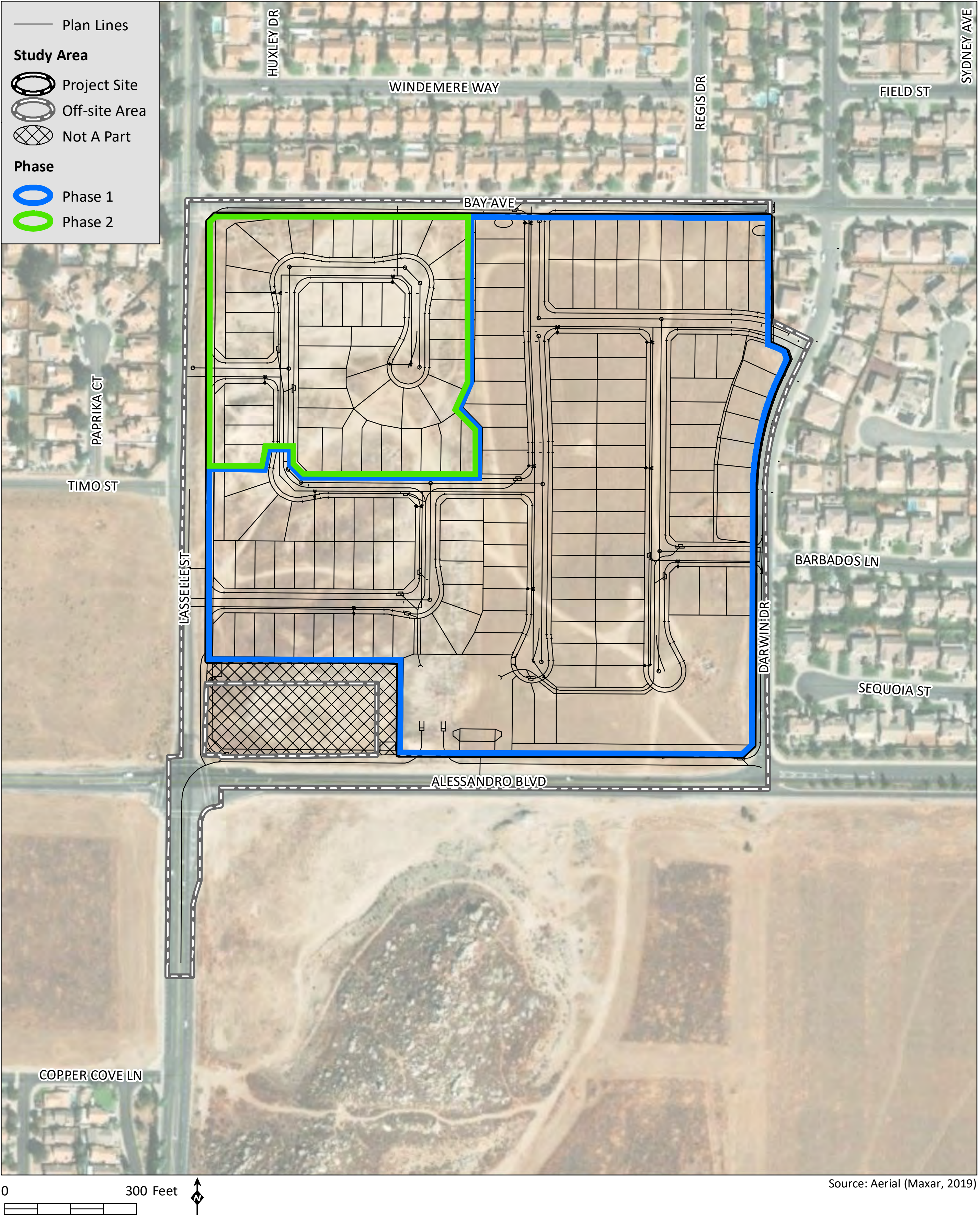
I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\ISMND\Fig3_Aerial.mxd 00239.28.1 10/24/2021 - SAB

HELIX
Environmental Planning

Aerial Photograph

Figure 3

Tentative Tract Map 38123



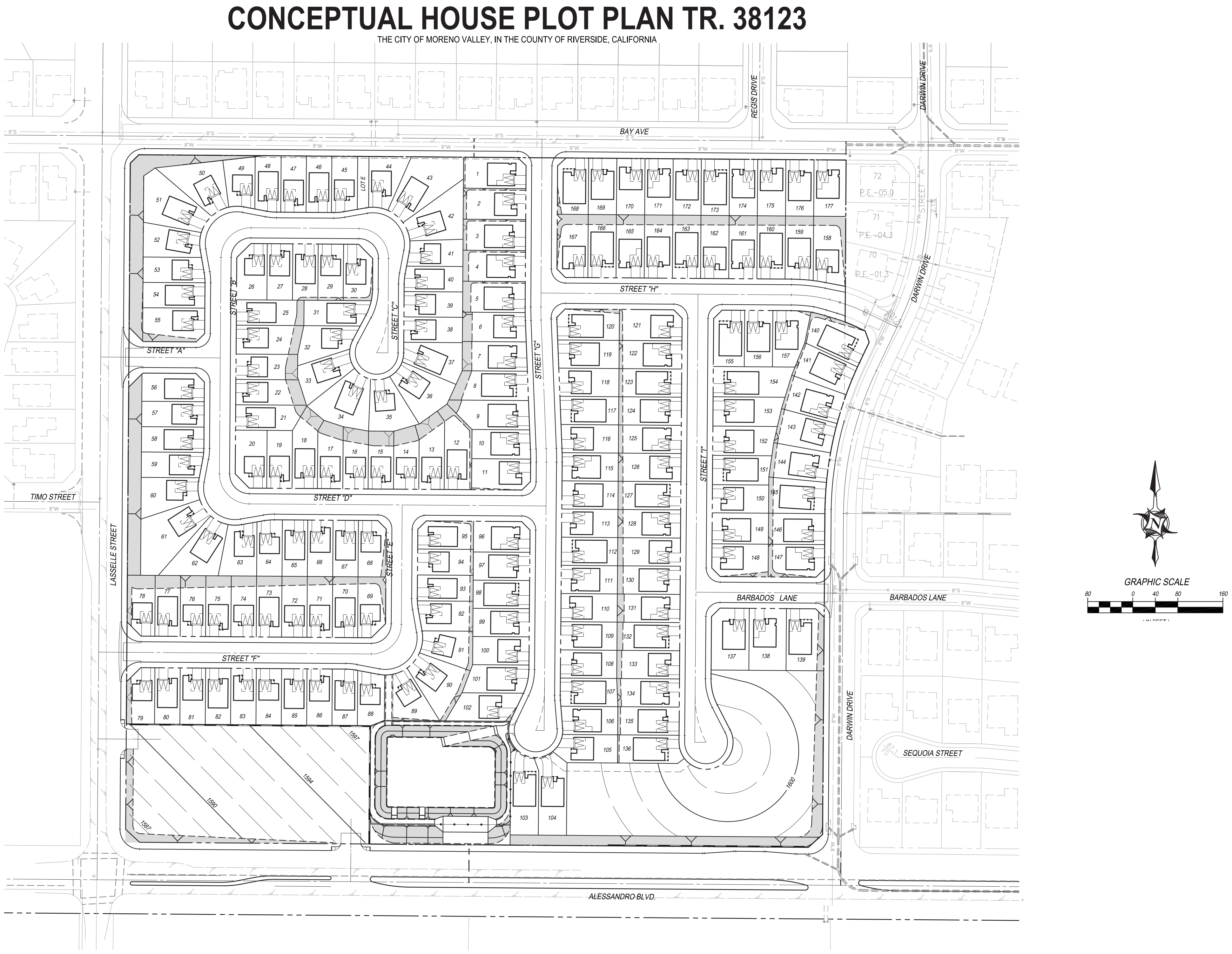
Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\ISMND\Fig4_SitePlan.mxd 00239.28.1 10/24/2021 - SAB

HELIX
Environmental Planning

Site Plan

Figure 4



Source: Mayers & Associates Civil Engineering, 2021

J:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\ISMND\Fig5_TentativeTractMap.indd 00239.00028.001 10/24/2021 - CL

HELIX
Environmental Planning

Tentative Tract Map

Figure 5

1.2 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” or “Less than Significant with Mitigation Incorporated” as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology and Soils	☒ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials
☐ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☒ Noise	☐ Population and Housing	☐ Public Services
☐ Recreation	☐ Transportation	☒ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

1.3 DETERMINATION

On the basis of this initial evaluation:

☐	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☐	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect I) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

Date

Printed Name

For

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

2.0 ENVIRONMENTAL INITIAL STUDY CHECKLIST

The lead agency has defined the column headings in the environmental checklist as follows:

A. “Potentially Significant Impact” is appropriate if there is substantial evidence that an effect may be significant. If there are one or more “Potentially Significant Impact” entries when the determination is made, an EIR is required.

B. “Less Than Significant with Mitigation Incorporated” applies where the inclusion of mitigation measures has reduced an effect from “Potentially Significant Impact” to a “Less Than Significant Impact.” All mitigation measures are described, including a brief explanation of how the measures reduce the effect to a less than significant level. Mitigation measures from earlier analyses may be cross-referenced.

C. “Less Than Significant Impact” applies where the project does not create an impact that exceeds a stated significance threshold.

D. “No Impact” applies where a project does not create an impact in that category. “No Impact” answers do not require an explanation if they are adequately supported by the information sources cited by the lead agency which show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A “No Impact” answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project would not expose sensitive receptors to pollutants, based on a project specific screening analysis).

The explanation of each issue identifies the significance criteria or threshold used to evaluate each question; and the mitigation measure identified, if any, to reduce the impact to less than significance. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration [CEQA Guidelines Section 15063(c)(3)(D)]. Where appropriate, the discussion identifies the following:

a) Earlier Analyses Used. Identifies where earlier analyses are available for review.

b) Impacts Adequately Addressed. Identifies which effects from the checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and states whether such effects were addressed by mitigation measures based on the earlier analysis.

c) Mitigation Measures. For effects that are “Less Than Significant with Mitigation Incorporated,” describes the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

I. AESTHETICS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

a) Have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. The project site is located within the City of Moreno Valley, which lies within a relatively flat valley floor surrounded by rugged hills and mountains. Topographic features of Moreno Valley that provide vistas include the Box Springs Mountains and Reche Canyon to the north, Moreno Peak in the middle of the City, the Badlands to the east and the Mount Russell area to the south. According to General Plan Figure OSRC-3, *Scenic Resources and Ridgelines*, the project site is not located within a view corridor for the Box Springs Mountains, Reche Canyon, Moreno Peak, the Badlands, or Mount Russell (General Plan 2021). Therefore, implementation of the proposed project would not have a substantial effect on a scenic vista and no impacts would occur**.**

b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. There are no State-designated or eligible scenic highways within the City. The project site is located approximately 12 miles north of Highway 74, which is the only facility within the project vicinity that is designated as a State-eligible scenic highway. The project site is located approximately one mile south of State Route 60 and two miles west of Moreno Beach Drive, which the City of Moreno Valley General Plan Figure OSRC-3, *Scenic Resources and Ridgelines*, identifies as “Scenic Routes” (General Plan 2021). Due to the distance and intervening topography and development, the project would not be visible from State Highway 74, State Route 60, or Moreno Beach Drive. Accordingly, implementation of the proposed project would not have a substantial effect on scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor. No impact would occur.

c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less Than Significant Impact. Implementation of the proposed project would convert land that was previously vacant and undeveloped to a residential development with landscaping, exterior lighting, and public streets. The project site is located in a portion of the City that has been mostly developed with surrounding residential uses and vacant land south of Alessandro Boulevard. The design of the development would be consistent with the residential uses located east of Darwin Drive and north of Bay Avenue. In addition, the project would be consistent with City of Moreno Valley Municipal Code requirements. Therefore, although the project would develop a vacant lot, it would not substantially degrade the existing visual character or conflict with applicable zoning regulations governing scenic quality. Impacts would be less than significant.

d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Less Than Significant Impact. The project site is currently a vacant lot and does not contain artificial light sources or sources of glare under existing conditions. The proposed project would include exterior lighting associated with the residences and street lighting. The proposed project would be required to adhere to the lighting requirements as set forth in the City Municipal Code. Municipal Code Chapter 9.08.100 specifies that all outdoor lighting associated with single-family residential areas shall be shielded and directed away from the property perimeter. Furthermore, the City's Municipal Code specifies that exterior lighting shall not blink, flash, or oscillate or be of unusually high intensity or brightness. The project would be required to demonstrate compliance with these requirements to the City prior to issuance of building permits. Project compliance with the lighting requirements of the City Municipal Code would ensure that the proposed project would not produce a new source of substantial light or glare from artificial lighting sources that would adversely affect day or nighttime views in the area. Therefore, impacts from lighting and glare would be less than significant.

II. AGRICULTURE AND FORESTRY RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non- forest use?	☐	☐	☐	☒

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. According to mapping available from the California Department of Conservation California Important Farmland Finder, the project site is mapped within an area defined as “Other Land,” and does not support agricultural uses (California Department of Conservation 2016). The project site does not contain lands mapped by the State Department of Conservation as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. As such, the project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use, and no impact would occur.

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. No land within the City, including the project site, is under a Williamson contract (General Plan 2021). Furthermore, according to the California Department of Conservation, the City does not include existing Williamson Act contracts (California Department of Conservation 2013). The project site is zoned for residential uses and surrounding land uses include residential and vacant land. Accordingly, because the project site is not located on or adjacent to land zoned for agricultural use and is also not subject to a Williamson Act contract, the proposed project has no potential to conflict with existing zoning for agricultural use or a Williamson Act contract. Therefore, no impact would occur.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

No Impact. The project site and surrounding area are classified as “Other Land” or “Urban and Built-Up Land” and are not zoned as forest land, timberlands, or timberland zoned Timberland Production (California Department of Conservation 2016). As such, the proposed project would not result in a loss of forest land or conversion of forest land to non-forest uses. Therefore, there would be no impact.

d) Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. As discussed above in Item II(c), the project site is located in an area where there are no farmlands or forest resources. Additionally, the project would largely occur on graded surfaces. The project site is classified as “Other Land” and is surrounded by “Urban and Built-Up Land” not zoned as forest land, timberlands, or timberland zoned Timberland Production (California Department of Conservation 2016). As such, the proposed project would not result in a loss of forest land or conversion of forest land to non-forest uses. Therefore, there would be no impact.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. Implementation of the proposed project would have no impact on agriculture and/or forestry resources. The project site is within areas where there are no farmlands or forest resources. The project site and surrounding areas are classified as “Other Land” or “Urban and Built-Up Land,” which do not contain agricultural uses or areas designated Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (California Department of Conservation 2016). Furthermore, there are no Williamson Act contracts or forest lands in the project vicinity (California Department of Conservation 2013). There would be no changes in the existing environment, which, due to their location and nature, would result in the conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use with implementation of the proposed project. Therefore, there would be no impact.

III. AIR QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

The following discussion is based on the Air Quality/Greenhouse Gas Report prepared by HELIX Environmental Planning, Inc. (HELIX 2021a), attached to this Initial Study as Appendix A.

a) Conflict with or obstruct implementation of the applicable air quality plan?

No Impact. The proposed project is located within the South Coast Air Basin (SCAB). Air quality in the SCAB is regulated by the South Coast Air Quality Management District (SCAQMD). The SCAQMD is the government agency that regulates sources of air pollution within the County. Currently, the SDAB is in "non-attainment" status for criteria pollutants ozone (O_3) and 2.5-micron or less particulate matter ($PM_{2.5}$).

The Southern California Association of Governments (SCAG) is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties, and addresses regional issues relating to transportation, economy, community development, and environment. With regard to air quality planning, SCAG has prepared the Regional Transportation Plan/ Sustainable Communities Strategy (RTP/SCS), a long-range transportation plan that uses growth forecasts to project trends out over a 20-year period to identify regional transportation strategies to address mobility needs. These growth forecasts form the basis for the land use and transportation control portions of the Air Quality Management Plan (AQMP). These documents are utilized in the preparation of the air quality forecasts and consistency analysis included in the AQMP. Both the RTP/SCS and AQMP are based, in part, on projections originating with County and City General Plans.

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center. The project would be consistent with the General Plan and zoning

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

designations for the site. Because the project is consistent with the local general plan, the project would be consistent with the growth assumption used to develop the region's AQMP. As such, residential growth in the City as a result of the project, and the related changes in regional emissions, are accounted for in the AQMP, which is crafted to bring the basin into attainment for all criteria pollutants. Therefore, the proposed project would not conflict with or obstruct implementation of the AQMP.

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard?

Less Than Significant with Mitigation Incorporated. Air quality is defined by ambient air concentrations of six specific pollutants identified by the United States Environmental Protection Agency (USEPA) to be of concern with respect to health and welfare of the general public. These pollutants include ozone, carbon monoxide (CO), nitrogen dioxide, PM_{10}, $PM_{2.5}$, sulfur dioxide, and lead. Air pollutants generated by the proposed project would be emissions associated with temporary construction activities. The project would generate criteria pollutants and precursors in the short-term during construction and the long-term during operation. To determine whether a project would result in cumulatively considerable emissions that would violate an air quality standard or contribute substantially to an existing or projected air quality violation, a project's emissions are evaluated based on the quantitative emission thresholds established by the SCAQMD.

Construction of the proposed project would result in temporary increases in air pollutant and dust emissions generated primarily from construction equipment exhaust, earth disturbance/excavation, and construction worker vehicle trips. Construction emissions were calculated in the Air Quality and Greenhouse Gas Emissions Technical Report using the South Coast Air Quality Control District's California Emissions Estimator Model (CalEEMod) emissions inventory model. The results of the calculations for project construction are shown in Table 1, *Unmitigated Daily Construction Emissions*. The data are presented as the maximum anticipated daily emissions for comparison with the SCAQMD thresholds.

Table 1
UNMITIGATED DAILY CONSTRUCTION EMISSIONS

Phase	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading	10.7	109.0	74.7	0.2	10.3	5.7
Soil Hauling	1.7	54.6	13.7	0.2	27.7	4.5
Blasting Drilling Fugitive Dust	-	-	-	-	5.2	1.0
Blasting	-	75.9	299.3	8.9	37.8	2.2
Underground Utilities	0.7	6.7	9.4	0.0	0.5	0.4
Paving	1.6	11.2	15.1	0.0	0.7	0.6
Building Construction	2.5	18.7	23.8	0.1	4.1	1.6
Architectural Coating	3.9	1.3	2.4	0.0	0.3	0.1
Maximum Daily Emissions[1,2]	**12.4**	**163.6**	**299.3**	**8.9**	**38.0**	**10.2**
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***Yes***	***No***	***No***	***No***	***No***

Source: HELIX 2021a

[1] Maximum daily emissions of CO and SO_2 would occur during blasting; maximum daily emissions of ROG, NO_X, PM_{10} and $PM_{2.5}$ would occur during concurrent grading, soil hauling and borehole drilling.

[2] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 1, emissions of NO_X would exceed the SCAQMD significance threshold, and the impact would be potentially significant. The project's operational emissions were also estimated using the CalEEMod model.

Table 1
DAILY OPERATIONAL EMISSIONS

Category	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Area	8.2	2.8	15.7	<0.1	0.3	0.3
Energy	0.1	1.2	0.5	<0.1	0.1	0.1
Mobile	3.9	5.9	38.4	<0.1	11.0	3.0
Maximum Daily Emissions[1]	**12.2**	**10.0**	**55.6**	**0.1**	**11.4**	**3.4**
SCAQMD Thresholds	*55*	*55*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: HELIX 2021a

[1] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

Table 2, *Daily Operational Emissions*, presents the summary of operational emissions for the project. The data are presented as the maximum anticipated daily emissions for comparison with the SCAQMD thresholds.

Table 2
MITIGATED DAILY CONSTRUCTION EMISSIONS

Phase	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading	2.9	12.1	103.1	0.2	6.6	2.3
Soil Hauling	1.3	49.2	16.3	0.2	27.5	4.3
Blasting Drilling Fugitive Dust	-	-	-	-	5.2	1.0
Blasting	-	75.9	299.3	8.9	37.8	2.2
Underground Utilities	0.2	1.2	10.2	0.0	0.2	0.1
Paving	0.8	1.3	17.8	0.0	0.2	0.1
Building Construction	1.3	5.8	25.1	0.1	3.4	1.0
Architectural Coating	3.7	0.2	2.4	0.0	0.2	0.1
Maximum Daily Emissions[1,2]	**4.9**	**75.9**	**299.3**	**8.9**	**37.8**	**6.6**
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: HELIX 2021a

[1] Maximum daily emissions of ROG would occur during concurrent building construction and architectural coatings; maximum daily emissions of NO_X, CO, SO_2 and PM_{10} would occur during blasting; maximum daily emissions of $PM_{2.5}$ would occur during concurrent grading, soil hauling and borehole drilling.

[2] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

As shown in Table 3, *Mitigated Daily Construction Emissions*, project emissions during operation would not exceed the daily thresholds set by the SCAQMD. While long-term operation of the project would not result in criteria pollutant and precursor pollutant emissions that would exceed the SCAQMD significance thresholds, short-term construction activities would result in emissions of NO_X exceeding the threshold, and the impact would be potentially significant. The following mitigation measure would be required or reduce NO_X emissions during project construction.

Mitigation Measure

AQ-1 **Tier 4 Off-Road Construction Equipment:** All off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction of the project shall be USEPA Tier 4 certified or have California Air Resource Board (CARB) approved engine/exhaust retrofit kits to result in equivalent emissions. Prior to issuing permits, the City shall verify that construction contracts specify the off-road equipment certification or retrofit requirements. The applicant shall compile and maintain an inventory, including documentation of engine certification or emissions retrofits, of all off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction. The inventory shall be available for review and verification by the City on demand.

c) Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant with Mitigation Incorporated. The localized effects from the on-site portion of daily construction emissions were evaluated at sensitive receptor locations potentially impacted by the project according to the SCAQMD's Localized Significance Threshold (LST). SCAQMD has developed a LST methodology and mass rate look-up tables by source receptor area (SRA) that can be used by public agencies to determine whether a project may generate significant adverse localized air quality impacts. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard; they are developed based on the ambient concentrations of that pollutant for each SRA. The proposed project is within SRA 24, Moreno Valley. Consistent with the LST guidelines, when quantifying mass emissions for localized analysis, only emissions that occur on site are considered. Emissions related to off-site delivery/haul truck activity and construction worker trips are not considered in the evaluation of construction-related localized impacts, as these do not contribute to emissions generated on a project site. The closest sensitive receptors are the three single-family residences adjacent to the northeast corner of the project site. Therefore, the LSTs in SRA 24 for receptors located less than 82 feet (25 meters) are used for project sites greater than 5 acres. Table 4, *Maximum Localized Daily Construction Emissions*, shows the localized construction emissions without implementation of mitigation measure AQ-1.

Table 3
MAXIMUM LOCALIZED DAILY CONSTRUCTION EMISSIONS

Activity	NO_X (lb/day)	CO (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading, Soil Hauling and Blasting Drilling	115.0	76.5	10.1	5.8
Blasting	75.9	299.3	37.8	2.2
Underground Utilities	6.2	8.9	0.3	0.3
Paving	11.1	14.6	0.6	0.5
Building Construction and Architectural Coating	14.3	16.4	0.7	0.7
Maximum Daily Emissions	**115.0**	**299.3**	**37.8**	**5.8**
SCAQMD LST Thresholds (25 meters)	*270*	*1,577*	*13*	*8*
SCAQMD LST Thresholds (50 meters)	*302*	*2,178*	*40*	*10*
Exceed LST (25 meters/50 meters)?	***No/No***	***No/No***	***Yes/No***	***No/No***

Source: HELIX 2021a
lb/day = pounds per day; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 4, localized emissions for all criteria pollutants would remain below their respective SCAQMD LSTs at 82 feet (25 meters), except for emissions of PM_{10} during blasting. However, the northeast portion of the project site, near the closest sensitive receptors, does not contain rock formations that would require blasting. There are no sensitive receptors within 164 feet (50 meters) of potential blasting areas. As shown in Table 4, the calculated blasting PM_{10} emissions would not exceed SCAQMD LST for receptors at 164 feet (50 meters). In addition, blasting would be a short event lasting less than a minute that would not create sustained fugitive dust emissions resulting elevated 24-hour average PM_{10} concentrations. Therefore, construction of the project would not result in exposure of sensitive receptors to substantial localized concentrations of criteria pollutants and precursors. Mitigation measure AQ-1 would not be required to reduce the severity of this impact.

Implementation of the project would result in the use of heavy-duty construction equipment, haul trucks, on-site generators, and construction worker vehicles. These vehicles and equipment could generate the TAC Diesel Particulate Matter (DPM). Generation of DPM from construction projects typically occurs in a localized area (e.g., at the project site) for a short period of time. Because construction activities and subsequent emissions vary depending on the phase of construction (e.g., grading, building construction), the construction-related emissions to which nearby receptors are exposed to would also vary throughout the construction period. During some equipment-intensive phases such as grading, construction-related emissions would be higher than other less equipment-intensive phases such as building construction. Concentrations of mobile-source DPM emissions are typically reduced by 70 percent at approximately 500 feet (CARB 2005). Considering this information, the highly dispersive nature of DPM, and the fact that construction activities would occur at various locations throughout the project site, it is not anticipated that construction of the project would expose sensitive receptors to substantial DPM concentrations.

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant Impact. According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting activities, refineries, landfills, dairies, and fiberglass molding operations (SCAQMD 1993). The project, involving a residential development, would not include any of these uses nor are there any of these land uses in the project vicinity.

Emissions from construction equipment, such as diesel exhaust, and volatile organic compounds (VOCs) from architectural coatings and paving activities may generate odors; however, these odors would be temporary, intermittent, and not expected to affect a substantial number of people. Additionally, noxious odors would be confined to the immediate vicinity of construction equipment. By the time such emissions reach any sensitive receptor sites, they would be diluted to well below any level of air quality concern. Furthermore, short-term construction-related odors are expected to cease upon the drying or hardening of the odor-producing materials. Long-term operation of the project would not be a substantial source of objectionable odors. Therefore, the project would not create objectionable odors affecting a substantial number of people, and the impact would be less than significant.

IV. BIOLOGICAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

A Biological Resources Assessment was prepared by HELIX to document the existing biological resources within the project study area and evaluate the potential for project impacts (HELIX 2021b). The conclusions of the survey and report are summarized below, and the report is included as Appendix B to this Initial Study.

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Less Than Significant with Mitigation Incorporated. The Biological Resources Assessment prepared for the proposed project included general biological surveys and a thorough review of relevant maps, databases, and literature pertaining to biological resources known to occur within the project vicinity. The project site consists of undeveloped land dominated by non-native herbaceous species with some rock outcrops in the southeastern and northwestern portions. There is a network of dirt roads that run throughout the site, and the western portion is heavily disturbed due to frequent off-road vehicle use. The site is located in an urbanized area of the City and is bounded by residential development to the north, northwest, and east by existing roads on all sides. Undeveloped land is located to the southwest and south.

Plant Species

Three of the five rare plant species recorded within the Sunnymead quadrangle were not considered to have a potential to occur based on geographic range, elevation range, and/or lack of suitable habitat. Rare plant surveys were not required since the study area is not located within a Criteria Area Species Survey Area (CASSA) or Narrow Endemic Plant Species Survey Area (NEPSSA) under the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP).

Two species (Parry's spineflower and San Bernardino aster) were determined to have a low potential to occur on the study area based on some areas of low-quality habitat. Parry's spineflower is conditionally covered under the MSHCP and is a California Rare Plant Rank (CRPR) 1B.1 species. San Bernardino aster is a CRPR 1B.2 species. Although potentially suitable habitat is present, these two species are not expected to occur since records within the vicinity of the study area are historical records. The nearest record of Parry's spineflower was recorded in 1936, approximately five miles to the northwest of the study area. The nearest record of San Bernardino aster was recorded in 1951, approximately 10 miles to the northeast of the study area. Therefore, the project is not anticipated to impact any rare plant species.

Animal Species

Of the 21 sensitive animal species recorded within the vicinity of the study area, 15 species were considered to have no potential to occur on the study area due to lack of suitable. Therefore, no significant impacts to these sensitive wildlife species are anticipated by the project. The remaining six species are discussed in detail below. In addition, the northwest portion of the study area supports depressional areas that may be potentially suitable habitat for federally listed fairy shrimp species. Fairy shrimp are discussed separately below.

Three of the remaining six species were determined to have a low potential to occur on the study area based on the presence of low-quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity of the study area. These species include red-diamond rattlesnake, San Diego black-tailed jackrabbit, and western mastiff bat (foraging only). Red-diamond rattlesnake and San Diego black-tailed jackrabbit are fully covered species under the MSHCP. With payment of the MSHCP Local Development Mitigation Fee (LDMF), no additional mitigation is required for potential impacts to these species. Western mastiff bat is a State Species of Special Concern (SSC) and is not a covered species under the MSHCP. The study area does not support suitable roosting habitat for western mastiff bat. There is some potential for foraging habitat on the study area, although the habitat is considered low quality based on the high-level of existing disturbance on the study area and surrounding area. This species was only recorded once within the Sunnymead quadrangle on the California Natural Diversity Database (CNDDB), which was in 1990 approximately 0.3-mile to the south of the study area. Based on the presence of low-quality habitat, lack of recent observations, and absence of suitable roosting habitat, no significant impacts to western mastiff batt are anticipated by the project.

The remaining three species were determined to have a moderate potential to occur on the study area based on the presence of potentially suitable habitat, including burrowing owl (BUOW), northwestern San Diego pocket mouse, and Stephens' kangaroo rat (SKR). Northwestern San Diego pocket mouse and SKR are fully covered species under the MSHCP. With payment of the MSHCP LDMF, no additional mitigation is required for potential impacts to these species. BUOW is a State SSC and MSHCP conditionally covered species. Based on the results of the focused BUOW surveys, the study area does not support BUOW. Prior to commencement of ground-disturbing activities, a pre-construction survey must be conducted within 30 days of ground-disturbing activities. If BUOW is detected during the pre-construction survey, avoidance of active nests and/or relocation of BUOW would be required as outlined in mitigation measure BIO-1 below.

Nesting Birds

If avoidance measures are not in place, the project could result in indirect impacts to bird species in the event they are found to be nesting near project construction. While no direct impacts are expected to occur to bird species, the project is required to comply with the regulations and guidelines of the Migratory Bird Treaty Act (MBTA) and California Fish and Game (CFG) Code. As such, the project must ensure no direct or indirect impacts to nesting birds, tree-nesting raptors, and sensitive bird species. Implementation of mitigation measure BIO-2 would reduce impacts to below a level of significance by ensuring that no indirect impacts occur to nesting birds or tree-nesting raptors during project construction.

Fairy Shrimp

There are three sensitive fairy shrimp species that occur in the overlapping MSHCP Plan Area, including Riverside fairy shrimp (*Streptocephalus woottoni*), Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*), and vernal pool fairy shrimp *(Branchinecta lynchi*). Vernal pool fairy shrimp occurs throughout several disjunct populations in Riverside County. This species exists in vernal pools and other ephemeral basins often located in patches of grassland and agriculture interspersed in coastal sage scrub and chaparral. Riverside fairy shrimp occurs in Riverside, Orange, and San Diego Counties as well as in northern Baja California, Mexico. This species is typically found in deeper vernal pools and other ephemeral basins that hold water for long periods of time (30 or more days). Santa Rosa Plateau fairy shrimp is limited to the Santa Rosa Plateau in Riverside County.

The project site supports 32 depressional features, which are mostly concentrated in the northwest portion of the project site. These depressional areas may provide suitable habitat for federally listed fairy shrimp species. Dry season fairy shrimp surveys were completed in accordance with USFWS protocol (USFWS 2017). *Branchinecta* sp. eggs were observed in 23 of the 32 sampled depressional areas. Wet season sampling will further inform which Branchinecta species are present within the sampled features. Wet season focused surveys are currently in progress and will be completed in 2021/2022. Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing) within the study area, wet season surveys will be completed by a permitted biologist following the current USFWS survey protocol for large brachiopods (USFWS 2017). If listed fairy shrimp are detected during the wet season surveys, a DBESP must be prepared to ensure that the proposed alternative provides for the replacement of any lost functions and values of habitat. Compensatory mitigation for impacts to occupied habitat would be required, as outlined below in mitigation measure BIO-3. With implementation of mitigation measure BIO-3, impacts would be less than significant.

Mitigation Measures

BIO-1 **Burrowing Owl:** In compliance with the MSHCP, a pre-construction survey shall be conducted on the study area within 30 days prior to ground disturbance to determine presence of BUOW. If the pre-construction survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW is observed during the pre-construction survey, active burrows shall be avoided by the project in accordance with the California Department of Fish and Wildlife's (CDFW) Staff Report on Burrowing Owl Mitigation (2012) or CDFW's most recent guidelines. The project proponent shall immediately inform the Western Riverside County Regional Conservation Authority (RCA) of BUOW observations. A BUOW Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by RCA prior to initiating ground disturbance. The RCA will coordinate directly with CDFW as needed to ensure that the plan is consistent with the MSHCP and CDFW guidelines. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31). The RCA may require translocation sites to be created within the MSHCP Conservation Area for the establishment of new colonies. If required, the translocation sites must take into consideration unoccupied habitat areas, presence of burrowing mammals, existing colonies, and effects to other MSHCP Covered Species in order to successfully create suitable habitat for BUOW. The translocation sites must be developed in consultation with RCA. If required, translocation sites would also be described in the agency-approved plan.

BIO-2 **Nesting Birds**: To the extent feasible, (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds. The general nesting season is March 15 through August 31 for songbirds and January 15 through August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory songbirds (March 15 through August 31) and raptors (January 15 through August 31), a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. If construction is inactive for more than seven days, an additional survey shall be conducted. The results of the pre-construction survey shall be documented by the qualified biologist.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.

BIO-3 **Fairy Shrimp**: Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing), wet season focused surveys for federally listed fairy shrimp species shall be completed. The wet season surveys shall be conducted by a permitted biologist and follow the current USFWS survey protocol for large brachiopods (USFWS 2017). Survey results shall be submitted to USFWS following completion of the surveys. If listed fairy shrimp species are not detected during the wet season surveys, then ground-disturbing activities shall be allowed to commence on the study area and no further mitigation is required.

If federally listed fairy shrimp are identified during the wet season surveys and the project cannot avoid occupied habitat, a DBESP assessment shall be completed to ensure that the proposed alternative provides for replacement of any lost functions and values of habitat. Project impacts to occupied listed fairy shrimp habitat shall be accomplished through purchase of off-site mitigation credits at an agency-approved mitigation bank or in-lieu fee program, or through purchase of off-site land that supports occupied habitat at a ratio of no less than 2:1. If off-site land is purchased, the mitigation site shall be preserved in perpetuity through a conservation easement, deed restriction, or similar legal protection mechanism.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

No Impact. The project site does not support any drainage features, wetlands, or other special aquatic sites under the jurisdiction of the CDFW. Therefore, no impacts to riparian habitats would occur and mitigation is not warranted.

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. As discussed above, the project site does not support any drainage features, wetlands, or other special aquatic sites. Therefore, no impacts are anticipated by the project.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant with Mitigation Incorporated. The proposed project would be entirely restricted to disturbed areas. The project site is not part of a regional corridor and does not serve as a nursery site. The project site is not part of a regional corridor and does not serve as a nursery site. The project site is bounded by residential development to the north, northwest, and east. The project site supports limited vegetation that may be used by birds and smaller mammals and reptiles that are adapted to human disturbance. Some wildlife moving may use the area for foraging and/or nesting, but use of the project site would be restricted due to limited vegetative cover and adjacent disturbance from existing human development.

Development of the proposed project could disturb or destroy active migratory bird nests, including eggs and young. Disturbance to or destruction of migratory bird eggs, young, or adults is in violation of the MBTA and is considered a potentially significant impact. Although suitable habitat for nesting birds on the study area is limited, herbaceous ground cover and shrubs located throughout the study area could provide habitat for protected nesting bird species. Implementation of mitigation measure BIO-2 would ensure the project is in compliance with MBTA regulations.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impact. The study area does not support any trees. Therefore, the project would not conflict with Section 9.17.030 of the City's Municipal Code.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less Than Significant with Mitigation Incorporated. The project site is within the Southwest Area Plan of the MSHCP. The study area is not located within or adjacent to an MSHCP Criteria Area; therefore, the study area is not subject to special conservation requirements that apply to cells and is not required to undergo the Habitat Acquisition and Negotiation Strategy (HANS) process.

The study area does not support suitable habitat for Riparian/Riverine or Vernal Pool plant species and, therefore, no impacts are anticipated by the project. However, the northwestern portion of the project site supports depressional areas that may potentially be suitable habitat for Riverside fairy shrimp. Dry season fairy shrimp surveys were completed in accordance with USFWS protocol, as previously discussed above. *Branchinecta* sp. eggs were observed in 23 of the 32 sampled depressional areas. Wet season sampling will further inform which Branchinecta species are present within the sampled features. Per mitigation measure, BIO-3, wet season focused surveys are currently in progress and will be completed in 2021/2022. Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing), wet season surveys will be completed by a permitted biologist following the current USFWS survey protocol for large brachiopods. If listed fairy shrimp are detected during the wet season surveys, a DBESP must be prepared to ensure that the proposed alternative provides for replacement of any lost functions and values of habitat. Compensatory mitigation for impacts to occupied habitat would be required, as outlined in Measure BIO-3.

In addition, the project shall not use invasive plants for erosion control, landscaping, wind rows, or other purposes. Mitigation measure BIO-4 is provided to require the project to comply with the MSHCP and avoid the use of invasive, non-native plants.

Furthermore, in order for the project to participate in the MSHCP, the project proponent is required to pay a Local Development Mitigation Fee (LDMF) in order to finance the acquisitions of conservation areas to provide habitat for MSHCP covered species. The LDMF must be paid prior to issuance of a building permit. The applicant shall pay the LDMF as determined by the City. Final fee credits shall be determined through coordination with the City. Since the project site is also within the SKR Habitat Conservation Plan (HCP) but is not located within any of the core reserves, the project is required to pay a SKR mitigation fee for incidental take authorization under the SKR HCP. Mitigation measure BIO-5 outlined below would require the project to pay the MSHCP LDMF and SKR HCP fees. As a result, impacts would be less than significant.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Mitigation Measures

BIO-4 **MSHCP Landscaping Restrictions**: In accordance with MSHCP, no invasive species shall be used in the project landscape plans (including hydroseed mix used for interim erosion control).

BIO-5 **Habitat Conservation Plan Fees**: The project applicant is subject to the MSHCP Local Development Mitigation Fee and the Stephens' Kangaroo Rat Habitat Conservation Plan Fee, which shall be paid prior to issuance of any grading permit.

V. CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

A Cultural Resources Study was prepared by HELIX to document the existing cultural resources within the project study area and evaluate the potential for project impacts (HELIX 2021c). The conclusions of the survey and report are summarized below, and the report is included as Appendix C to this Initial Study.

a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Less Than Significant Impact. The Cultural Resources Study included a records search, Sacred Lands File search, Native American outreach, a review of historic aerial photographs and maps, and a field survey. The records search conducted at the Eastern Information Center (EIC) indicated that 23 previous cultural resources studies have been conducted within a half-mile of the project, two of which, RI-00182 (Weaver 1975) and RI-00742 (Wilke 1979), occurred within the project site. Additionally, the records search identified 16 previously recorded cultural resources within a half-mile radius of the project site. Of these, two resources (P-33-003249 and P-33-016788) are located within the project site.

The remaining 14 resources are located outside of the development footprint within a half-mile of the project site. However, three resources (P-33-000857, P-33-003159, and P-33-003342) are located adjacent to the project site, south of Alessandro Boulevard. The resources within the search area pertain to both the prehistoric and historic eras. The prehistoric resources include sites comprised of lithic scatters, bedrock milling features, cairns/rock features, and rock shelters. The historic resources consist of historic archaeological sites containing structural pads or foundations, privies or historic trash scatters, wells/cisterns, water conveyance systems, and historic (single-family) properties. P-33-003249, a historic concrete water cistern, could not be observed during the survey; it appears to have been destroyed sometime between 2004 and 2005. The pedestrian survey concluded that no historic resources of significance occur on the site due to past disturbance. Therefore, impacts to historic resources would be less than significant.

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Less Than Significant with Mitigation Incorporated. HELIX contacted the NAHC for a Sacred Lands File search and a list of Native American contacts for the Project site and vicinity. The NAHC completed its

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

search and it did not identify any known sacred lands or Native American cultural resources are within the project site or the surrounding vicinity. Letters were sent to Native American representatives and interested parties identified by the NAHC on March 11, 2021. To date, four responses have been received from the San Manuel Band of Mission Indians, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Agua Caliente Band of Cahuilla Indians. The Agua Caliente Band of Cahuilla Indians indicated that the project resides within the Tribe's Traditional Use Area. As such, the Agua Caliente Band of Cahuilla Indians requests that the project complete a cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area and a copy of the record search and any cultural resource documentation (report and site records) generated in connection with this project be sent to the Tribe.

As discussed above, the records search conducted for the project site identified resources within the search area pertaining to both the prehistoric and historic eras. The prehistoric resources include sites comprised of lithic scatters, bedrock milling features, cairns/rock features, and rock shelters. A pedestrian survey of the project site was conducted in 2021 by HELIX archaeologists and a Native American monitor from the Soboba Band of Luiseño Indians. P-33-016788, a suspected prehistoric bedrock milling feature, is located along the northeastern boundary of the western (Skylar Place) parcel. However, the "mortars" do not appear to be prehistoric in nature. The "mortars" pictured on the original site record appear to be mechanically drilled holes in the rock, rather than bedrock milling features. Only mechanically drilled holes were observed during the survey, no actual mortars. The "feature" remains heavily disturbed and out of context, consistent with the observations made in 2007 when it was originally recorded.

Based upon the findings of the survey, the project is expected to have no impacts to significant cultural resources; however, the general vicinity of the project has been occupied/used by the Luiseño, Cahuilla, and other native people for thousands of years, and there are numerous previously recorded cultural resources within the project vicinity. In addition, the project site falls within the Traditional Use Area of local tribes and may be sensitive for cultural resources requiring mitigation. Based on these factors, an archaeological and Native American monitoring program is recommended, as described in the mitigation measures below.

Mitigation Measures

CUL-1 **Archaeological Monitoring.** Prior to the issuance of a grading permit, the Developer shall retain a professional archaeologist to conduct monitoring of all mass grading and trenching activities. The Project Archaeologist shall have the authority to temporarily redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project Archaeologist, in consultation with the Consulting Tribe(s), the contractor, and the City, shall develop a CRMP as defined in Mitigation Measure CUL-3. The Project archeologist shall attend the pre-grading meeting with the City, the construction manager and any contractors and will conduct a mandatory Cultural Resources Worker Sensitivity Training to those in attendance. The archaeological monitor shall have the authority to temporarily halt and redirect earth moving activities in the affected area in the event that suspected archaeological resources are unearthed.

CUL-2 **Native American Monitoring.** Prior to the issuance of a grading permit, the Developer shall secure agreements with the Consulting Tribe(s) for tribal monitoring. The City is also required to provide a minimum of 30 days advance notice to the tribes of all ground disturbing activities. The Native American Tribal Representatives shall have the authority to temporarily halt and redirect earth moving activities in the affected area in the event that suspected archaeological resources are unearthed. The Native American Monitor(s) shall attend the pre-grading meeting with the Project Archaeologist, City, the construction manager and any contractors and will conduct the Tribal Perspective of the mandatory Cultural Resources Worker Sensitivity Training to those in attendance.

CUL-3 **Cultural Resource Monitoring Plan (CRMP).** The Project Archaeologist, in consultation with the Consulting Tribe(s), the contractor, and the City, shall develop a CRMP in consultation pursuant to the definition in AB 52 to address the details, timing and responsibility of all archaeological and cultural activities that will occur on the project site. A consulting Tribe is defined as a Tribe that initiated the AB 52 tribal consultation process for the Project, has not opted out of the AB52 consultation process, and has completed AB 52 consultation with the City as provided for in California Public Resources Code Section 21080.3.2(b)(1) of AB 52. Details in the Plan shall include:

a. Project description and location

b. Project grading and development scheduling;

c. Roles and responsibilities of individuals on the Project;

d. The pre-grading meeting and Cultural Resources Worker Sensitivity Training details;

e. The protocols and stipulations that the contractor, City, Consulting Tribe (s) and Project archaeologist will follow in the event of inadvertent cultural resources discoveries, including any newly discovered cultural resource deposits that shall be subject to a cultural resources evaluation.

f. The type of recordation needed for inadvertent finds and the stipulations of recordation of sacred items.

g. Contact information of relevant individuals for the Project.

CUL-4 **Cultural Resource Disposition.** In the event that Native American cultural resources are discovered during the course of ground disturbing activities (inadvertent discoveries), the following procedures shall be carried out for final disposition of the discoveries:

a. One or more of the following treatments, in order of preference, shall be employed with the tribes. Evidence of such shall be provided to the City of Moreno Valley Planning Department:

   i. Preservation-In-Place of the cultural resources, if feasible. Preservation in place means avoiding the resources, leaving them in the place they were found with no development affecting the integrity of the resources.

   ii. Onsite reburial of the discovered items as detailed in the treatment plan required pursuant to Mitigation Measure CUL-1. This shall include measures and

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

provisions to protect the future reburial area from any future impacts in perpetuity. Reburial shall not occur until all legally required cataloging and basic recordation have been completed. No recordation of sacred items is permitted without the written consent of all Consulting Native American Tribal Governments as defined in Mitigation Measure CUL-3 The location for the future reburial area shall be identified on a confidential exhibit on file with the City, and concurred to by the Consulting Native American Tribal Governments prior to certification of the environmental document.

The City shall verify that the following note is included on the Grading Plan:

"If any suspected archaeological resources are discovered during ground –disturbing activities and the Project Archaeologist or Native American Tribal Representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the Project Archaeologist and the Tribal Representatives to the site to assess the significance of the find."

CUL-5 **Inadvertent Finds.** If potential historic or cultural resources are uncovered during excavation or construction activities at the project site that were not assessed by the archaeological report(s) and/or environmental assessment conducted prior to Project approval, all ground disturbing activities in the affected area within 100 feet of the uncovered resource must cease immediately and a qualified person meeting the Secretary of the Interior's standards (36 CFR 61), Tribal Representatives, and all site monitors per the Mitigation Measures, shall be consulted by the City to evaluate the find, and as appropriate recommend alternative measures to avoid, minimize or mitigate negative effects on the historic, or prehistoric resource. Further ground disturbance shall not resume within the area of the discovery until an agreement has been reached by all parties as to the appropriate mitigation. Work shall be allowed to continue outside of the buffer area and will be monitored by additional archeologist and Tribal Monitors, if needed. Determinations and recommendations by the consultant shall be immediately submitted to the Planning Division for consideration, and implemented as deemed appropriate by the Community Development Director, in consultation with the State Historic Preservation Officer (SHPO) and any and all Consulting Native American Tribes as defined in Mitigation Measure CUL-2 before any further work commences in the affected area. If the find is determined to be significant and avoidance of the site has not been achieved, a Phase III data recovery plan shall be prepared by the Project Archeologist, in consultation with the Tribe, and shall be submitted to the City for their review and approval prior to implementation of the said plan.

CUL-6 **Archeology Report - Phase III and IV.** Prior to final inspection, the developer/permit holder shall prompt the Project Archeologist to submit two (2) copies of the Phase III Data Recovery report (if required for the Project) and the Phase IV Cultural Resources Monitoring Report that complies with the Community Development Department's requirements for such reports. The Phase IV report shall include evidence of the required cultural/historical sensitivity training for the construction staff held during the pre-grade meeting. The Community Development Department shall review the reports to determine adequate mitigation compliance. Provided the reports are adequate, the

Community Development Department shall clear this condition. Once the report(s) are determined to be adequate, two (2) copies shall be submitted to the Eastern Information Center (EIC) at the University of California Riverside (UCR) and one (1) copy shall be submitted to the Consulting Tribe(s) Cultural Resources Department(s).

c) Disturb any human remains, including those interred outside of dedicated cemeteries?

Less Than Significant with Mitigation Incorporated. There are no known grave sites within the project limits, and the potential for encountering human remains during construction activities is considered low, since grading and excavation activities would occur within a previously disturbed area. In the unlikely event that human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of any human remains find immediately. If the remains are determined to be prehistoric, the Coroner would notify the NAHC, which would determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery, and shall complete the inspection within 24 of notification by the NAHC. The MLD would have the opportunity to make recommendations to the NAHC on the disposition of the remains. Accordingly, impacts would be less than significant with mitigation measures CUL-7 and CUL-8.

<u>Mitigation Measure</u>

CUL-7 **Human Remains.** If human remains are discovered, no further disturbance shall occur in the affected area until the County Coroner has made necessary findings as to origin. If the County Coroner determines that the remains are potentially Native American, the California Native American Heritage Commission shall be notified within 24 hours of the published finding to be given a reasonable opportunity to identify the "most likely descendant". The "most likely descendant" shall then make recommendations, and engage in consultations concerning the treatment of the remains (California Public Resources Code 5097.98). (GP Objective 23.3, CEQA).

CUL-8 **Non-Disclosure of Reburial Locations.** It is understood by all parties that unless otherwise required by law, the site of any reburial of Native American human remains or associated grave goods shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, pursuant to the specific exemption set forth in California Government Code 6254 (r)., parties, and Lead Agencies, will be asked to withhold public disclosure information related to such reburial, pursuant to the specific exemption set forth in California Government Code 6254 (r).

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

VI. ENERGY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less Than Significant Impact. Energy used for construction would primarily consist of fuels in the form of diesel and gasoline for the operation of construction equipment and construction worker vehicles. While construction activities would consume petroleum-based fuels, consumption of such resources would be temporary and would cease upon the completion of construction. The Air Quality and Greenhouse Gas Emissions Technical Report estimated the proposed project's GHG emissions using CalEEMod (HELIX 2021a). The construction energy calculations from the prepared for the proposed project are shown in Table 5, *Construction Energy Summary*.

Table 5
CONSTRUCTION ENERGY SUMMARY

Source	Gallons Diesel	Gallons Gas	kBtu
Off-Road Construction Equipment	48,080	-	6,683,131
On-Road Construction Traffic	81,615	105,208	24,390,287
Project Construction Total	**129,695**	105,208	**31,073,418**

Source: HELIX 2021a; kBtu = kilo-British thermal unit

The petroleum consumed during project construction would be typical of similar construction projects and would not require the use of new petroleum resources beyond what are typically consumed in California. Based on these considerations, construction of the project would not result in wasteful, inefficient, or unnecessary consumption of energy resources.

Once the proposed project construction is completed, electricity and natural gas would be required for multiple purposes during long term operation of the project, including, but not limited to, building heating and cooling, lighting, appliances, and electronics. The proposed project would be designed to achieve Title 24 energy standards, at a minimum, through implementation of energy-reduction measures, such as energy-efficient lighting and appliances, water-efficient appliances and plumbing fixtures, solar photovoltaic systems, and water-efficient landscaping and irrigation. The operational energy calculations prepared for the proposed project are shown in Table 6, *Operational Energy Summary*.

Table 6
OPERATIONAL ENERGY SUMMARY

Energy Type	Quantity	kBtu
Gasoline (Gallons)	178,950	22,189,829
Diesel (Gallons)	26,777	3,721,959
Natural Gas (kBtu)	5,112,369	5,112,369
Electricity (kWh)	976,712	3,332,678
	Total	**34,356,836**

Source: HELIX 2021a; kBtu = kilo-British thermal unit

During operations, the majority of fuel consumption resulting from the project would involve the use of motor vehicles traveling to and from the project site, as well as fuels used for alternative modes of transportation that may be used by residents. It should be noted that over the lifetime of the project, the fuel efficiency of vehicles is expected to increase. As such, the amount of gasoline consumed as a result of vehicular trips to and from the project site during operation is expected to decrease over time. Based on these considerations, implementation of the proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy. Impacts would be less than significant.

b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Less Than Significant Impact. The State's Title 24 Building Energy Efficiency Standards and California Green Building Standards (CalGreen) include provisions applicable to all buildings, which are mandatory requirements for efficiency and design of construction in the City. The project would be consistent with these requirements through implementation of energy-reduction measures, such as energy-efficient lighting and appliances, water-efficient appliances and plumbing fixtures, water-efficient landscaping and irrigation. The project would not conflict or obstruct any local or state plans for renewable energy or energy efficiency. Impacts would be less than significant.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

VII. GEOLOGY AND SOILS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic ground shaking?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv. Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

Geotechnical Evaluations were prepared by GeoTek, Inc. (GeoTek) for the Windsong and Skylar Place properties, respectively, to document the existing geologic conditions within the project study area and evaluate the potential for project impacts (GeoTek 2020a and 2020b). The conclusions of the Geotechnical Evaluations are summarized below, and the reports are included in Appendix D to this Initial Study. In addition, a Paleontological Resources Assessment was prepared for the project site by Paleo Solutions, Inc. (Paleo Solutions, 2021), which is included as Appendix E to this Initial Study.

a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?

Less Than Significant Impact. The project site is located within a seismically active region and is within an Alquist-Priolo earthquake fault zone (California Department of Conservation 2015). The nearest mapped fault, however, is the San Jacinto Fault, which is located approximately five miles east of the project site as mapped on City of Moreno Valley General Plan Map S-1, *Fault Zones*. In addition, according to the Geotechnical Evaluations performed for the project site (Appendix D), no active or potentially active fault is known to exist at this site nor is the site situated within a State of California designated "Alquist-Priolo" Earthquake Fault Zone. Because there are no faults located on the project site, the potential for the proposed project to expose people or structures to substantial adverse effects, including the risk of loss, injury or death involving ground rupture is considered low, and impacts would be less than significant.

   ii. Strong seismic ground shaking?

Less Than Significant Impact. As discussed above, the project site is located in a seismically active area of southern California and is expected to experience moderate to severe ground-shaking during the lifetime of the proposed project. Per the Geotechnical Evaluations prepared for the project site, the Modified Peak Ground Acceleration for the site would be a maximum of 0.898 g (where "g" is the acceleration due to Earth's gravity), which would be for the Windsong (eastern) half of the property. Final selection of the appropriate seismic design coefficients would be made by the project structural engineer prior to issuance of building permits. As a mandatory condition of project approval, the project would be required to construct the proposed buildings in accordance with the California Building Code (CBC), also known as California Code of Regulations (CCR), Title 24 (Part 2), and the City of Moreno Valley Building Code, which is based on the CBC with local amendments. The CBC and City of Moreno Valley Building Code provide standards that must be met to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures, and have been specifically tailored for California earthquake conditions. With mandatory compliance with these standards, the project would not expose people or structures to substantial adverse effects, including loss, injury or death, involving seismic ground shaking, and impacts would be less than significant.

   iii. Seismic-related ground failure, including liquefaction?

Less Than Significant Impact. Liquefaction occurs when loose, unconsolidated, water-laden soils are subject to shaking, causing the soils to lose cohesion and behave as a liquid. According to the Geotechnical Evaluations prepared for the project site, as well as the City's General Plan Map S-2, *Liquefaction Hazards*, the project site is not located in an area with the potential for liquefaction. In addition, as described above, the City would require that the property be developed in accordance with the latest applicable seismic safety guidelines, including the standard requirements of the CBC and the City Building Code. Therefore, the project's impacts related to seismic-related ground failure, including liquefaction, would be less than significant.

iv. Landslides?

No Impact. The City of Moreno Valley General Plan identifies the Badlands area of the City as having a potential for landslides. The project site is located approximately five miles from the Badlands area and is in a flat, urbanized area with no slopes. Furthermore, the Geotechnical Evaluations prepared for the project indicate that evidence of ancient landslides or slope instabilities at this site was not observed during the site investigations, and therefore the potential for landslides is considered negligible. Therefore, the project site is not at risk of landslides and no impacts would occur.

b) Result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact. Project development would involve grading and soil movement, which could result in erosion. Because the project site has an area greater than one acre, the proposed project is required to obtain a National Pollutant Discharge Elimination System (NPDES) permit. A Storm Water Pollution Prevention Plan (SWPPP) would also be required to address erosion and discharge impacts associated with the proposed on-site grading. In addition to preparation of a SWPPP, new development projects submitted to the City would be required to submit a project-specific Water Quality Management Plan (WQMP). A WQMP has been prepared for the proposed project and it identifies measures to treat and/or limit the entry of contaminants into the storm drain system (Mayers & Associates 2021a; Appendix F). The WQMP would be incorporated by reference to the project's SWPPP as the Post-Construction Management Plan. Through compliance with the required permits and plans, the project would not result in substantial soil erosion or loss of topsoil, and impacts would be less than significant.

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less Than Significant Impact. The project site has a low potential for liquefaction, landslides, and soil erosion. Compliance with the CBC and City Building Code design and engineering standards would reduce potential impacts to less than significant.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less Than Significant Impact. Expansive soils generally have a significant amount of clay particles, which can give up water (shrink) or take on water (swell). The change in volume exerts stress on buildings and other loads placed on these soils. The extent of shrink/swell is influenced by the amount and kind of clay in the soil. The occurrence of these soils is often associated with geologic units having marginal stability. The distribution of expansive soils can be widely dispersed, and they can occur in hillside areas as well as low-lying alluvial basins. The soil types in the project area have a low shrink-swell potential due to their low clay content. Additionally, development of the project site would be required to adhere to the CBC and the City Building Code design and engineering standards. Impacts associated with this issue would therefore be less than significant.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The proposed project would be served by an existing wastewater disposal system and would not install septic tanks or alternative wastewater disposal systems on site. Therefore, no impact would occur.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less Than Significant with Mitigation Incorporated. The project site is identified by the County of Riverside's General Plan (Figure OS-8) as having a "high" sensitivity to contain paleontological resources (County 2015).However, in order to address the potential for paleontological resources specific to the project site, Paleo Solutions conducted an analysis of existing data including a geologic map and literature review, online searches of paleontological databases, and paleontological searches of records maintained by the Natural History Museum of Los Angeles County (LACM) and the Western Science Center (WSC), as well as a site survey. Paleontological sensitivity assignments for geologic units mapped within the project area and half-mile buffer were developed following the Potential Fossil Yield Classification (PFYC) system developed by the United State Department of the Interior Bureau of Land Management and best practices in mitigation paleontology.

Geologic mapping D.M. Morton et al. (2002) indicates that the project site is underlain primarily by very low paleontological potential (PFYC 1) Cretaceous-age Peninsular Ranges batholith, tonalite, undifferentiated (tonalite) (Kt) and lesser amounts of moderate paleontological potential (PFYC 3) Pleistocene-age very old alluvial fan deposits (Qvof). Also mapped within the vicinity, within the half-mile buffer, are low paleontological potential (PFYC 2) Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf). Aerial imagery also indicates that Cretaceous-age tonalite (Kt) is exposed at the project site surface in portions of the southeastern and central-eastern portions of the Windsong tract and the northern and southeastern portions of the Skylar Place tract. Additionally, alternative mapping by T.W. Dibblee and J.A. Minch (2003) indicates that the project site is underlain primarily by very low paleontological potential (PFYC 1) Cretaceous-age plutonic rocks of Peninsular Ranges, quartz diorite (quartz diorite) (qdx) and lesser amounts of low paleontological potential (PFYC 2) Holocene-age alluvial sand, gravel, and clay of valley areas (young alluvium) (Qa). For the purposes of this analysis, and based on field observations by Paleo Solutions staff, the geologic mapping by Morton et al. (2002) is utilized.

The LACM and WSC records searches yielded no fossil localities recorded within the project site, although several localities are recorded from nearby from sedimentary units of similar age to those that occur within the project site and surrounding area. As noted above, the analysis of existing data was supplemented with a pedestrian field survey, the results of which indicate that although no fossils were observed at the project site surface, sediments conducive to fossil preservation, particularly early Pleistocene-age very old alluvial fan deposits (Qvof), are exposed at the surface in portions of the project site. Project construction may involve excavation greater than four feet below the ground surface. Therefore, there is a potential to uncover fossils that may be buried beneath the surface of the site within these sediments and impacts would be potentially significant. However, with implementation of mitigation measure PAL-1 below would reduce such impacts to less than significant.

<u>Mitigation Measure</u>

PAL-1 Prior to construction, a paleontological mitigation plan (PMP) shall be prepared, which shall provide detailed recommended monitoring locations; a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by a paleontological monitor or other project personnel. A curation agreement with WSC or another accredited repository shall also be obtained. Construction excavations that disturb geologic units with moderate paleontological potential (PFYC 3) shall be monitored by a professional paleontologist in order to reduce potential adverse impacts on scientifically important paleontological resources to a less than significant level. If it is determined that only Cretaceous-age tonalite (Kt) (PFYC 1) is impacted, the monitoring program shall be halted in those areas. Any subsurface bones or potential fossils that are unearthed during construction shall be evaluated by a professional paleontologist as described in the PMP.

VIII. GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☒	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☒	☐	☐

The following discussion is based on the Air Quality/Greenhouse Gas Report prepared by HELIX (HELIX 2021a), attached to this Initial Study as Appendix A.

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less Than Significant with Mitigation Incorporated. Global climate change refers to changes in average climatic conditions on Earth as a whole, including temperature, wind patterns, precipitation, and storms. Global temperatures are moderated by naturally occurring atmospheric gases, including water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone, and certain hydro-fluorocarbons. These gases, known as greenhouse gases (GHGs), allow solar radiation (sunlight) into the Earth's atmosphere, but prevent radiative heat from escaping, thus warming the Earth's atmosphere. GHGs are emitted by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Emissions of GHGs in excess of natural ambient concentrations are thought to be responsible for the enhancement of the greenhouse effect and contributing to what is termed "global warming," the trend of warming of the Earth's climate from anthropogenic activities. Global climate change impacts are by nature cumulative; direct impacts cannot be evaluated because the impacts themselves are global rather than localized impacts.

The Air Quality and Greenhouse Gas Emissions Technical Report estimated the proposed project's GHG emissions using CalEEMod. Emissions of GHGs related to the construction of the project would be temporary. As shown in Table 7, *Estimated Construction GHG Emissions*, total GHG emissions associated with construction of the project are estimated at2,044.3 MT CO_2e. For construction emissions, SCAQMD guidance recommends that the emissions be amortized (i.e., averaged) over 30 years and added to operational emissions. Averaged over 30 years, the proposed construction activities would contribute approximately 68.1 MT CO_2e emissions per year.

Table 7
ESTIMATED CONSTRUCTION GHG EMISSIONS

Year/Activity	Emissions (MT CO_2e)
2022 Grading, Soil Hauling Underground Utilities, Paving and Building Construction	798.5
2022 Blasting	64.2
2023 Building Construction and Architectural Coating	793.5
2024 Building Construction and Architectural Coating	798.4
2025 Building Construction and Architectural Coating	388.0
TOTAL[1]	**2044.3**
Amortized Construction Emissions[2]	*68.1*

Source: HELIX 2021a

[1] Totals may not sum due to rounding.

[2] Construction emissions are amortized over 30 years in accordance with SCAQMD guidance.

GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

The City's Climate Action Plan (CAP) is a qualified GHG reduction plan in accordance with CEQA Guidelines Section 15183.5. Projects which are consistent with the control measures and 2040 GHG reduction target of 4.0 MT CO_2e per year per capita in the City CAP would have GHG emissions that are less than significant. The project's per capita GHG emissions are the total emissions divided by the project population. At full buildout, the total project population would be approximately 690 persons (3.0 persons per household; SCAG 2019). Table 8, *Total Estimated Operational GHG Emissions*, shows the calculated total annual emissions for the project and the emissions per capita. The emissions include the amortized annual construction emissions anticipated for the project.

Table 8
TOTAL ESTIMATED OPERATIONAL GHG EMISSIONS

Emission Sources	2020 Emissions (MT CO_2e)
Area Sources	41.5
Energy Sources	389.9
Vehicular (Mobile) Sources	1,673.8
Solid Waste Sources	78.3
Water Sources	49.7
Subtotal[1]	**2,233.2**
Construction (Annualized over 30 years)	68.1
TOTAL[1]	**2,301.3**
Emissions per Capita[2]	**3.3**
CAP 2040 Target Emissions per Capita	**4.0**
Exceed Threshold?	**No**

Source: HELIX 2021a

[1] Totals may not sum due to rounding.

[2] Emission per capita is the project total emissions divided by the project population (2,301.3/690).

GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

As shown in Table 8, the project emissions per capita of 3.3 MT CO_2e per year per capita would not exceed the City CAP 2040 GHG reduction target of 4.0 MT CO_2e per year per capita. Chapter 4 of the City CAP contains additional GHG reduction measure (measures beyond state and federal policies) organized into sectors: Transportation, Industrial, Residential, Commercial, Off-Road Equipment, Public Services, and Natural Resources. Of the additional GHG reduction measures, only residential measure R-2 would be applicable for implementation by the project.

Measure R-2 requires new construction and major remodels to install interior real-time energy smart meters in line with current utility provider efforts. Because there is no uniformly applicable development code that would enforce the City CAP GHG reduction measure R-2, the project may not be consistent with the City CAP and the impact would be potentially significant. Mitigation measure GHG-1 would ensure the project would be consistent with the City CAP GHG reduction measures. As shown in Table 8, the project emissions per capita of 3.3 MT CO_2e per year per capita would not exceed the City CAP 2040 GHG reduction target of 4.0 MT CO_2e per year per capita. Therefore, the project would be consistent with the City CAP and implementation of the project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and the impact would be less than significant with mitigation implemented.

<u>Mitigation Measure</u>

GHG-1 Smart Meters: Real-time energy smart meters shall be installed on all project residences. Prior to issuing building permits, the City shall verify that project plans include the requirement for smart meters. Prior to finalizing each project residence building permit, the City shall verify that a smart meter has been installed on the residence.

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant with Mitigation Incorporated. There are numerous State plans, policies, and regulations adopted for the purpose of reducing GHG emissions. The principal overall State plan and policy is AB 32, the California Global Warming Solutions Act of 2006. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 32 would require further reductions of 40 percent below 1990 levels by 2030. Because the project's operational year is post-2020, the project aims to reach the quantitative goals set by SB 32. Statewide plans and regulations such as GHG emissions standards for vehicles (AB 1493), the Low Carbon Fuel Standard (LCFS), and regulations requiring an increasing fraction of electricity to be generated from renewable sources are being implemented at the statewide level; as such, compliance at the project level is not addressed. Therefore, the proposed project would not conflict with those plans and regulations.

Transportation-related emissions consistently contribute the most GHG emissions in California (41 percent in 2017). According to the Transportation Impact Analysis (TIA) Vehicles Miles Traveled (VMT) analysis, the project is located in a low VMT area and would have a less than significant impact related to VMT. The project would be consistent with the General Plan and zoning designations for the site. Because the project would be consistent with the local general plan, residential growth in the City as a result of the project, and the related changes in regional VMT, would be accounted for in the SCAG's RTP/SCS.

The project must also be constructed in accordance with the energy-efficiency standards, water reduction goals, and other standards contained in the 2019 Title 24 Part 6 Building Energy Efficiency Standards and Part 11 (CALGreen) Building Standards, including the requirement for onsite solar electricity generation. Because there is no uniformly applicable development code that would enforce the City CAP GHG reduction measure R-2, the project may not be consistent with the City CAP and the impact would be potentially significant. Mitigation measure GHG-1 would ensure the project would be consistent with the City CAP.

IX. HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less Than Significant Impact. Materials and waste are generally considered hazardous if they are poisonous (toxicity), can be ignited by open flame (ignitability), corrode other materials (corrosivity), or react violently, explode, or generate vapors when mixed with water (reactivity). The term “hazardous material” is defined in the State Health and Safety Code (Chapter 6.95, Section 25501[o]) as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment. Hazardous waste is defined as any hazardous material that is abandoned, discarded, or recycled, as defined in the State Health and Safety Code (Chapter 6.95, Section 25125). The transportation, use, and disposal of hazardous materials, as well as the potential releases of hazardous materials to the environment, are closely regulated through many state and federal laws.

Project construction would require the use of materials that are typically associated with construction activities, such as diesel fuels, hydraulic liquids, oils, solvents, and paint. Hazardous materials used during project construction would be transported, used, and stored in accordance with state and federal regulations regarding hazardous materials. Operation of the proposed facilities would include the storage and use of household hazardous materials and wastes. However, the project would be required to conform with all regulations governing hazardous materials during both project construction and operation. Therefore, the project would result in less than significant impacts associated with the routine use, transport, or disposal of hazardous materials.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less Than Significant Impact. The proposed project is not anticipated to result in a release of hazardous materials into the environment. During the temporary, short-term construction period, there is the possibility of accidental release of hazardous substances such as spilling of hydraulic fluid or diesel fuel associated with construction equipment maintenance. The level of risk associated with the accidental release of these hazardous substances is not considered significant due to the small volume and low concentration of hazardous materials. The construction contractor would be required to use standard construction controls and safety procedures to avoid or minimize the potential for accidental release of such substances into the environment. Therefore, the impact of the proposed project with respect to exposing the public or the environment to hazardous materials through upset and accident conditions would be less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. The school nearest to the project alignment is Moreno Elementary School, located approximately 0.5 miles northeast of the project site along Cottonwood Avenue. Hazardous materials used during construction would not be handled within one-quarter mile of the school. Furthermore, the use of these materials would be temporary and in accordance with applicable standards and regulations. Therefore, impacts related to the handling of hazardous materials within one-quarter mile of a school would not occur.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact. Pursuant to Government Code Section 65962.5 (Cortese List) requirements, the SWRCB GeoTracker database (SWRCB 2021) and the California Department of Toxic Substances Control (DTSC) EnviroStor database (DTSC 2021) were searched for hazardous materials sites within the project area. According to these databases, there are no listed hazardous materials sites within or adjacent to the project site. Therefore, no impact would occur.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. The project site is located approximately 3 miles northeast of the nearest airport, March Air Reserve Base. Nearly the entire City is located within the boundaries of the Reserve Base's Airport Land Use Compatibility Plan (ALUCP). The project site is not located within an excessive noise contour as defined in the ALUCP. However, according to City of Moreno Valley General Plan S-7, the project site is not located within an Accident Potential Zone or "Clear Zone" (i.e., high risk areas 3,000 feet from each end of the runway). Thus, because the project site is not located within an excessive noise contour or an area identified as an Accident Potential Zone or a Clear Zone, implementation of the proposed project would not result in a safety hazard or excessive noise for people residing or working in the project area, and no impacts would occur.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. The City adopted an Emergency Operations Plan (EOP) in March 2009. The project site does not contain emergency facilities, nor does it serve as an emergency evacuation route. During construction and long-term operation, the proposed project would be required to maintain adequate emergency access for emergency vehicles, as required by the City. Because the proposed project would not interfere with an adopted emergency response or evacuation plan, impacts would be less than significant.

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Less Than Significant Impact. According to City's General Plan Map S-5, *Fire Hazard Severity Zones*, the project site is not located in an area of substantial or high fire risk (General Plan 2021). The surrounding area has either been developed or has vacant lots mostly devoid of vegetation. No wildlands are located on or adjacent to the project site. Furthermore, the project site is level with minimal slope and associated wildfire risk. Therefore, implementation of the proposed project would not expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. Impacts would be less than significant.

X. HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off- site?	☐	☐	☒	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional resources of polluted runoff?	☐	☐	☒	☐
iv. Impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Less Than Significant Impact. Construction of the proposed project would involve grading, paving, utility installation, building construction, and landscaping installation, which would result in the generation of potential water quality pollutants such as silt, debris, chemicals, paints, and other solvents with the potential to affect water quality. The project would be constructed and operated consistent with all applicable regulations established by the Santa Ana Regional Water Quality Control Board (RWQCB), which includes compliance with relevant NPDES permitting requirements and adoption and implementation of a SWPPP. As discussed in the project's WQMP (Mayers & Associates, 2021a; Appendix F) and Hydrology Report (Mayers & Associates, 2021b; Appendix G), construction Best Management Practices (BMPs) that may be implemented include silt fences, gravel bag barriers, street

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

sweeping, solid waste management, stabilized construction entrance/exit, water conservation practices, and spill prevention and control. Implementation of these or similar BMPs would reduce potentially adverse impacts of stormwaters discharged from portions of the site affected by construction activities.

As an urban development, long-term operation of the proposed project would add typical, non-point-source pollutants to stormwater runoff, primarily due to runoff from impervious surfaces where a variety of pollutants can collect over time, such as driveways, streets, roofs, patios, and other paved surfaces. Landscaped areas can also generate water pollutants such as fertilizers and weed control agents, as well as green waste from landscape maintenance cuttings. Operational BMPs would include using low-impact development such as the project's bio-retention basins, which allow for peak runoff retention and reduction of pollutant loads. Adoption and implementation of the required WQMP, which reflect the project's commitment to install and maintain appropriate stormwater structural facilities, as well as implement non-structural BMPs, would reduce potential water quality impacts to a less than significant level.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less Than Significant Impact. The project site properties are currently vacant, and the proposed project would not require the use of groundwater. The project would increase the area of impervious surfaces on site through the development of buildings, driveways, roadways, sidewalks, and other paved areas. However, other areas would consist of landscaping and natural open spaces areas that can absorb precipitation. Runoff from the proposed impervious surfaces would be directed into proposed on-site bio-retention basins, where it would be eventually infiltrate into the local groundwater basin. Therefore, the project would have a less than significant impact on groundwater supply and recharge.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

  i. Result in substantial erosion or siltation on- or off-site?

Less Than Significant Impact. The project site is currently vacant and undeveloped. Construction of the proposed project would involve grading of the site's existing ground contours and altering the site's existing drainage pattern, which could result in related erosion. However, as discussed above, the project would implement BMPs as part of the WQMP during construction activities, including silt fences and gravel bag barriers. Furthermore, the proposed project would construct two bioretention basins to convey runoff and prevent off-site impacts. Therefore, anticipated erosion would be minimal, and impacts would be less than significant.

  ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off- site?

Less Than Significant Impact. As previously discussed, the proposed project would increase impervious surfaces throughout the project site and would result in substantial physical changes at the site due to the proposed development. The physical changes at the project site could potentially result in changes in the rate or amount of surface runoff which could result in flooding and contribute to runoff water. Existing site conditions have three separate flow paths. Area A is a 19.2-acre area which flows to the southwest portion of the site. Area B is a 13.4-acre area which flows to the southeast portion of the site.

Area C is a 5.3-acre area on the southeast side of the site, and it drains to the southeastern corner of the site adjacent to Alessandro Boulevard. The runoff from the developed portion of the site will drain southerly to the biofiltration basin through a storm drain system and then outlet into an existing storm drain located in Alessandro Boulevard. The basin is designed to store the project flows and the increased runoff mitigation flows. From the basin, water will be split to two separate drop inlets on opposite ends of the bioretention basin. Approximately half of the developed site's stormwater will drain to an existing 36-inch storm drain in Alessandro Boulevard. This existing 36-inch diameter storm drain is referred to as the "J-5" storm drain on the Moreno Master Drainage Plan (MDP) of the Riverside County Flood Control Master Drainage Map. The other half of the basin will drain to a newly built 781-linear-foot, 36-inch diameter reinforced concrete pipe (RCP) storm drain, which will drain south and tie into an existing 36-inch RCP storm drain in Lasselle Street, referred to as the "N-2" storm drain in the Sunnymead MDP of the Riverside County Flood Control Master Drainage Map. The J-5 storm drain would not accommodate all of the stormwater flows under the developed condition, and therefore the new storm drain and connection to the N-2 storm drain is necessary to adequately convey the additional flows from the project. As such, with construction of the new storm drain and proposed connections to existing facilities, impacts would be less than significant.

iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional resources of polluted runoff?

Less Than Significant Impact. As discussed above, the proposed project would increase impervious surfaces throughout the project site and would result in substantial physical changes at the site due to the proposed development. However, BMPs and the proposed bioretention basins would reduce runoff amounts and not exceed the capacity of existing or planned stormwater drainage systems. Impacts would be less than significant.

iv. Impede or redirect flood flows?

Less Than Significant Impact. According to the FEMA Flood Insurance Rate Map for the area, the project site is not located within a 100-year floodplain. Therefore, the project would not impede or redirect flood flows, and no associated impact would occur.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less Than Significant Impact. The Pacific Ocean is located over 40 miles from the project site; therefore, the potential for tsunamis to impact the project site is extremely low. The nearest water body to the project site is the Perris Reservoir, which is located approximately 3.5 miles to the south. Due to this distance, a seiche in the Perris Reservoir would not impact the project site. Furthermore, the project site is not located in a 100-year floodplain, and no impacts from flood hazards would occur. Impacts would be less than significant.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less Than Significant Impact. As previously discussed, implementation of the proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. Project BMPs in the WQMP would reduce impacts to less than significant.

XI. LAND USE AND PLANNING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Physically divide an established community?	☐	☐	☒	☐
b) Cause significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

a) Physically divide an established community?

Less Than Significant Impact. The project site consists of vacant and undeveloped land located in a developed area of the City. Development of the project site would not physically disrupt or divide the arrangement of the established community. Therefore, no impacts related physical dividing a community would occur.

b) Cause significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact. The project proposes to develop residential uses and a two-acre park. On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center. The project would be consistent with the General Plan and zoning designations for the site. As such, the project would not conflict with an applicable land use plan, policy, or regulation, and impacts would be less than significant.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

XII. MINERAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. The County of Riverside General Plan identifies the project area as Mineral Resource Zone 3 (MRZ-3). MRZ-3 denotes that mineral deposits are likely to exist; however, the significance of the deposit is undetermined. The proposed project would occur in an area that has not been used for mining, is designated for residential uses, and is surrounded by other uses where mining operations are not expected to occur. Therefore, no impacts would occur.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact. See Item XII(a), above. No impacts related to mineral resource recovery would occur.

XIII. NOISE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☒	☐	☐

The following discussion was informed by the project's Noise Assessment Study prepared by HELIX (HELIX 2021d), which is attached to this Initial Study as Appendix H.

Noise Fundamentals

Noise can be defined as unwanted sound. Sound (and therefore noise) consists of energy waves that people receive and interpret. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. Sound intensity or acoustic energy is measured in decibels (dB) that are weighted to correct for the relative frequency response of the human ear. Unlike linear units (inches or pounds), dB are measured on a logarithmic scale, representing points on a sharply rising curve.

Since dBs are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. As a general rule, doubling the traffic volume on a street or the speed of the traffic will increase the traffic noise level by three dBA.[1] Conversely, halving the traffic volume or speed will reduce the traffic noise level by 3 dBA. A 3-dBA change in sound is the level where humans generally notice a barely perceptible change in sound and a 5-dBA change is generally readily perceptible. A 10-dBA change is generally considered substantial.

The predominant rating scales for human communities are the Noise Equivalent (L_{EQ}), and the Community Noise Equivalent Level (CNEL), both of which are based on dBA. The L_{EQ} is the total sound

---

[1] To account for the range of sound that human hearing perceives, a modified scale is utilized known as the A-weighted decibel, dBA. Sound intensity or acoustic energy is measured in dBs that are weighted to correct for the relative frequency response of the human ear. For example, an A-weighted noise level includes a de-emphasis on high frequencies of sound that are heard by a dog's ear but not by a human's ear.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

energy of time-varying noise over a sample period. The CNEL is the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 5 dBA to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of 10 dBA to sound levels in the night from 10:00 p.m. to 7:00 a.m. CNEL is utilized for describing ambient noise levels because they account for all noise sources over an extended period of time and account for the heightened sensitivity of people to noise during the night.

<u>Sensitive Noise Receptors</u>

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise. NSLUs in the project vicinity include the adjacent single-family residences surrounding the project site. Construction activities could temporarily produce elevated short-term noise levels that would potentially impact NSLUs.

<u>Regulatory Framework</u>

The project site occurs within the City of Moreno Valley. On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. The City's 2040 General Plan Noise Element establishes noise compatibility guidelines for uses affected by noise. The acceptable noise levels for project land uses are 65 CNEL for single-family residential and 70 CNEL for parks and recreation (playgrounds and neighborhood parks). For traffic-related noise, impacts are considered significant in areas where traffic noise at single-family residential uses exceeds 65 CNEL. The acceptable interior noise is 45 CNEL for residences. The City's Municipal Code regulates construction noise at residential property lines. Municipal Code Section 11.80.030 restricts noise levels to 60 dBA L_{EQ} during daytime hours.

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant with Mitigation Incorporated.

<u>Construction Noise</u>

Construction of the project would result in temporary increases in noise levels from operation of the construction equipment. The magnitude of the noise impact would depend on the type of construction activity, equipment, duration of each construction phase, distance between the noise source and receiver, and any intervening structures. Construction would generate elevated noise levels for nearby residences to the west, north, and east of the project site. All construction equipment would not be expected to be operating at the same time and would be located throughout the project site and would therefore not remain at one distance to nearby residences during the 8-hour operating day. As a conservative analysis, it was assumed that the equipment would be in operation simultaneously and at an average distance of 100 feet.

The project's most prominent noise-generating construction activities are anticipated to include grading and blasting. These activities are further analyzed below. Grading would occur across the project site and is anticipated to involve the simultaneous use of a scraper and dozer. At a distance of 100 feet, a scraper and dozer would together generate a noise level of 75.7 dBA L_{EQ}. This would exceed the 60 dBA

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

L_{EQ} noise level limit and impacts would be potentially significant. The City noise ordinance does not allow the operation of construction equipment between 8:00 p.m. and 7:00 a.m. Mitigation measure NOI-1 would require a construction noise management plan with measures to ensure construction equipment noise during the hours from 7:00 a.m. to 8:00 p.m. would not exceed the 60 dBA L_{EQ} noise level limit. With implementation of mitigation measure NOI-1, the potential impact from construction equipment noise would be reduced to a less than significant level.

Because project-specific details regarding blasting operations are not available at this time, impacts to off-site residences are conservatively assessed as potentially significant. The basic planning for blasting discussed in the noise report (Appendix H of this Initial Study) provides an estimate of distances and does not constitute a final project-specific analysis. The blasting contractor would be required to determine the allowable distances and charge weights. This analysis is general in nature and does not substitute for proper planning of any blasting and/or responsibility for any potential damages caused by the blaster. Mitigation measure NOI-2 would require a Blasting Management Plan to be submitted and approved by the City. With implementation of measure NOI-2 potential impacts from blasting during project construction would be reduced to a less than significant level.

Construction Traffic

Project construction is anticipated to result in approximately 5,400 one-way truck trips, or approximately 180 truckloads per day of material would be exported over 15 days during grading, which would be required for construction over the course of 15 days during construction. Over the course of an eight-hour construction day, it is assumed 22 trips would occur per hour. This daily traffic level is anticipated to be the highest daily traffic level associated with project construction. The Noise Assessment Study modeled existing traffic volumes and the increased traffic volume from construction to the nearest single-family residences. The addition of the project's haul truck trips during construction would result in noise levels exceeding 65 CNEL within 8 feet of the roadway centerline. However, the nearest residential properties are more than 50 feet from the roadway centerline. Therefore, noise levels would remain below the 65 CNEL maximum exterior noise limit guideline for residential uses. Further, this increase in noise from haul trucks would be temporary (estimated at 15 days) and would cease upon the completion of construction. Therefore, impacts from construction traffic noise would be less than significant.

Operational Traffic

The project would generate vehicular traffic that would utilize surrounding streets and have the potential to result in increased noise levels at existing single-family residences. A general rule of thumb is that a doubling of average daily traffic (ADT) would cause a doubling in noise (a 3-dBA increase), which would be considered a significant increase. According to the project's TIA, these roadways currently have moderate levels of traffic and the conservative addition of the entirety of the project's 1,841 new trips any of these existing roadways would not double ADT. As outlined in the City General Plan, impacts related to exterior noise would be significant if future single-family residences are exposed to noise levels in excess 65 CNEL. The Noise Assessment Study modeled the vehicular noise levels generated from Lasselle Street, Alessandro Boulevard, Bay Avenue, and Darwin Drive on future residences. Noise levels would not be in excess of 65 CNEL at the project's boundaries. The highest calculated traffic noise levels at the perimeter of the proposed park area in the southeast corner of the project site would be 58.4 CNEL, below the 70 CNEL limit for recreational uses as defined in the City's Noise Element.

Therefore, the increase in traffic from the project would not result in excessive noise and impacts from project-generated traffic would be less than significant.

Heating, Venting, Air Conditioning, and Cooling (HVAC)

The project would include Heating, Venting, Air Conditioning, and Cooling (HVAC) units at ground-level locations adjacent to each proposed residence. According to the Noise Assessment Study, a single unit typically generates a noise level of 56 dBA at a distance of 7 feet. At this distance, off-site single-family residences would not be exposed to excess noise from the project's HVAC units. Property line noise levels would not be in excess of the 55 dBA nighttime limit at the property line for off-site single-family residential uses. As such, impacts would be less than significant.

Interior Noise Levels

Traditional architectural materials typically attenuate noise levels by 15 CNEL. Therefore, at locations where noise levels at residence's façades would exceed 60 CNEL, interior noise levels of proposed residential units may exceed the City Noise Element's interior noise standard of 45 CNEL. The Noise Assessment Study determined that residences proposed in the western and northern portions of the project site near Lassalle Street and Bay Avenue would be exposed to exterior noise levels in excess of 60 CNEL. At these residences, interior noise levels would exceed City Noise Element interior noise standards unless the buildings were set back from the road or additional architectural attenuation is incorporated. Mitigation measure NOI-3 would ensure the reduction of noise levels at interior habitable spaces would not exceed 45 CNEL.

Mitigation Measures

NOI-1 **Construction Noise Management Plan.** Noise levels from project-related construction activities shall not exceed the 60 dBA noise limit specified in the Noise Ordinance, when measured at the boundary line of the property where the noise is located or any occupied property where noise is being received. A Construction Management Plan that describes the measures included on the construction plans to ensure compliance with the noise limit shall be prepared by the project applicant and submitted to the City for approval prior to issuance of the grading permit. The following measures may be included to reduce construction noise:

- Construction equipment to be properly outfitted and maintained with manufacturer-recommended noise-reduction devices.
- Diesel equipment to be operated with closed engine doors and equipped with factory-recommended mufflers.
- Mobile or fixed "package" equipment (e.g., arc-welders and air compressors) to be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Electrically powered equipment to be used instead of pneumatic or internal-combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) to be prohibited.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

- Material stockpiles and mobile equipment staging, parking, and maintenance areas to be located as far as practicable from noise sensitive receptors.

- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.

- Temporary sound barriers or sound blankets may be installed between construction operations and adjacent noise-sensitive receptors. Due to equipment exhaust pipes being approximately 7 to 8 feet above ground, a sound wall at least 10 feet in height above grade, located along the eastern property line between the project and neighboring three residences would mitigate noise levels to within acceptable levels. To effectively reduce noise levels, the sound barrier should be constructed of a material with a minimum weight of two pounds per square foot with no gaps or perforations and remain in place until the conclusion of demolition, grading, and construction activities.

- The project applicant shall notify residences within 100 feet of the project's property line in writing within one week of any construction activity such as blasting or heavy grading operations. The notification shall describe the activities anticipated, provide dates and hours, and provide contact information with a description of a complaint and response procedure.

The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process for the affected resident shall be established prior to construction commencement to allow for resolution of noise problems that cannot be immediately solved by the site supervisor.

NOI-2 **Blasting Management Plan**. Should blasting be required on the project site, the project applicant shall prepare a Blasting Management Plan that minimizes potential blasting effects, including from noise, vibration, airblast and flyrock, to adjacent residences within 100 feet. All blast planning must be done by a City of Moreno Valley-approved blasting contractor, and submitted to the City with the appropriate blasting permits, and all other applicable local, state, and federal permits, licenses, and bonding. The blasting contractor or owner must conduct all notifications, inspections, monitoring, and major or minor blasting requirements planning with seismograph reports, as necessary.

NOI-3 **Compliance with Interior Noise Standards.** The project shall incorporate building materials that reduce interior noise levels to 45 CNEL. Standard measures such as glazing with appropriate Sound Transmission Class (STC) ratings, as well as walls with appropriate STC ratings, should be considered. Once specific building plan information is available, an exterior-to-interior analysis shall be performed for residences in locations exceeding 60 CNEL to demonstrate compliance. The information in the analysis shall include wall heights and lengths, room volumes, window and door tables typical for a building plan, as well as information on any other openings in the building shell. With this specific building plan information, the analysis shall determine the predicted interior noise levels for the planned residential spaces. If predicted noise levels are found to exceed 45 CNEL, the analysis shall identify architectural materials or techniques that could be included to reduce noise levels to 45 CNEL. Final plans shall demonstrate that interior noise levels do not exceed 45 CNEL for proposed habitable areas.

b) Generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant Impact with Mitigation Incorporated. According to the Noise Assessment Study, a possible source of vibration, aside from blasting-related vibration during general project construction activities would be a vibratory roller, which may be used for compaction of soil beneath building foundations and could be used within 50 feet of off-site residences. However, this equipment would be used at distances greater than 50 feet from any single residence due to the mobile nature of its use across the project site. A vibratory roller would create approximately 0.098 inch per second peak particle velocity (PPV) at a distance of 50 feet. This would be lower than the structural damage impact to older structures of 0.5 inch per second PPV and the “strongly perceptible” impact for humans of 0.1 inch per second PPV. Additionally, off-site exposure to such ground-borne vibration would be temporary as it would be limited to the short-term construction period. Therefore, even though vibration may be perceptible at nearby residences, temporary impacts associated with the roller (and other potential equipment) would be less than significant.

Blasting activities during construction, noise impacts for which are discussed above, would also be a potentially significant source of vibration during project construction. However, implementation of mitigation measure NOI-2 requiring a blasting plan would also reduce vibration impacts from blasting to less than significant.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Less Than Significant Impact. The project is subject to some distant aircraft noise and is located approximately 3 miles northeast of the nearest airport, March Air Reserve Base. Nearly the entire City is located within the boundaries of the Reserve Base’s ALUCP. However, the project site is not located within an excessive noise contour as defined in the ALUCP as being in excess of 65 CNEL. Periodic flights in the distance would not result in the exposure of people working or residing in the project area to excessive noise from airports and the impact would be less than significant.

XIV. POPULATION AND HOUSING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Less Than Significant Impact. Growth inducing impacts are a result of those characteristics of a project that foster or encourage population and/or economic growth. These characteristics include adding residential units, expanding infrastructure, or generating employment opportunities. The project proposes 177 single-family dwelling units and a park. Based on an average City household size of 3.9 people (SCAG 2019), the proposed project is expected to have a population of approximately 675 people. However, the population increase would be consistent with projections made by SCAG and the General Plan. As such, impacts would be less than significant.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The project site does not contain existing residents or dwelling units. The proposed project would not remove housing; therefore, it would not displace substantial numbers of people and would not necessitate the construction of housing elsewhere. The project would increase the availability of housing in the area. No impact would occur.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

XV. PUBLIC SERVICES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☒	☐
e) Other public facilities?	☐	☐	☒	☐

a) Fire protection?

Less Than Significant Impact. The City contracts with the Riverside County Fire Department to provide fire protection, fire prevention, and emergency services to its residents. The project proposes 177 new single-family residential dwelling units, with an expected population of approximately 690 people, based on the City's average household population of 3.9 people, which is higher than the County average of 3.3 people (SCAG 2019). It is expected that residents of the proposed project would be from out of the area, although some project residents may be relocating from other areas within the City, potentially resulting in a smaller actual population increase from the project. The project site is within the service area for Station No. 99, located at 13400 Morrison Street, approximately one half-mile northeast of the project site. The proposed project would increase the need for fire protection services within the City, but would not require the construction of new fire facilities to maintain acceptable service ratios, response times, or other performance objectives. The project would be required to adhere to all standards and conditions required by the City and the Riverside County Fire Department, including, but not limited to, restrictions on project design, imposition of construction standards, and payment of development impact fees. Adherence to these standards would result in a less than significant impacts associated with the provision of fire protection.

b) Police protection?

Less Than Significant Impact. The City contracts police services from the Riverside County Sheriff's Department. The Moreno Valley Police Department (MVPD) operates out of the Central Police Station, located at 22850 Calle San Juan de Los Lagos. The proposed project would result in an increased demand for police protection services associated with the 177 new single-family residential dwelling units, with an expected population of approximately 690 people, based on the City's average household population of 3.9 people (SCAG 2019). As discussed above, the proposed project is consistent with population

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

projections identified in the General Plan and is located adjacent to other similar residential development. The extension of police protection services to the proposed development would not result in the need for new or altered police protection services. The proposed project would incrementally increase the need for police protection services within the City. The proposed project would be required to adhere to all standards and conditions required by the City and the MVPD, including the payment of impact fees. While the proposed project would increase the need for police protection, it would not require the construction of new facilities to maintain acceptable service ratios, response times, or other performance objectives. Therefore, the proposed project would result in a less than significant impact associated with the provision of police protection.

c) Schools?

Less Than Significant Impact. The project would generate new students that would attend local schools. The Moreno Valley Unified School District (MVUSD) provides educational services for the City's school-age population. The MVUSD currently has sufficient enrollment capacity for future development with no future school facility needs anticipated. However, the project would be required to pay developer fees to MVUSD, which is based on the square footage of the proposed development. Payment of developer fees is considered full mitigation for school facility impacts. As such, the proposed project would not result in significant impacts to schools that would require the need for new or expanded school facilities. Impacts to schools would be less than significant.

d) Parks?

Less Than Significant Impact. The proposed project is expected to have a population of approximately 675 people, based on the City's average household population of 3.9 people (SCAG 2019), and the project would not increase population beyond what was anticipated in the City's General Plan. The availability of nearby City parks available for use by residents, including Morrison and Weston Parks, located with one mile of the project site, would provide adequate park facilities for use by the residents of the proposed project. The project would also include open space areas and landscaped lots. As the proposed project would not result in a population increase in excess General Plan projections, and considering the availability of existing park facilities and the new facilities provided by the proposed project, the project would not result in substantial adverse physical impacts associated with the provision of new or physically altered park facilities. Impacts would be less than significant.

e) Other public facilities?

Less Than Significant Impact. Future residents of the proposed project would likely utilize other public facilities, such as the City's library services. However, since the proposed project is consistent with the growth projected in the City General Plan, it is expected existing public facilities are adequate to serve the project. The project would not result in the need for new or altered public facilities, and as such, impacts would be less than significant.

XVI. RECREATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Less Than Significant Impact. The proposed project is not expected to significantly impact the City's existing parks or recreational facilities. The City's General Plan and development impact fee ordinance requires new development to dedicate parkland and/or pay fees to provide 3 acres of parkland per 1,000 new residents (General Plan Policy 4.2.7). As discussed above, the proposed project is expected to have a population of approximately 675 people, and the project would not increase population beyond what was anticipated in the City General Plan. Additionally, the proposed project would include a park totaling approximately two acres and associated recreational opportunities. Therefore, the payment of applicable development impact fees, provision of project-provided recreational amenities, and the availability of existing recreational amenities in the area, including Morrison and Weston Parks, would ensure that adequate recreational amenities are available to serve the project. It is not expected that the project would result in a substantial increase in use that would cause the physical deterioration of recreational facilities. As such, impacts related to the increased use of existing parks and recreational facilities would be less than significant.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Less Than Significant Impact. The proposed project would include a park totaling approximately two acres, common area landscaping, and internal sidewalks. The environmental impacts of the recreational amenities associated with the project are included in the overall environmental impact analysis for the project. The project would not result in an increase local or regional population that would require the construction or expansion of recreational facilities other than those included in the project and paid for with applicable development impact fees. Impacts would be less than significant.

XVII. TRANSPORTATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☐	☒

a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Less Than Significant Impact. A TIA was prepared for the proposed project by TJW Engineering (TJW 2021; Appendix I). The TIA evaluated the traffic and transportation impacts associated with the development of 195 single-family homes on the project site; however, since preparation of the TIA, the project was reduced to include the currently proposed 177 single-family homes. As such, the analysis presented in the TIA is considered conservative. The proposed project would result in changes to the existing circulation system through the modification of existing roadways and the addition of new internal streets. The project would generate traffic during construction activities and would result in the addition of new long-term traffic to the area by providing 177 new single-family residential dwelling units. The proposed project is anticipated to be built and generating operational trips in 2023. Cumulative traffic forecasts were developed using existing traffic volumes, an annual ambient growth rate per year to the project's opening year, and traffic generated from cumulative projects. The proposed project, as evaluated in the TIA, is conservatively projected to generate 144 total AM peak hour trips, 193 total PM peak hour trips and 1,841 total daily trips. Due to the additional strain on the existing transportation network, the project would provide funding for the construction of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with projected population increases. Therefore, payment of applicable development impact fees would reduce impacts to the circulation system, including transit, roadway, bicycle and pedestrian facilities to a less than significant level.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Less Than Significant Impact. Senate Bill (SB) 743 was adopted in 2013 requiring the Governor's Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts. For land use projects, OPR has identified VMT as the new metric for transportation analysis under CEQA. The regulatory changes to the CEQA guidelines by SB 743 were implemented on July 1st,

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

2020. Consistent with the new metric of VMT for analysis of transportation impacts, the project's TIA followed VMT guidelines set forth by the City of Moreno Valley TIA Guidelines for VMT and Level of Service (LOS) Assessment. For land use projects using the Western Riverside Council of Governments (WRCOG) VMT Screening Tool, the project is located in a low VMT area. Therefore, the project is presumed to have a less than significant VMT impact per City guidelines.

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less Than Significant Impact. The project does not propose a design feature or incompatible use that could substantially increase hazards. The project's driveways would be designed to allow safe ingress and egress in accordance with Section 9.11.080 of the City Municipal Code, which outlines design standards for driveways. Impacts would be less than significant.

d) Result in inadequate emergency access?

No Impact. Access to the site for emergency vehicles would be provided via the project internal streets connected to Lasselle Street and Darwin Drive. The project would be subject to City review and approval for consistency with design requirements while acquiring building permits to ensure that no impediments to emergency access occur. No impacts would occur.

XVIII. TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☒	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Less Than Significant with Mitigation Incorporated. The following discussion addresses questions XVIII(a) and (b).

AB 52 introduced the Tribal Cultural Resource (TCR) as a class of cultural resource and additional considerations relating to Native American consultation into CEQA. A TCR may be considered significant if included in a local or state register of historical resources; determined by the lead agency to be significant pursuant to criteria set forth in Public Resources Code §5024.1; is a geographically defined cultural landscape that meets one or more of these criteria; is a historical resource described in Public Resources Code §21084.1, a unique archaeological resources described in Public Resources Code §21083.2; or is a non-unique archaeological resource if it conforms with the above criteria.

HELIX conducted a Sacred Lands File search of the project site and for a list of consultant tribes with traditional lands or cultural places within the project site. The NAHC did not identify any known sacred lands or Native American cultural resources are within the project site or the surrounding vicinity. Letters were sent to Native American representatives and interested parties identified by the NAHC on March 11, 2021. To date, four responses have been received from the San Manuel Band of Mission Indians, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Agua Caliente Band of Cahuilla Indians. The Agua Caliente Band of Cahuilla Indians indicated that the project resides within the Tribe's Traditional Use Area. As such, the Agua Caliente Band of Cahuilla Indians requests that the project complete a cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area and a copy of the record search and any cultural resource documentation (report and site records) generated in connection with this project be sent to the Tribe.

Based upon the findings of the survey, the project is expected to have no impacts to significant TCRs; however, the general vicinity of the project has been occupied/used by the Luiseño, Cahuilla, and other native people for thousands of years, and there are numerous previously recorded cultural resources within the project vicinity. In addition, the project site falls within the Traditional Use Area of local tribes and may be sensitive for cultural resources requiring mitigation. Mitigation measures CUL-1 through CUL-8, described above under Item V(a) would reduce impacts to a less than significant level.

XIX. UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Less Than Significant Impact. All dry (electricity, gas, telecommunications) and wet (water, sewer, storm drainage) utilities are currently available to residences adjacent to the project site. The project design would include the extension of existing utilities to the project site. The project also includes on- and off-site storm drain improvements within the ROW. While the project would by nature require expanded water, wastewater, storm drainage, electric power, natural gas, and telecommunication facilities, it would not require the relocation of existing facilities and potential impacts of these future facilities are included as part of the project design analyzed in this document. As such, impacts would be less than significant.

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less Than Significant Impact. The proposed residences would result in an increase in potable water demand from the local water purveyor, Eastern Municipal Water District (EMWD). However, the proposed project is consistent with the assumptions made in EMWD's 2015 Urban Water Management

Plan, as the project site is consistent with the existing land use and zoning designations that are used to calculate population projections (EMWD 2015). EMWD's 2015 Urban Water Management Plan concludes that the EMWD has sufficient water supplies available to serve planned land uses within its service area through at least 2040. In addition, the proposed project would not be subject to the provisions of Senate Bill (SB) 610, requiring a Water Supply Assessment, because the proposed project does not involve a use that would result in water demand equivalent to a residential development of more than 500 dwelling units. Therefore, impacts related to water supply would be less than significant.

c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less Than Significant Impact. The proposed project would be required to comply with the applicable waste discharge prohibitions and water quality objectives established by the Santa Ana RWQCB. Treatment of residential wastewater generated by the project would be routine and would not exceed wastewater treatment requirements of the RWQCB. The EMWD is the wastewater treatment provider for the project area. The project would not exceed wastewater treatment capacity of the EMWD's Moreno Water Reclamation Facility. The project proponent would also be required to satisfy City and EMWD requirements related to the payment of fees and/or the provision of wastewater conveyance features, and installation and maintenance prior to the issuance of building permits. Adherence to these wastewater treatment requirements would result in a less than significant impact.

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less Than Significant Impact. Implementation of the proposed project would result in solid waste generation. Construction of the proposed project would result in generation of waste construction materials. In the operational phase, the proposed project would generate household waste and be serviced by Republic Services for residential trash hauling. The project would be required to comply with City of Moreno Valley Ordinance No. 706, which requires a minimum of 50 percent of all construction waste and debris to be recycled. Solid waste generated by the proposed project would be disposed at the Badlands Sanitary Landfill, the Lamb Canyon Sanitary Landfill, and/or the El Sobrante Landfill. Existing capacities between each of these landfills would be sufficient to serve the proposed project. Therefore, impacts would be less than significant.

e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less Than Significant Impact. Construction and operation of the proposed project would comply with applicable federal, state, and local statutes and regulations related to solid waste, including the California Integrated Waste Management Act and the City's recycling programs. The implementation of these programs would reduce the amount of solid waste generated be the proposed project and diverted to landfills. Impacts would be less than significant.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

XX. WILDFIRE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

a) Substantially impair an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. The City adopted an EOP in March 2009 that analyses potential threats to public safety. The project site does not serve as an emergency evacuation route. During construction and long-term operation, the proposed project would be required to maintain adequate emergency access for emergency vehicles, as required by the City. Because the proposed project would not interfere with an adopted emergency response or evacuation plan, impacts would be less than significant.

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Less Than Significant Impact. According to City's General Plan Map S-5, *Fire Hazard Severity Zones*, the project site is not located in an area of substantial or high fire risk (General Plan 2021). The surrounding area has either been developed or has vacant lots mostly devoid of vegetation. No wildlands are located on or adjacent to the project site. Furthermore, the project site is level with minimal slope and associated wildfire risk. Therefore, implementation of the proposed project would not exacerbate wildfire risk or expose occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Impacts would be less than significant.

c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Less Than Significant Impact. The proposed project would require the installation and maintenance of several infrastructure improvements, including roads, stormwater facilities, and utilities. These facilities would not be expected to individually increase fire risks given their setting within an existing urbanized area and connection to existing off-site utilities. Therefore, exacerbated fire risks for the project site and surrounding area associated with project implementation would be less than significant.

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Less Than Significant Impact. The proposed project would result in grading and landform changes. However, this would occur within an existing urbanized area not subject to wildfires. Therefore, the project would not result in significant impacts related to downslope or downstream flooding or landslides, as a result on runoff, post-fire slope instability, or drainage changes. Impacts would be less than significant.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant with Mitigation Incorporated. As described under Biological Resources, construction of the proposed project could result in impacts to BUOW and Fairy Shrimp. Furthermore, construction-related noise during the general bird nesting season has the potential to result in impacts to nesting birds in violation of the MBTA and CFG Code. Implementation of mitigation measures BIO-1 through BIO-5 would reduce potentially significant impacts biological resources impacts to below a level of significance. The project would not reduce the habitat of a fish or wildlife species or have a substantial adverse effect on federally-protected wetlands. The project would not cause a wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal upon implementation of mitigation measures BIO-1 through BIO-5. In addition, grading activities on the project site would have the potential to adversely affect archaeological resources, tribal cultural resources, and paleontological resources; however, implementation of mitigation measures CUL-1 through CUL-8 and PAL-1 would reduce such impacts to less than significant levels. As such, implementation of the project would not eliminate important examples of the major periods of California history or prehistory.

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

b) Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of past, present and probable future projects)?

Less Than Significant with Mitigation Incorporated. Cumulative impacts are defined as two or more individual project effects that, when considered together or in concert with other projects, combine to result in a significant impact (CEQA Guidelines Section 15355). The proposed project, which is almost exclusively limited to construction-related effects, would not result in impacts that are cumulatively considerable and unmitigated. Cumulative potential impacts would be limited through implementation of the identified mitigation measures for air quality (AQ-1), biological resources (BIO-1 through BIO-5), GHGs (GHG-1), and noise (NOI-1 through NOI-4).

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant with Mitigation Incorporated. With the adherence to regulatory codes, ordinances, regulations, standards, and guidelines for a number of issue areas addressed herein, in conjunction with the discussed mitigation measures for air quality (AQ-1), cultural resources (CUL-1 through CUL-8), and noise (NOI-1 through NOI-4) construction and operation of the proposed project would not result in a substantial adverse effect on human beings either directly or indirectly.

3.0 REFERENCES

California Air Resources Board (CARB)

2005. Air Quality and Land Use Handbook: A Community Health Perspective. April. Available at: https://ww3.arb.ca.gov/ch/handbook.pdf.

California Department of Conservation (CDC)

2016 California Important Farmland Map. Available at: http://maps.conservation.ca.gov/ciff/ciff.html.

2015 Alquist-Priolo Mapping. Available at: https://www.conservation.ca.gov/cgs/alquist-priolo

2013 Williamson Act Contract Map. Available at: https://maps.conservation.ca.gov/agriculture/

California Department of Toxic Substances Control (DTSC)

2020 EnviroStor Database. Available at: http://www.envirostor.dtsc.ca.gov/public/.

Eastern Municipal Water District (EMWD).

2015 Urban Water Management Plan.

GeoTek, Inc. (GeoTek)

2020a. Updated Geotechnical Evaluation Proposed Single-Family Residential Development Tract No. 31589 – Darwin Site APN 487-470-028 Northwest of Alessandro Boulevard and Darwin Drive Intersection City Of Moreno Valley, Riverside County, California. August. (Appendix D)

2020b. Updated Geotechnical Evaluation Proposed Single-Family Residential Development APN 487-470-025, Winco Site Northeast of Alessandro Boulevard and Lasselle Avenue Intersection City Of Moreno Valley, Riverside County, California. August. (Appendix D)

HELIX Environmental Planning, Inc. (HELIX)

2021a Air Quality/Greenhouse Gas Report. (Appendix A)

2021b Biological Resources Letter Report. (Appendix B)

2021c Cultural Resources Survey Report. (Appendix C)

2021d Noise Assessment Study. (Appendix H)

Mayers & Associates Civil Engineering, Inc. (Mayers & Associates)

2021a Water Quality Management Plan. (Appendix F)

2021b Hydrology Report. (Appendix G)

Moreno Valley, City of. 2021. General Plan. Available at:

Attachment: Exhibit A to Resolution 2022-06 - MND/IS [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

http://www.moval.org/cdd/documents/general-plan-update/draft-docs/MV-GP-PublicReview.pdf

Paleo Solutions, Inc. (Paleo Solutions)
2021. Paleontological Assessment Report - Tentative Tract Map 38123 Project, City of Moreno Valley, Riverside County, California. (Appendix E)

Riverside, County of. 2015. General Plan. Available at: https://planning.rctlma.org/General-Plan-Zoning/General-Plan

State Water Resources Control Board (SWRCB)
2020 GeoTracker Database. Available at: https://geotracker.waterboards.ca.gov/.

South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook*.

Southern California Association of Governments (SCAG). Local Profile Report. 2019. Available at: https://scag.ca.gov/sites/main/files/fileattachments/morenovalley_localprofile.pdf?1606013528#:~:text=Between%202000%20and%202018%2C,increased%20by%2065%2C250%20to%20207%2C629.

TJW Engineering
2021. Traffic Impact Analysis. September. (Appendix I)

United States Department of Fish and Wildlife (USFWS). 2015. Survey Guidelines for the Listed Large Branchiopods. Sacramento, California: USFWS. May 2015. Retrieved from: https://www.fws.gov/cno/es/FinalSurveyGuidelinesforListedLargeBranchiopods.pdf.

4.0 PREPARERS

David Crook, AICP, LEED AP, Project Manager

Brendan Sullivan, Environmental Planner

Lauren Singleton, Biology Project Manager

Kassie Sugimoto, Archaeology Project Manager

Charles Terry, Principal Acoustician

Jason Runyan, Acoustics Project Manager

Victor Ortiz, Air Quality/Greenhouse Gas Project Manager

Martin Rolph, Air Quality/Acoustics Specialist

Tentative Tract Map 38123 Residential Project

Air Quality and Greenhouse Gas Emissions Technical Report

October 2021 | 00239.00028.001

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

This page intentionally left blank

Tentative Tract Map 38123 Residential Project

Air Quality and Greenhouse Gas Emissions Technical Report

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

October 2021 | 00239.00028.001

This page intentionally left blank

TABLE OF CONTENTS

Section **Page**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS (cont.)

Section **Page**

LIST OF APPENDICES

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
APN	Assessor’s Parcel Number
AQMP	Air Quality Management Plan
C_2F_6	hexafluoroethane
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CF_4	tetraflouromethane
CFC	chlorofluorocarbon
CH_4	methane
City	City of Moreno Valley
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DPM	diesel particulate matter
EO	Executive Order
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
I-	Interstate
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatts
kWhr	kilowatts-hours
LCFS	Low Carbon Fuel Standard
LLG	Linscott, Law & Greenspan, Engineers
LOS	Level of Service
LST	localized significance threshold

ACRONYMS AND ABBREVIATIONS (cont.)

mg/m^3	milligrams per cubic meter
MMT	million metric tons
mpg	miles per gallon
mph	miles per hour
MT	metric tons
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NHTSA	National Highway Traffic Safety Administration
NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
O_3	ozone
Pb	lead
PFC	perfluorocarbon
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
ppm	parts per million
ROG	reactive organic gas
RTP	Regional Transportation Plan
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SF	Square Feet
SF_6	hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_X	sulfur oxides
SRA	source receptor area
TACs	toxic air contaminants
TIA	Traffic Impact Analysis
USEPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled
VOC	volatile organic compound

This page intentionally left blank

EXECUTIVE SUMMARY

This report presents an assessment of potential air quality and greenhouse gas (GHG) emissions impacts during construction and operation of the proposed Darco Residential Project (project), located in the City of Moreno Valley (City). The Project includes construction of 177 single-family residential lots, a 2.2-acre park, water quality retention basins, open space areas, underground utilities, and internal streets/sidewalks.

The project would be consistent with the City's General Plan land use designation and zoning. As such, the project's growth is accounted for in the South Coast Air Quality Management District's (SCAQMD's) Air Quality Management Plan. Therefore, the proposed project would not conflict with or obstruct implementation of the most recent AQMP.

The project would result in emissions of criteria air pollutants during construction and operation. In accordance with SCAQMD Rule 403, fugitive dust control measures are incorporated into the project design including: the use of an on-site water truck to wet down active grading areas and roads at least twice daily, maintaining a minimum moisture content of 12 percent on unpaved roads, and enforcing a 15 mile per hour (mph) speed limit on unpaved roads. Project emissions of criteria pollutants during construction would exceed the SCAQMD emissions threshold for nitrogen oxides (NO_X). Mitigation measure AQ-1 would require USPEA Tier 4 certified engines for all diesel construction equipment with 50 or more horsepower. Impacts related to cumulatively considerable net increases of criteria pollutant in the region would be less than significant with mitigation incorporated.

Project-generated traffic would not result in a carbon monoxide hot spot. Construction and operation of the project would not result in exposure of sensitive receptors to significant quantities of toxic air contaminants or substantial localized criteria pollutant and precursor concentrations. Impacts related to exposure of sensitive receptors to substantial pollutant concentrations, or other emissions such as odors, would be less than significant.

The project would be required to comply with the 2019 Title 24 Energy Code, including the requirement for on-site solar electricity generation; the 2019 California Green Building Standards Code; the Assembly Bill 341 solid waste diversion target of 75 percent; reduction of potable water use by 20 percent when compared to the statewide average; low-flow water and bathroom fixtures; reduction of wastewater generation by 20 percent; weather-based irrigation systems; and provide areas for storage and collection of recyclables and yard waste. The project is located in an area considered to have low vehicle miles traveled (VMT) for the region.

The project-related construction activities are estimated to generate 2,044 metric tons (MT) of carbon dioxide equivalent (CO_2e), or 68 MT per year of CO_2e emissions per year for 30 years. The project-related operational and amortized construction GHG emissions for the first full year of operation (estimated to be 2026) would be 2,301 MT CO_2e and the GHG emissions per capita would be 3.3 MT CO_2e. Project emissions would not exceed the 2040 GHG reduction target of 4.0 MT CO_2e per capita in the City's Climate Action Plan (CAP). To ensure consistency with the City CAP GHG reduction measures, mitigation measure GHG-1 would require smart meters to be installed on all project residences. The impacts related to GHG emissions and conflicts with GHG reduction plans and policies would be less than significant with mitigation incorporated.

This page intentionally left blank

1.0 INTRODUCTION

This report presents an assessment of potential air quality and greenhouse gas (GHG) emissions impacts during construction and operation of the proposed Darco Residential Project (project).

1.1 PROJECT LOCATION

The project is located within the City of Moreno Valley (City), in western Riverside County, within Section 9 of Township 3 South, Range 3 West, on the U.S. Geological Survey (USGS) 7.5-minute Sunnymead quadrangle. The project site consists of two adjacent properties: Assessor's Parcel Number (APN) 487-470-025, approximately 17.6 acres on the west, and APN 487-470-028, approximately 17.9 acres on the east. See Figure 1, *Regional Location*, and Figure 2, *Aerial Photograph*.

1.2 PROJECT DESCRIPTION

The project would develop a residential tract within the two adjacent parcels totaling approximately 33.6 acres. Site development would include the grading and construction of single-family residential lots/homes, a water quality basin, a 2.2-acre open space park, underground utilities, off-site sewer improvements, and internal streets/sidewalks. The vacant lot in the southwest corner of the western parcel is not part of the project. Residential home sizes range from a minimum 1,378 square feet (SF) to 2,435 SF. Vehicular access to the project site would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. See Figure 3, *Site Plan*.

1.3 CONSTRUCTION ACTIVITIES AND PHASING

Project construction is assumed to occur over an approximately 3-year, 2-month period starting in May 2022. Construction activities include grading (possibly with blasting), installation of underground utilities and infrastructure, paving, construction of residences, and architectural coating (e.g., painting). The project would not require demolition, as the site is currently vacant and undeveloped. Site preparation (e.g., grubbing) would be included in the grading. During grading, approximately 180 truckloads per day of material would be exported over 15 days, generating approximately 5,400 one-way truck trips. Blasting may be required during grading if conventional equipment is unable to efficiently remove areas of rock. Blasting is assumed to occur up to one day per week during grading. All other construction activities on the project site would be halted while explosives are prepared and detonated. Architectural coatings would occur concurrently with building construction—residences would be painted in sequence as they are completed. Detailed construction phasing and equipment assumptions are summarized in Section 4.1, *Methodology*, and provided in Appendix A.

Project construction would be required to implement all applicable fugitive dust best available control measures specified in Table 1 of the SCAQMD Rule 403, *Fugitive Dust* (SCAQMD 2005), including, but not limited to: the use of an on-site water truck to wet down exposed areas at least twice daily, maintaining a 12 percent moisture content to unpaved roads, and limiting vehicle speeds to 15 miles per hour (mph).

2.0 REGULATORY SETTING

2.1 AIR QUALITY

The project site is located within the South Coast Air Basin (SCAB). Air quality in the SCAB is regulated by the U.S. Environmental Protection Agency (USEPA) at the federal level, by the California Air Resources Board (CARB) at the state level, and by the SCAQMD at the regional level.

2.1.1 Air Pollutants of Concern

2.1.1.1 Criteria Pollutants

Criteria pollutants are defined by state and federal law as a risk to the health and welfare of the general public. In general, criteria air pollutants include the following compounds:

- Ozone (O_3)
- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Particulate matter (PM), which is further subdivided:
  - Coarse PM, 10 micrometers or less in diameter (PM_{10})
  - Fine PM, 2.5 micrometers or less in diameter ($PM_{2.5}$)
- Sulfur dioxide (SO_2)
- Lead (Pb)

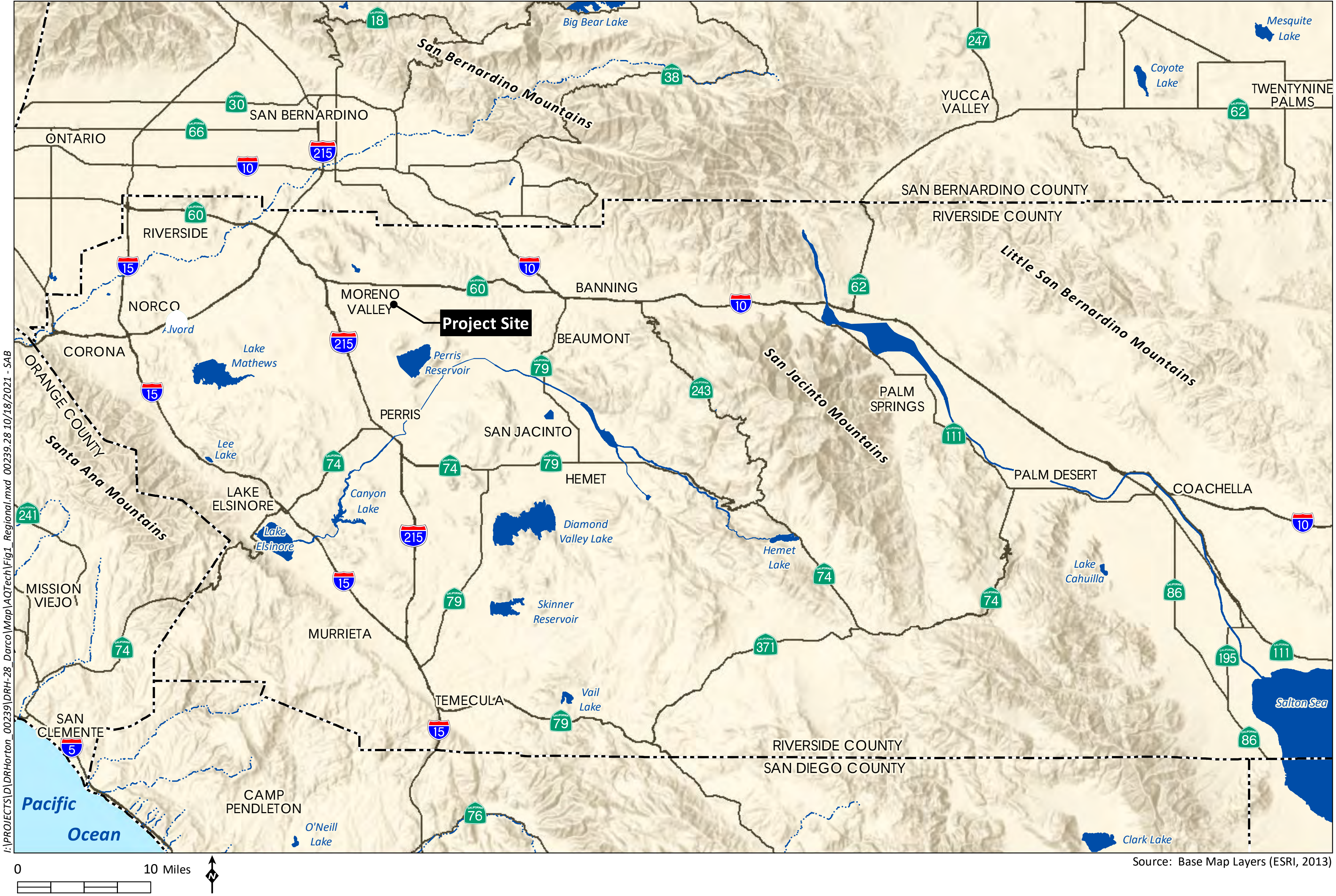
Criteria pollutants can be emitted directly from sources (primary pollutants; e.g., CO, SO_2, PM_{10}, $PM_{2.5}$, and lead), or they may be formed through chemical and photochemical reactions of precursor pollutants in the atmosphere (secondary pollutants; e.g., ozone, NO_2, PM_{10}, and $PM_{2.5}$). PM_{10} and $PM_{2.5}$ can be both primary and secondary pollutants. The principal precursor pollutants of concern are reactive organic gases ([ROGs] also known as volatile organic compounds [VOCs])[1] and nitrogen oxides (NO_X).

The descriptions of sources and general health effects for each of the criteria air pollutants are shown in Table 1, *Summary of Common Sources and Human Health Effects of Criteria Air Pollutants*, based on information provided by the California Air Pollution Control Officers Association ([CAPCOA] 2021a). Specific adverse health effects on individuals or population groups induced by criteria pollutant emissions are highly dependent on a multitude of interconnected variables such as cumulative concentrations, local meteorology and atmospheric conditions, and the number and characteristics of exposed individuals (e.g., age, gender). Criteria pollutant precursors (ROG and NO_X) affect air quality on a regional scale, typically after significant delay and distance from the pollutant source emissions. Health effects related to ozone and NO_2 are, therefore, the product of emissions generated by numerous sources throughout a region. Emissions of criteria pollutants from vehicles traveling to or from the project site (mobile emissions) are distributed nonuniformly in location and time throughout the region,

---

[1] CARB defines and uses the term ROGs while the USEPA defines and uses the term VOCs. The compounds included in the lists of ROGs and VOCs and the methods of calculation are slightly different. However, for the purposes of estimating criteria pollutant precursor emissions, the two terms are often used interchangeably.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Source: Base Map Layers (ESRI, 2013)

HELIX
Environmental Planning

Regional Location

Figure 1

Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\AQTech\Fig2_Aerial.mxd 00239.28 10/18/2021 - SAB

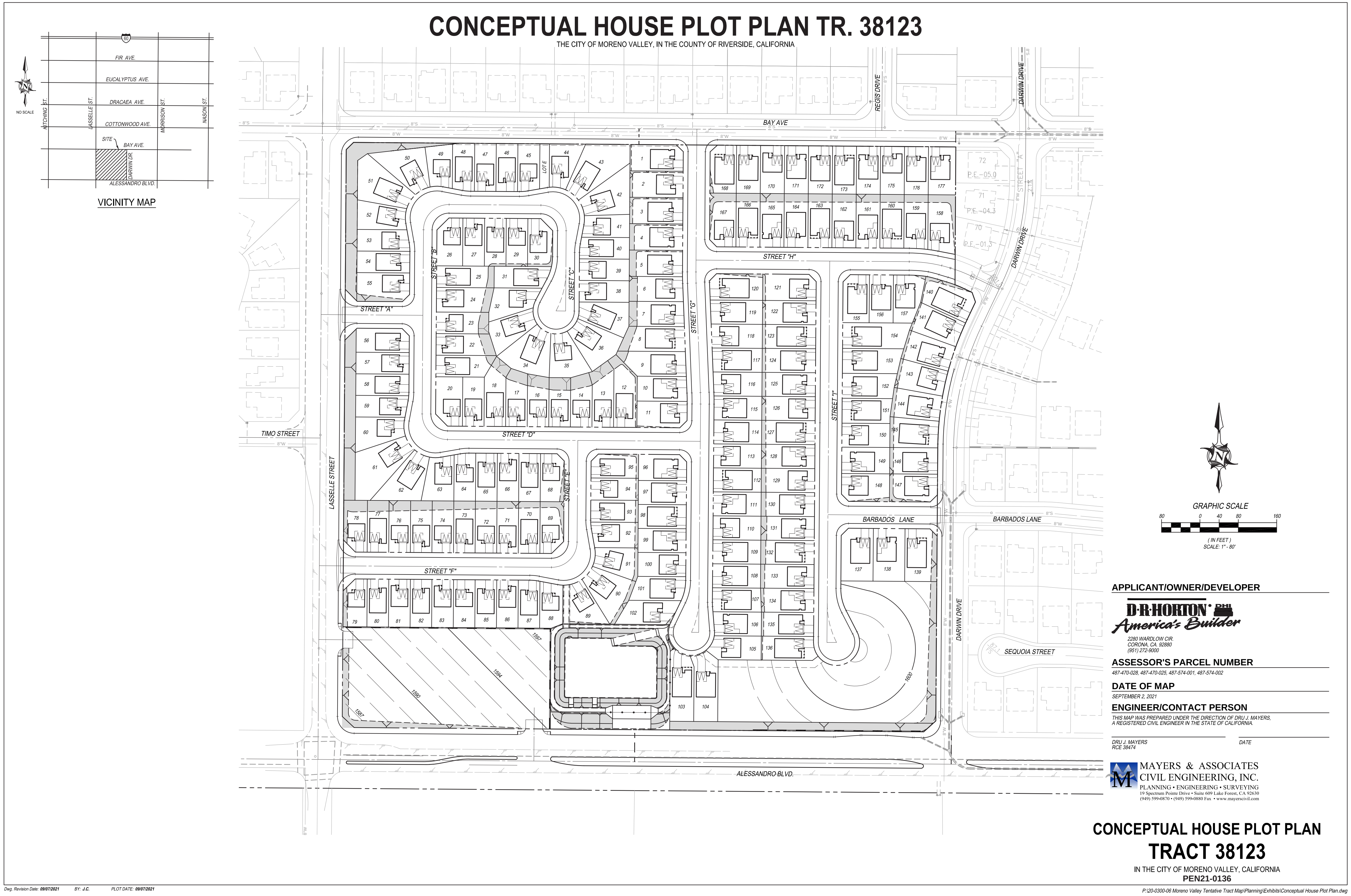
HELIX
Environmental Planning

Aerial Photograph

Figure 2

CONCEPTUAL HOUSE PLOT PLAN TR. 38123

THE CITY OF MORENO VALLEY, IN THE COUNTY OF RIVERSIDE, CALIFORNIA



APPLICANT/OWNER/DEVELOPER

D·R·HORTON America's Builder

2280 WARDLOW CIR.
CORONA, CA. 92880
(951) 272-9000

ASSESSOR'S PARCEL NUMBER

487-470-028, 487-470-025, 487-574-001, 487-574-002

DATE OF MAP

SEPTEMBER 2, 2021

ENGINEER/CONTACT PERSON

THIS MAP WAS PREPARED UNDER THE DIRECTION OF DRU J. MAYERS, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA.

DRU J. MAYERS
RCE 38474

DATE

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

CONCEPTUAL HOUSE PLOT PLAN
TRACT 38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA
PEN21-0136

P:\20-0300-06 Moreno Valley Tentative Tract Map\Planning\Exhibits\Conceptual House Plot Plan.dwg

Dwg. Revision Date: **09/07/2021** BY: **J.C.** PLOT DATE: **09/07/2021**

Source: Mayers & Associates Civil Engineering, 2021

HELIX
Environmental Planning

Site Plan

Figure 3

wherever the vehicles may travel. As such, specific health effects from these criteria pollutant emissions cannot be meaningfully correlated to the incremental contribution from the project.

Table 1
SUMMARY OF COMMON SOURCES AND HUMAN HEALTH EFFECTS OF CRITERIA AIR POLLUTANTS

Pollutant	Major Man-Made Sources	Human Health Effects
Carbon Monoxide (CO)	An odorless, colorless gas formed when carbon in fuel is not burned completely; a component of motor vehicle exhaust.	Reduces the ability of blood to deliver oxygen to vital tissues, affecting the cardiovascular and nervous system. Impairs vision, causes dizziness, and can lead to unconsciousness or death.
Nitrogen Dioxide (NO_2)	A reddish-brown gas formed during fuel combustion for motor vehicles and industrial sources. Sources include motor vehicles, electric utilities, and other sources that burn fuel.	Respiratory irritant; aggravates lung and heart problems. Precursor to ozone and acid rain. Contributes to climate change and nutrient overloading, which deteriorates water quality. Causes brown discoloration of the atmosphere.
Ozone (O_3)	Formed by a chemical reaction between reactive organic gases (ROGs) and nitrogen oxides (NO_X) in the presence of sunlight. Common sources of these precursor pollutants include motor vehicle exhaust, industrial emissions, gasoline storage and transport, solvents, paints, and landfills.	Irritates and causes inflammation of the mucous membranes and lung airways; causes wheezing, coughing, and pain when inhaling deeply; decreases lung capacity; aggravates lung and heart problems. Damages plants; reduces crop yield. Damages rubber, some textiles and dyes.
Particulate Matter (PM_{10} and $PM_{2.5}$)	Produced by power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, automobiles, and other sources.	Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).
Sulfur Dioxide (SO_2)	A colorless, nonflammable gas formed when fuel containing sulfur is burned, when gasoline is extracted from oil, or when metal is extracted from ore. Examples are petroleum refineries, cement manufacturing, metal processing facilities, locomotives, and ships.	Respiratory irritant. Aggravates lung and heart problems. In the presence of moisture and oxygen, sulfur dioxide converts to sulfuric acid, which can damage marble, iron, and steel. Damages crops and natural vegetation. Impairs visibility. Precursor to acid rain.
Lead	Metallic element emitted from metal refineries, smelters, battery manufacturers, iron and steel producers, use of leaded fuels by racing and aircraft industries.	Anemia, high blood pressure, brain and kidney damage, neurological disorders, cancer, lowered IQ. Affects animals, plants, and aquatic ecosystems.

Source: CAPCOA 2021a

2.1.1.2 Toxic Air Contaminants

The Health and Safety Code (§39655, subd. (a).) defines a toxic air contaminant (TAC) as "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health." A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the Federal Clean Air Act (CAA) (42 United States Code Section 7412[b]) is a TAC. Under State law, the California Environmental Protection Agency (CalEPA), acting through CARB, is authorized to identify a substance as a TAC if it determines the substance is an air pollutant that may cause or contribute to an increase in mortality or an increase in serious illness, or that may pose a present or potential hazard to human health.

Diesel engines emit a complex mixture of air pollutants, including both gaseous and solid material. The solid material in diesel exhaust is referred to as diesel particulate matter (DPM). Almost all DPM is 10 microns or less in diameter, and 90 percent of DPM is less than 2.5 microns in diameter (CARB 2021a). Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung. In 1998, CARB identified DPM as a TAC based on published evidence of a relationship between diesel exhaust exposure and lung cancer and other adverse health effects. DPM has a notable effect on California's population—it is estimated that about 70 percent of total known cancer risk related to air toxics in California is attributable to DPM (CARB 2021a).

2.1.2 Federal Air Quality Regulations

2.1.2.1 Federal Clean Air Act

Air quality is defined by ambient air concentrations of specific pollutants identified by the USEPA to be of concern with respect to health and welfare of the general public. The USEPA is responsible for enforcing the CAA of 1970 and its 1977 and 1990 Amendments. The CAA required the USEPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the USEPA established both primary and secondary standards for several criteria pollutants. Table 2, *Ambient Air Quality Standards*, shows the federal and state ambient air quality standards for these pollutants.

Table 2
AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards	Federal Standards Primary[1]	Federal Standards Secondary[2]
O_3	1 Hour	0.09 ppm (180 µg/m^3)	–	–
	8 Hour	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)	Same as Primary
PM_{10}	24 Hour	50 µg/m^3	150 µg/m^3	Same as Primary
	AAM	20 µg/m^3	–	Same as Primary
$PM_{2.5}$	24 Hour	–	35 µg/m^3	Same as Primary
	AAM	12 µg/m^3	12.0 µg/m^3	15.0 µg/m^3
CO	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	–
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
NO_2	1 Hour	0.18 ppm (339 µg/m^3)	0.100 ppm (188 µg/m^3)	–
	AAM	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary

Pollutant	Averaging Time	California Standards	Federal Standards Primary[1]	Federal Standards Secondary[2]
SO_2	1 Hour	0.25 ppm (655 μg/m^3)	0.075 ppm (196 μg/m^3)	–
	3 Hour	–	–	0.5 ppm (1,300 μg/m^3)
	24 Hour	0.04 ppm (105 μg/m^3)	–	–
Lead	30-day Avg.	1.5 μg/m^3	–	–
	Calendar Quarter	–	1.5 μg/m^3	Same as Primary
	Rolling 3-month Avg.	–	0.15 μg/m^3	Same as Primary
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per km – visibility ≥ 10 miles (0.07 per km – ≥30 miles for Lake Tahoe)	No Federal Standards	No Federal Standards
Sulfates	24 Hour	25 μg/m^3	No Federal Standards	No Federal Standards
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)	No Federal Standards	No Federal Standards
Vinyl Chloride	24 Hour	0.01 ppm (26 μg/m^3)	No Federal Standards	No Federal Standards

Source: CARB 2016

[1] National Primary Standards: The levels of air quality necessary, within an adequate margin of safety, to protect the public health.

[2] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

O_3 = ozone; ppm: parts per million; μg/m^3 = micrograms per cubic meter; PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less; AAM = Annual Arithmetic Mean; $PM_{2.5}$ = fine particulate matter; CO = carbon monoxide; mg/m^3 = milligrams per cubic meter; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; km = kilometer; – = No Standard

The USEPA has classified air basins (or portions thereof) as being in “attainment,” “nonattainment,” “maintenance,” or “unclassified” for each criteria air pollutant, based on whether or not the NAAQS have been achieved. Upon attainment of a standard for which an area was previously designated nonattainment, the area will be classified as a maintenance area. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. The project site is located within the Riverside County portion of the SCAB and, as such, is in an area designated as a nonattainment area for certain pollutants that are regulated under the CAA. Table 3, *South Coast Air Basin Attainment Status*, lists the federal and state attainment status of the SCAB for the criteria pollutants. With respect to federal air quality standards, the USEPA classifies the SCAB as in attainment for PM_{10}, CO, NO_2, SO_2, and lead, and in nonattainment for 8-hour ozone and $PM_{2.5}$.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 3
SOUTH COAST AIR BASIN ATTAINMENT STATUS
(RIVERSIDE COUNTY PORTION)

Criteria Pollutant	Federal Designation	State Designation
O_3 (1-hour)	(No federal standard)	Nonattainment
O_3 (8-hour)	Extreme Nonattainment	Nonattainment
CO	Attainment (Maintenance)	Attainment
PM_{10}	Attainment (Maintenance)	Nonattainment
$PM_{2.5}$	Serious Nonattainment	Nonattainment
NO_2	Attainment (Maintenance)	Attainment
SO_2	Unclassifiable/Attainment	Unclassifiable/Attainment
Lead	Attainment	Attainment
Sulfates	(No federal standard)	Attainment
Hydrogen Sulfide	(No federal standard)	Attainment
Visibility	(No federal standard)	Attainment

Source: SCAQMD 2016a

2.1.3 California Air Quality Regulations

2.1.3.1 California Clean Air Act

The federal CAA allows states to adopt ambient air quality standards and other regulations provided that they are at least as stringent as federal standards. CARB, a part of the CalEPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California, including setting the California Ambient Air Quality Standards (CAAQS). CARB also conducts research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

In addition to primary and secondary AAQS, the state has established a set of episode criteria for ozone, CO, NO_2, SO_2, and PM. These criteria refer to episode levels representing periods of short-term exposure to air pollutants that actually threaten public health. Table 3, above, lists the state attainment status of the SCAB for the criteria pollutants. Under state designation, the SCAB is currently in attainment for CO, NO_2, SO_2, and lead; and in nonattainment for ozone, PM_{10}, and $PM_{2.5}$.

2.1.3.2 State Implementation Plan

The CAA requires areas with unhealthy levels of ozone, inhalable particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide to develop plans, known as State Implementation Plans (SIPs). SIPs are comprehensive plans that describe how an area will attain the NAAQS. The 1990 amendments to the CAA set deadlines for attainment based on the severity of an area's air pollution problem.

SIPs are not single documents—they are a compilation of new and previously submitted plans, programs (e.g., monitoring, modeling, permitting), district rules, state regulations and federal controls. Many of California's SIPs rely on a core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts and other agencies prepare SIP elements and submit them to CARB for review and approval. CARB forwards the SIP revisions to the USEPA for approval and publication in the Federal Register. The Code of Federal Regulations (CFR) Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items that are included in the California SIP (CARB 2009). At any one time, several California submittals are pending USEPA approval.

2.1.3.3 California Energy Code

California Code of Regulations (CCR) Title 24 Part 6, California's Energy Efficiency Standards for Residential and Nonresidential Buildings, were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for space and water heating) results primarily in GHG emissions. The California Energy Code is discussed in further detail in Section 2.2.4, below.

2.1.4 Local Regulations

2.1.4.1 South Coast Air Quality Management District

Air quality in the non-desert portion of Riverside County is regulated by the SCAQMD. As a regional agency, the SCAQMD works directly with the Southern California Association of Governments (SCAG), County transportation commissions, and local governments and cooperates actively with all federal and state government agencies. The SCAQMD develops rules and regulations; establishes permitting requirements for stationary sources; inspects emissions sources; and enforces such measures through educational programs or fines, when necessary.

Air Quality Management Plan

The SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources. It has responded to this requirement by preparing a sequence of Air Quality Management Plans (AQMP).

On March 3, 2017, the SCAQMD adopted the 2016 AQMP, which is a regional and multi-agency effort (SCAQMD, CARB, SCAG, and USEPA). The 2016 AQMP represents a comprehensive analysis of emissions, meteorology, atmospheric chemistry, regional growth projections, and the impact of existing control measures. The plan seeks to achieve multiple goals in partnership with other entities promoting reductions in criteria pollutant, GHGs, and toxic risk, as well as efficiencies in energy use, transportation, and goods movement (SCAQMD 2017).

The AQMP, in combination with those from all other California nonattainment areas with serious (or worse) air quality problems, is submitted to CARB, which develops the California SIP. The SIP relies on the same information from SCAG to develop emission inventories and emission reduction strategies that are included in the attainment demonstration for the air basin. The current federal and state attainment status for the SCAB is presented above, in Table 3.

Rules and Regulations

The following rules promulgated by the SCAQMD would be applicable to construction and/or operation of the project.

Rule 401 – Visible Emissions: Limits the allowable opacity of air contaminant emissions from any single source (SCAQMD 2001).

Rule 402 – Nuisance: Prohibits the discharge of air contaminants, including odors, which cause injury, detriment, nuisance, or annoyance to any considerable number of persons (SCAQMD 1976).

Rule 403 – Fugitive Dust: Requires actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions, including emissions from construction activities. Project construction would be required to implement all applicable fugitive dust best available control measures specified in Table 1 in the rule (SCAQMD 2005).

Rule 445 – Wood Burning Devices: Controls the operation sale, and installation of wood-burning devices. Permanently installed wood-burning devices (e.g., fireplace, woodstoves) are prohibited in all new development (SCAQMD 2020).

Rule 113 – Architectural Coating: Establishes VOC limits for architectural coatings (e.g., paints, stains, preservatives). Effective January 1, 2019, building interior and exterior paint is limited to a maximum VOC content of 50 grams per liter (SCAQMD 2016b).

2.2 GREENHOUSE GASES

2.2.1 Climate Change Overview

Global climate change refers to changes in average climatic conditions on Earth including temperature, wind patterns, precipitation, and storms. Global temperatures are moderated by atmospheric gases. These gases are commonly referred to as GHGs because they function like a greenhouse by letting sunlight in but preventing heat from escaping, thus warming the Earth's atmosphere.

GHGs are emitted by natural processes and human (anthropogenic) activities. Anthropogenic GHG emissions are primarily associated with: (1) the burning of fossil fuels during motorized transport, electricity generation, natural gas consumption, industrial activity, manufacturing, and other activities; (2) deforestation; (3) agricultural activity; and (4) solid waste decomposition.

The temperature record shows a decades-long trend of warming, with 2016 global surface temperatures ranking as the warmest year on record since 1880. The newest release in long-term warming trends announced 2020 ranked as tied with 2016 for the warmest year on record with an increase of 1.84 degrees Fahrenheit compared to the 1951-1980 average (National Aeronautics and Space Administration [NASA] 2021). GHG emissions from human activities are the most significant driver of observed climate change since the mid-20th century (United Nations Intergovernmental Panel on Climate Change [IPCC] 2013). The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. The statistical models show a "high confidence" that temperature increase caused by anthropogenic GHG emissions could be kept to less than two degrees Celsius relative to pre-industrial levels if atmospheric concentrations are stabilized at about 450 parts per million (ppm) carbon dioxide equivalent (CO_2e) by the year 2100 (IPCC 2014).

2.2.2 Types of Greenhouse Gases

The GHGs defined under California's AB 32 include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Carbon Dioxide. CO_2 is the most important and common anthropogenic GHG. CO_2 is an odorless, colorless GHG. Natural sources include the decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungi; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of CO_2 include burning fuels, such as coal, oil, natural gas, and wood. Data from ice cores indicate that CO_2 concentrations remained steady prior to the current period for approximately 10,000 years. The atmospheric CO_2 concentration in 2010 was 390 ppm, 39 percent above the concentration at the start of the Industrial Revolution (approximately 280 ppm in 1750). In February 2021, the CO2 concentration was 416 ppm, a 48 percent increase since 1750 (National Oceanic and Atmospheric Administration [NOAA] 2021).

Methane. CH_4 is the main component of natural gas used in homes. A natural source of methane is from the decay of organic matter. Geological deposits known as natural gas fields contain methane, which is extracted for fuel. Other sources are from decay of organic material in landfills, fermentation of manure, and cattle digestion.

Nitrous Oxide. N_2O is produced by both natural and human-related sources. N_2O is emitted during agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Primary human-related sources of N_2O are agricultural soil management, animal manure management, sewage treatment, mobile and stationary combustion of fossil fuel, adipic (fatty) acid production, and nitric acid production.

Hydrofluorocarbons. Fluorocarbons are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. Chlorofluorocarbons (CFCs) are nontoxic, nonflammable, insoluble, and chemically nonreactive in the troposphere (the level of air at Earth's surface). CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone; therefore, their production was stopped as required by the 1989 Montreal Protocol.

Sulfur Hexafluoride. SF_6 is an inorganic, odorless, colorless, nontoxic, nonflammable gas. SF_6 is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semi-conductor manufacturing, and as a tracer gas for leak detection.

GHGs have long atmospheric lifetimes that range from one year to several thousand years. Long atmospheric lifetimes allow for GHG emissions to disperse around the globe. Because GHG emissions vary widely in the power of their climatic effects, climate scientists have established a unit called global warming potential (GWP). The GWP of a gas is a measure of both potency and lifespan in the atmosphere as compared to CO_2. For example, a gas with a GWP of 10 is 10 times more potent than CO_2 over 100 years. CO_2e is a quantity that enables all GHG emissions to be considered as a group despite their varying GWP. The GWP of each GHG is multiplied by the prevalence of that gas to produce CO_2e.

Historically, GHG emission inventories have been calculated using the GWPs from the IPCC's Second Assessment Report (SAR). In 2007, IPCC updated the GWP values based on the latest science at the time in its Fourth Assessment Report (AR4). The updated GWPs in the IPCC AR4 have begun to be used in recent GHG emissions inventories. In 2013, IPCC again updated the GWP values based on the latest science in its Fifth Assessment Report (AR5) (IPCC 2013). However, United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines for national inventories require the use of GWP values from the AR4. To comply with international reporting standards under the UNFCCC, official emission estimates for California and the U.S. are reported using AR4 GWP values, and statewide and national GHG inventories have not yet updated their GWP values to the AR5 values. Project GHG emissions in this analysis are reported using the AR4 GWP values.

By applying the GWP ratios, project-related CO_2e emissions can be tabulated in metric tons per year. Typically, the GWP ratio corresponding to the warming potential of CO_2 over a 100-year period is used as a baseline. The atmospheric lifetime and GWP of selected GHGs are summarized in Table 4, *Global Warming Potentials and Atmospheric Lifetimes*.

Table 4
GLOBAL WARMING POTENTIALS AND ATMOSPHERIC LIFETIMES

Greenhouse Gas	Atmospheric Lifetime (years)	IPCC SAR GWP	IPCC AR4 GWP	IPCC AR5 GWP
Carbon Dioxide (CO_2)	50-200	1	1	1
Methane (CH_4)	12	21	25	28
Nitrous Oxide (N_2O)	114	310	298	265
HFC-134a	14	1,300	1,430	1,300
PFC: Tetraflouromethane (CF_4)	50,000	6,500	7,390	6,630
PFC: Hexafluoroethane (C_2F_6)	10,000	9,200	12,200	11,100
Sulfur Hexafluoride (SF_6)	3,200	23,900	22,800	23,500

Source: IPCC 2007
IPCC = Intergovernmental Panel on Climate Change; GWP = global warming potential; HFC = hydrofluorocarbon; PFC = perfluorocarbon

2.2.3 Federal Greenhouse Gas Regulations

2.2.3.1 Federal Clean Air Act

The U.S. Supreme Court ruled on April 2, 2007, in *Massachusetts v. U.S. Environmental Protection Agency* that CO_2 is an air pollutant, as defined under the CAA, and that the USEPA has the authority to regulate emissions of GHGs. The USEPA announced that GHGs (including CO_2, CH_4, N_2O, HFC, PFC, and SF_6) threaten the public health and welfare of the American people (USEPA 2021). This action was a prerequisite to finalizing the USEPA's GHG emissions standards for light-duty vehicles, which were jointly proposed by the USEPA and the United States Department of Transportation's National Highway Traffic Safety Administration (NHTSA).

2.2.3.2 Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards

The USEPA and the NHTSA worked together on developing a national program of regulations to reduce GHG emissions and to improve fuel economy of light-duty vehicles. The USEPA established the first-ever national GHG emissions standards under the CAA, and the NHTSA established CAFE standards under the Energy Policy and Conservation Act. On April 1, 2010, the USEPA and NHTSA announced a joint Final Rulemaking that established standards for 2012 through 2016 model year vehicles. This was followed up on October 15, 2012, when the agencies issued a Final Rulemaking with standards for model years 2017 through 2025. On March 3, 2020, the agencies released the final Safer Affordable Fuel-Efficient Vehicles

Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule). The purpose of the SAFE Vehicles Rule is "to correct the national automobile fuel economy and GHG emissions standards to give the American people greater access to safer, more affordable vehicles that are cleaner for the environment." The direct effect of the rule is to eliminate the standards that were put in place to gradually raise average fuel economy for passenger cars and light trucks under test conditions from 37 miles per gallon (mpg) in 2020 to 50 mpg in 2025. The new SAFE Vehicles Rule freezes the average fuel economy level standards indefinitely at the 2020 levels. The new SAFE Vehicles Rule also results in the withdraw of the waiver previously provided to California for that State's GHG and zero emissions vehicle (ZEV) programs under Section 209 of the CAA (USEPA and NHTSA 2020).

2.2.4 California Greenhouse Gas Regulations

2.2.4.1 California Code of Regulations, Title 24, Part 6

CCR Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. Energy-efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for space or water heating) results in GHG emissions.

The Title 24 standards are updated approximately every three years to allow consideration and possible incorporation of new energy efficiency technologies and methods. The 2019 Title 24 standards went into effect on January 1, 2020. The 2019 update to the Building Energy Efficiency Standards focuses on several key areas to improve the energy efficiency of newly constructed buildings and additions and alterations to existing buildings. The most significant efficiency improvement to the residential standards is a requirement for onsite photovoltaic electricity generation (e.g., solar panels) for most new or modified residential building up to three stories high (California Energy Commission [CEC] 2019a).

The standards are divided into three basic sets. First, there is a basic set of mandatory requirements that apply to all buildings. Second, there is a set of performance standards – the energy budgets – that vary by climate zone (of which there are 16 in California) and building type; thus, the standards are tailored to local conditions. Finally, the third set constitutes an alternative to the performance standards, which is a set of prescriptive packages that are basically a recipe or a checklist compliance approach.

2.2.4.2 California Green Building Standards Code

The California Green Building Standards Code (CALGreen; CCR Title 24, Part 11) is a code with mandatory requirements for all nonresidential buildings (including industrial buildings) and residential buildings for which no other state agency has authority to adopt green building standards. The current 2019 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings went into effect on January 1, 2020 (California Building Standards Commission [CBSC] 2019).

The development of CALGreen is intended to (1) cause a reduction in GHG emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; (3) reduce energy and water consumption; and (4) respond to the directives by the Governor. In short, the code is established to reduce construction waste; make buildings more efficient in the use of materials and energy; and reduce environmental impact during and after construction.

CALGreen contains requirements for storm water control during construction; construction waste reduction; indoor water use reduction; material selection; natural resource conservation; site irrigation conservation; and more. The code provides for design options allowing the designer to determine how best to achieve compliance for a given site or building condition. The code also requires building commissioning, which is a process for the verification that all building systems, like heating and cooling equipment and lighting systems, are functioning at their maximum efficiency.

2.2.4.3 Executive Order S-3-05

On June 1, 2005, Executive Order (EO) S-3-05 proclaimed that California is vulnerable to climate change impacts. It declared that increased temperatures could reduce snowpack in the Sierra Nevada, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To avoid or reduce climate change impacts, EO S-3-05 calls for a reduction in GHG emissions to the year 2000 level by 2010, to year 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

2.2.4.4 Assembly Bill 32 – Global Warming Solution Act of 2006

The California Global Warming Solutions Act of 2006, widely known as AB 32, requires that CARB develop and enforce regulations for the reporting and verification of statewide GHG emissions. CARB is directed by AB 32 to set a GHG emission limit, based on 1990 levels, to be achieved by 2020. The bill requires CARB to adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

2.2.4.5 Executive Order B-30-15

On April 29, 2015, EO B-30-15 established a California GHG emission reduction target of 40 percent below 1990 levels by 2030. The EO aligns California's GHG emission reduction targets with those of leading international governments, including the 28 nation European Union. California is on track to meet or exceed the target of reducing GHGs emissions to 1990 levels by 2020, as established in AB 32. California's new emission reduction target of 40 percent below 1990 levels by 2030 will make it possible to reach the goal established by EO S-3-05 of reducing emissions 80 percent under 1990 levels by 2050.

2.2.4.6 Senate Bill 32

Senate Bill (SB) 32 (Amendments to the California Global Warming Solutions Action of 2006) extends California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include Section 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030. SB 32 codified the targets established by EO B-30-15 for 2030, which set the next interim step in the State's continuing efforts to pursue the long-term target expressed in EO B-30-15 of 80 percent below 1990 emissions levels by 2050.

2.2.4.7 Assembly Bill 197

A condition of approval for SB 32 was the passage of AB 197. AB 197 requires that CARB consider the social costs of GHG emissions and prioritize direct reductions in GHG emissions at mobile sources and large stationary sources. AB 197 also gives the California legislature more oversight over CARB through the addition of two legislatively appointed members to the CARB Board and the establishment a legislative committee to make recommendations about CARB programs to the legislature.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

2.2.4.8 Assembly Bill 1493 – Vehicular Emissions of Greenhouse Gases

AB 1493 (Pavley) requires that CARB develop and adopt regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty truck and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State." On September 24, 2009, CARB adopted amendments to the Pavley regulations that intend to reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments bind California's enforcement of AB 1493 (starting in 2009), while providing vehicle manufacturers with new compliance flexibility. In January 2012, CARB approved a new emissions-control program for model years 2017 through 2025. The program combines the control of smog, soot, and global warming gases and requirements for greater numbers of zero-emission vehicles into a single packet of standards called Advanced Clean Cars (CARB 2021b).

2.2.4.9 Assembly Bill 341

The state legislature enacted AB 341 (California Public Resource Code Section 42649.2), increasing the diversion target to 75 percent statewide. AB 341 requires all businesses and public entities that generate 4 cubic yards or more of waste per week to have a recycling program in place. The final regulation was approved by the Office of Administrative Law on May 7, 2012 and went into effect on July 1, 2012.

2.2.4.10 Executive Order S-01-07

This EO, signed by Governor Schwarzenegger on January 18, 2007, directs that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by the year 2020. It orders that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established for California and directs CARB to determine whether a LCFS can be adopted as a discrete early action measure pursuant to AB 32. CARB approved the LCFS as a discrete early action item with a regulation adopted and implemented in April 2010. Although challenged in 2011, the Ninth Circuit reversed the District Court's opinion and rejected arguments that implementing LCFS violates the interstate commerce clause in September 2013. CARB is therefore continuing to implement the LCFS statewide.

2.2.4.11 Senate Bill 350

Approved by Governor Brown on October 7, 2015, SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. This will increase the use of Renewables Portfolio Standard eligible resources, including solar, wind, biomass, and geothermal. In addition, large utilities are required to develop and submit Integrated Resource Plans to detail how each entity will meet their customers resource needs, reduce GHG emissions, and increase the use of clean energy.

2.2.4.12 Senate Bill 375

SB 375, the Sustainable Communities and Climate Protection Act of 2008, supports the State's climate action goals to reduce GHG emissions through coordinated transportation and land use planning with the goal of more sustainable communities.

Under the Sustainable Communities Act, CARB sets regional targets for GHG emissions reductions from passenger vehicle use. In 2010, CARB established these targets for 2020 and 2035 for each region covered

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

by one of the State's metropolitan planning organizations (MPOs). CARB periodically reviews and updates the targets, as needed.

Each of California's MPOs must prepare a Sustainable Communities Strategy (SCS) as an integral part of its regional transportation plan (RTP). The SCS contains land use, housing, and transportation strategies that, if implemented, would allow the region to meet its GHG emission reduction targets. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region. CARB must review the adopted SCS to confirm and accept the MPO's determination that the SCS, if implemented, would meet the regional GHG targets. If the combination of measures in the SCS would not meet the regional targets, the MPO must prepare a separate alternative planning strategy (APS) to meet the targets. The APS is not a part of the RTP. Qualified projects consistent with an approved SCS or Alternative Planning Strategy categorized as "transit priority projects" would receive incentives to streamline CEQA processing.

2.2.4.13 Senate Bill 100

Approved by Governor Brown on September 10, 2018, SB 100 extends the renewable electricity procurement goals and requirements of SB 350. SB 100 requires that all retail sale of electricity to California end-use customers be procured from 100 percent eligible renewable energy resources and zero-carbon resources by the end of 2045.

2.2.4.14 California Air Resources Board: Scoping Plan

On December 11, 2008, the CARB adopted the Scoping Plan (CARB 2008) as directed by AB 32. The Scoping Plan proposes a set of actions designed to reduce overall GHG emissions in California to the levels required by AB 32. Measures applicable to development projects include those related to energy-efficiency building and appliance standards, the use of renewable sources for electricity generation, regional transportation targets, and green building strategy. Relative to transportation, the Scoping Plan includes nine measures or recommended actions related to reducing VMT and vehicle GHGs through fuel and efficiency measures. These measures would be implemented statewide rather than on a project-by-project basis.

In response to EO B-30-15 and SB 32, all state agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets. CARB was directed to update the Scoping Plan to reflect the 2030 target and, therefore, is moving forward with the update process (CARB 2014). The mid-term target is critical to help frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue driving down emissions. CARB is moving forward with a second update to the Scoping Plan to reflect the 2030 target set by EO B-30-15 and codified by SB 32. The 2017 Climate Change Scoping Plan Update, Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target, was adopted in December 2017. The Scoping Plan Update establishes a proposed framework for California to meet a 40 percent reduction in GHGs by 2030 compared to 1990 levels (CARB 2017).

2.2.5 Regional GHG Policies and Plans

2.2.5.1 Western Riverside Council of Governments

In September 2014, the Western Riverside Council of Governments (WRCOG) completed the Subregional Climate Action Plan (Subregional CAP). The Subregional CAP is a joint effort by twelve cities

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

in the subregion which establishes emissions reduction targets, emissions reduction measures, and action steps to assist each community to demonstrate consistency AB 32 (WRCOG 2014). The City of Moreno Valley was not a participating agency in developing (and has not adopted) the Subregional CAP.

2.2.5.2 City of Moreno Valley

As a part of the 2040 General Plan update, on June 15, 2021 the City Council adopted a resolution certifying the General Plan Environmental Impact Report (EIR), and adopting the 2040 MoVal General Plan Update and Climate Action Plan (CAP). The City CAP is designed to reinforce the City's commitment to reducing GHG emissions and demonstrate how the City will comply with State of California's GHG emission reduction standards. The CAP has established a 2040 emissions target of 4.0 MT CO_2e per year per capita (City of Moreno Valley 2021a). As a Qualified GHG Reduction Strategy, the CAP will enables streamlined environmental review of future development projects, in accordance with CEQA Guidelines Section 15183.5.

3.0 EXISTING CONDITIONS

The project site is located in a generally suburban residential area in the central portion of the city. The project site currently is currently vacant. Land uses surrounding the project site include single-family residential neighborhoods to the east, north, and west. Lots south and southwest of the project site are currently undeveloped (see Figure 2).

3.1 CLIMATE AND METEOROLOGY

The project site is in the SCAB, which consists of all or part of four counties: Los Angeles, San Bernardino, Riverside, and Orange. The distinctive climate of the SCAB is determined by its terrain and geographic location. The SCAB is a coastal plain with connecting broad valleys and low hills. It is bound by the Pacific Ocean to the southwest and high mountains around the rest of its perimeter. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific, resulting in a mild climate tempered by cool sea breezes with light, average wind speeds.

The usually mild climatological pattern is interrupted occasionally by periods of extremely hot weather, winter storms, or Santa Ana winds. Winds in the project area are usually driven by the dominant land/ sea breeze circulation system. Regional wind patterns are dominated by daytime onshore sea breezes. At night, the wind generally slows and reverses direction traveling toward the sea. Local canyons can also alter wind direction, with wind tending to flow parallel to the canyons. The vertical dispersion of air pollutants in the SCAB is hampered by the presence of persistent temperature inversions. High pressure systems, such as the semi-permanent high-pressure zone in which the SCAB is located, are characterized by an upper layer of dry air that warms as it descends, restricting the mobility of cooler marine-influenced air near the ground surface, and resulting in the formation of subsidence inversions. Such inversions restrict the vertical dispersion of air pollutants released into the marine layer and, together with strong sunlight, can produce worst-case conditions for the formation of photochemical smog. The basin-wide occurrence of inversions at 3,500 feet above mean sea level or less averages 191 days per year (SCAQMD 1993).

The predominant wind direction in the vicinity of the project site is from the northwest and the average wind speed is approximately 4.9 mph, as measured at the March Air Force Base, approximately 3.5 miles southwest of the project site (Iowa Environmental Mesonet [IEM] 2021). The annual average maximum temperature in the project area, as measured at the Riverside Fire Station 3 climatic station, approximately 10.5 miles northwest of the project site, is approximately 79.5 degrees Fahrenheit (°F), and the annual average minimum temperature is approximately 48.6°F. Total precipitation in the project area averages approximately 10.2 inches annually. Precipitation occurs mostly during the winter and relatively infrequently during the summer (Western Regional Climate Center [WRCC] 2017).

3.2 EXISTING AIR QUALITY

3.2.1 Criteria Pollutants

3.2.1.1 Attainment Designations

Attainment designations are discussed in Section 2.1 and Table 2. The SCAB is a federal and state nonattainment area for 8-hour ozone and $PM_{2.5}$. The SCAB is also a state nonattainment area for 1-hour ozone and PM_{10}.

3.2.1.2 Monitored Air Quality

The SCAQMD maintains monitoring stations to measure ambient concentrations of pollutants in the SCAB. The nearest monitoring station, approximately 9 miles south project site, is the Perris monitoring station. The closest monitoring station with data for $PM_{2.5}$ and NO_2 is the Riverside-Rubidoux monitoring station, approximately 13 miles northwest of the project site. Table 5, *Air Quality Monitoring Data*, presents a summary of the ambient pollutant concentrations monitored at the two air quality monitoring stations during the most recent three years (2018 through 2020) for which the SCAQMD has reported data.

Table 5
AIR QUALITY MONITORING DATA

Pollutant Standard	2018	2019	2020
Ozone (O_3) – Perris Station			
Maximum concentration 1-hour period (ppm)	0.117	0.118	0.125
Maximum concentration 8-hour period (ppm)	0.103	0.095	0.106
Days above 1-hour state standard (>0.09 ppm)	31	28	34
Days above 8-hour state/federal standard (>0.070 ppm)	67	64	74
Coarse Particulate Matter (PM_{10}) – Perris Station			
Maximum 24-hour concentration (μg/m^3)	64.4	97.0	92.3
Measured Days above 24-hr state standard (>50 μg/m^3)	2	4	6
Measured Days above 24-hr federal standard (>150 μg/m^3)	0	0	0
Annual average (μg/m^3)	28.9	24.4	*
Exceed state annual standard (20 μg/m^3)	Yes	Yes	*
Fine Particulate Matter ($PM_{2.5}$) – Riverside-Rubidoux Station			
Maximum 24-hour concentration (μg/m^3)	66.3	55.7	59.9
Measured Days above 24-hour federal standard (>35 μg/m^3)	3	5	12
Annual average (μg/m^3)	12.6	11.2	14.1
Exceed state and federal annual standard (12 μg/m^3)	Yes	No	Yes

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Pollutant Standard	2018	2019	2020
Nitrogen Dioxide (NO_2) – Riverside-Rubidoux Station			
Maximum 1-hour concentration (ppm)	0.055	0.056	0.062
Days above state 1-hour standard (0.18 ppm)	0	0	0
Days above federal 1-hour standard (0.100 ppm)	0	0	0
Annual average (ppm)	0.014	0.014	0.014
Exceed annual federal standard (0.053 ppm)	No	No	No
Exceed annual state standard (0.030 ppm)	No	No	No

Source: CARB 2021c
ppb = parts per billion; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter, * = insufficient data available.

As shown in Table 5, The 1- and 8-hour ozone. PM_{10}, and $PM_{2.5}$ standards were exceeded numerous times in each of the sample years. Data for NO_2 showed no exceedances.

3.2.2 Greenhouse Gases

In 2014, total GHG emissions worldwide were estimated at 48,892 million metric tons (MMT) of CO_2e emissions (World Resource Institute [WRI] 2020). The U.S. contributed the second largest portion (13 percent) of global GHG emissions in 2014. The total U.S. GHG emissions was 6,319 MMT CO_2e in 2019, of which 82 percent was CO_2 emission (WRI 2020). On a national level, approximately 27 percent of GHG emissions were associated with transportation and about 38 percent were associated with electricity generation (WRI 2020).

CARB performed statewide inventories for the years 1990 to 2019, as shown in Table 6, *California Greenhouse Gas Emissions by Sector*. The inventory is divided into five broad sectors of economic activity: agriculture, commercial and residential, electricity generation, industrial, and transportation. Emissions are quantified in MMT CO_2e.

Table 6
CALIFORNIA GREENHOUSE GAS EMISSIONS BY SECTOR

Sector	Emissions (MMT CO_2e)			
	1990	2000	2010	2019
Agriculture and Forestry	18.9 (4%)	31.0 (7%)	33.7 (8%)	31.8 (8%)
Commercial and Residential	44.1 (10%)	45.8 (10%)	52.2 (12%)	43.8 (43.8%)
Electricity Generation	110.5 (26%)	105.4 (22%)	90.6 (20%)	58.8 (14%)
Industrial	105.3 (24%)	105.8 (22%)	101.8 (23%)	88.2 (21%)
Transportation	150.6 (35%)	183.2 (39%)	170.2 (38%)	166.1 (40%)
Unspecified Remaining	1.3 (<1%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
TOTAL	**430.7**	**471.1**	**448.5**	**418..2**

Source: CARB 2007 and CARB 2021d
MMT = million metric tons; CO_2e = carbon dioxide equivalent

As shown in Table 6, statewide GHG source emissions totaled 431 MMT CO_2e in 1990, 471 MMT CO_2e in 2000, 449 MMT CO_2e in 2010, and 424 MMT CO_2e in 2017. Transportation-related emissions consistently contribute the most GHG emissions, followed by electricity generation and industrial emissions (CARB 2007 and CARB 2021d).

A community GHG emissions inventory was prepared as part of the City CAP. The 2016 emissions inventory for the community is shown below in Table 7, *Moreno Valley Greenhouse Gas Emissions by*

Sector. The sectors included in this inventory are somewhat different from those in the statewide inventory. Similar to the statewide emissions, transportation related GHG emissions contributed the most in Moreno Valley with 56 percent of the total.

Table 7
MORENO VALLEY GREENHOUSE GAS EMISSIONS BY SECTOR (MT CO_2E)

Sector	2018
Residential	206,790 (23.9%)
Commercial	100,766 (11.6%)
Industrial	19,589 (2.3%)
Transportation	483,063 (55.8%)
Solid Waste	7,737 (0.9%)
Wastewater	2,129 (0.2%)
Agriculture	4,395 (0.5%)
Off-Road Equipment	37,784 (4.4%)
Public Lighting	2,219 (0.3%)
TOTAL	**866,410**

Source: City of Moreno Valley 2021a
MT = metric tons; CO_2e = carbon dioxide equivalent

4.0 METHODOLOGY AND SIGNIFICANCE CRITERIA

4.1 METHODOLOGY

Criteria pollutant and GHG emissions were calculated using the California Emissions Estimator Model (CalEEMod), Version 2020.4.0 CalEEMod is a computer model used to estimate air emissions resulting from land development projects throughout the state of California. CalEEMod was developed by CAPCOA in collaboration with the California air quality management and pollution control districts, primarily the SCAQMD. The calculation methodology, source of emission factors used, and default data is described in the CalEEMod User's Guide, and Appendices A, D, and E (CAPCOA 2021b).

In brief, CalEEMod is a computer model that estimates criteria air pollutant and greenhouse gas emissions from mobile (i.e., vehicular) sources, area sources (fireplaces, woodstoves, and landscape maintenance equipment), energy use (electricity and natural gas used in space heating, ventilation, and cooling; lighting; and plug-in appliances), water use and wastewater generation, and solid waste disposal. Emissions are estimated based on land use information input to the model by the user.

In the first module, the user defines the specific land uses that will occur at the project site. The user also selects the appropriate land use setting (urban or rural), operational year, location, climate zone, and utility provider. The input land uses, size features, and population are used throughout CalEEMod in determining default parameters and calculations in each of the subsequent modules. The input land use information consists of land use subtypes (such as the residential subtypes of single-family residential and multi-family medium-rise residential) and their unit or square footage quantities.

Subsequent modules include construction (including off-road vehicle emissions), mobile (on-road vehicle emissions), area sources (architectural coatings [painting], consumer products [cleansers, aerosols,

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

solvents]), water and wastewater, and solid waste. Each module comprises multiple components including an associated mitigation module to account for further reductions in the reported baseline calculations. Other inputs include trip generation rates, trip lengths, vehicle fleet mix (percentage autos, trucks, etc.), trip distribution (percent work to home, etc.), duration of construction phases, construction equipment usage, grading areas, season, and ambient temperature, as well as other parameters.

In various places the user can input additional information and/or override the default assumptions to account for project- or location-specific parameters. For this assessment, the default parameters were not changed unless otherwise noted. The CalEEMod output files are included in Appendix A to this report.

4.1.1 Construction Emissions

CalEEMod has the capability to calculate reductions in construction emissions from the effects of dust control, diesel-engine classifications, and other selected emissions reduction measures. In compliance with SCAQMD Rule 403, fugitive dust emissions calculations assume application of water on exposed surface a minimum of two times per day, enforcing a 15-mph speed limit on unpaved surfaces, and maintaining a minimum 12 percent moisture content in unpaved roads and parking areas within the project sate. Based on CalEEMod, Version 2020.4.0 defaults, the control efficiency for watering two times per day is 55 percent.

CalEEMod estimates construction emissions for each year of construction activity based on the annual construction equipment profile and other factors determined as needed to complete all phases of construction by the target completion year. As such, each year of construction activity has varying quantities of GHG emissions. Per SCAQMD guidance, total construction GHG emissions resulting from the project are amortized over 30 years and added to operational GHG emissions.

4.1.1.1 Construction Activities

Construction emissions were estimated based on the timeline provided by the project applicant, which assumes construction would commence with grading in May 2022 and the first model homes would be complete in March 2023. Remaining residences would be completed depending on market conditions. To be conservative in analyzing the highest potential project emissions, this analysis assumes full buildout of all residential units (196 DU) by July 2025. The quantity, duration, and intensity of construction activity influence the amount of construction emissions and related pollutant concentrations that occur at any one time. As such, the emission forecasts provided herein reflect a specific set of conservative assumptions based on the expected construction scenario wherein a relatively large amount of construction activity is occurring in a relatively intensive manner. Because of this conservative assumption, actual emissions could be less than those forecasted. If construction is delayed or occurs over a longer time period, emissions could be reduced because of: (1) a more modern and cleaner-burning construction equipment fleet mix than assumed in CalEEMod; and/or (2) a less intensive buildout schedule (i.e., fewer daily emissions occurring over a longer time interval).

Construction activities would include grading, soil hauling during grading, potential blasting during grading, installation of underground utilities, paving internal streets, building construction, and architectural coatings. Construction is assumed to occur five days per week with equipment operating up to eight hours per day. Based on project-specific information provided by Mesa General Engineering, approximately 180 truckloads per day of material would be exported over 15 days during grading,

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

generating approximately 5,400 one-way truck trips. Small areas of rock may require blasting during grading. Blasting is assumed to occur up to one day per week during grading, for a total of up to 8 days. All other construction activities on the project site would be halted while explosives are prepared and detonated. Architectural coatings would occur concurrently with building construction—residences would be painted in sequence as they are completed. The construction schedule assumed in the modeling is shown in Table 8, *Anticipated Construction Schedule*.

Table 8
ANTICIPATED CONSTRUCTION SCHEDULE

Construction Activity	Construction Period Start	Construction Period End	Number of Working Days
Grading	5/1/2022	6/30/2022	44
Soil Hauling	5/1/2022	5/20/2022	15
Underground Utilities	7/1/2022	9/15/2022	55
Paving	9/16/2022	11/15/2022	43
Building Construction	11/16/2022	6/30/2025	684
Architectural Coatings	3/1/2023	6/30/2025	609

Source: D.R. Horton; CalEEMod

4.1.1.2 Construction Off-Road Equipment

Construction would require the use of heavy off-road equipment. Grading constriction equipment estimates are based on project-specific information provided by Mesa General Engineering, with a water truck and two drill rigs (for boring blasting holes) added. Construction equipment estimates for other activities estimates are based on default values in CalEEMod, with additional equipment added for excavation for underground utilities (based on assumptions used for similar projects). Table 9, *Construction Equipment Assumptions*, presents a summary of the assumed equipment that would be involved in each stage of construction.

Table 9
CONSTRUCTION EQUIPMENT ASSUMPTIONS

Equipment	Horsepower	Number	Hours/Day
Grading			
Scraper (Caterpillar 637)	700	4	8
Rubber Tired Dozer (Caterpillar 824)	319	1	8
Crawler Dozer (Caterpillar D8)	309	1	8
Scraper (Caterpillar 623)	395	1	8
Grader (Caterpillar 14M)	272	1	8
Excavator	236	1	8
Off-Highway Rock Truck	236	3	8
Water Truck	236	1	8
Bore/Drill Rig	221	2	8
Soil Hauling			
Rubber Tired Loader	203	2	8
Underground Utilities			
Excavators	158	1	8
Forklifts	89	1	8
Tractors/Loaders/Backhoes	97	2	8

Equipment	Horsepower	Number	Hours/Day
Paving			
Pavers	130	2	8
Paving Equipment	132	2	8
Rollers	80	2	8
Building Construction			
Cranes	231	1	7
Forklifts	89	3	8
Generator Sets	84	1	7
Tractors/Loaders/Backhoes	97	3	8
Architectural Coating			
Air Compressors	78	1	6

Source: Mesa General Engineering; CalEEMod

4.1.1.3 Construction Blasting

Blasting may be required at the site during grading. Blasting operations could be conducted using drilling and explosive detonation to fracture rocks. As of this analysis, the area and depth of potential blasting has not been determined. Based on the site plan and the existing terrain of the project site, an estimated maximum area of 30,000 SF per week (up to eight blasting events, one event per week during grading) could require blasting to remove rock to an average depth of 15 feet. Blasting operations would be conducted by a licensed blasting contractor, in strict compliance with applicable federal and state regulations. All blasting materials would be transported to the site for each blasting sequence and no explosives would be stored at the site. All other construction activities on the project site would be halted while explosives are prepared and detonated. For typical blasting to fracture rock, drill rigs are used to drill a pattern of boreholes each with a diameter of 3 to 6 inches, spaced 10 to 20 feet apart. For this analysis, 4-inch diameter boreholes by 15 feet deep were assumed, resulting in approximately 133 boreholes per blasting event. Each borehole would be loaded with carefully metered explosives. The "shot" would be timed to detonate each hole(s) in sequence. This minimizes the ground vibration and noise of the blast, while maximizing fracture of the rock. Some dust would be created as a result of the blast. However, the dust would be fully dissipated within 30 to 60 seconds following the shot.

Fugitive dust emissions associated with blasting were estimated based on the USEPA's emission factor for blasting for coal mining to remove overburden (which is a similar process) from AP-42, Section 11.9, Table 11.9-1 (USEPA 1998). Fugitive dust emissions from drilling boreholes was based on a similar mechanical process for aggregate rock crushing. The emission factors for tertiary rock crushing were estimated based on the USEPA's AP-42 Section 11.19.2, Table 11.19.2-2 9 (USEPA 1998). Exhaust emissions from the use of drill rigs are included in the CalEEMod grading phase emissions estimates.

The explosive to be used has not been determined at the time of this analysis. The most common commercial explosive, ammonium nitrate/fuel oil (ANFO), is assumed in this analysis. Based on the USEPA's AP-42 Section 13.3 emission factors, emissions from use of ANFO are estimated to be 67 pounds of CO per ton of ANFO, and 17 pounds of NO_X per ton of ANFO (USEPA 1980). Based on the assumed area and boreholes, a maximum of 9,000 pounds (4.5 tons) of ANFO could be used per blasting event. The complete blasting and drilling emissions calculations are included in Appendix B to this report.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

4.1.1.4 Construction On-Road Trips

Worker commute trips and vendor delivery trips were modeled based on CalEEMod defaults. Worker trips are anticipated to vary between 10 and 273 trips per day, depending on construction activity. Per estimates provided by Mesa General Engineering, approximately 180 truckloads per day of material would be exported over 15 days during grading, generating approximately 5,400 one-way truck trips. Approximately 660 feet (0.12 mile) of every haul truck trip was assumed to be on unpaved on-site access roads. A maximum architectural coating crew size of 10 was assumed to paint each house in sequence concurrent with building construction. The CalEEMod default worker, vendor and haul trip distances were used in the model.

4.1.2 Operation Emissions

Operational impacts were estimated using CalEEMod. Operational sources of emissions include area, energy, transportation, water use, and solid waste.

4.1.2.1 Area Source Emissions

Area sources include emissions from landscaping equipment, the use of consumer products, the reapplication of architectural coatings for maintenance, and hearths. Emissions associated with area sources were estimated using the CalEEMod default values with the exception of hearths—in accordance with SCAQMD Rule 445, the project would not include wood burning stoves or fireplaces (SCAQMD 2020).

4.1.2.2 Energy Emissions

Development within the project would use electricity for lighting, heating, and cooling. Direct emissions from the burning of natural gas may result from furnaces, hot water heaters, and kitchen appliances. Electricity generation typically entails the combustion of fossil fuels, including natural gas and coal, which is then transmitted to end users. A building’s electricity use is thus associated with the off-site or indirect emission of GHGs at the source of electricity generation (power plant).

Energy source emissions were estimated assuming implementation of energy-reducing project design features to comply with the 2019 Title 24 standards which include a requirement for new residential buildings with three or fewer residential floors to have on-site generation of electricity through photovoltaic (solar) panels. Based on an average area of the project model homes, and assuming an unconditioned 400 SF garage for each house, the project’s residential buildings (177 dwelling units) total approximately 266,695 SF of conditioned space (total floor area minus garage area) and would require solar panels producing a minimum of 417 kilowatts (kW).[2] The annual electricity generated by a rooftop mounted solar power system varies by the climate, amount of sunlight available per day, the pitch and orientation of the roof, and the efficiency of the electrical transmission. Assuming a capacity factor (CF) of 20%, which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss, the power produced by the project’s solar panels would be approximately 730,212 kilowatt-hours (kWhr)

---

[2] Per the 2019 Title 24 residential building energy efficiency requirements, the minimum solar electrical generation required is calculated by kW = (CFA x A)/1000 + (DU * B), where CFA is the conditioned floor area, A is 0.572 (climate zone 10 adjustment factor), DU is the total number of dwelling units, and B is 1.15 (climate zone 7 dwelling unit factor).

per year.[3] The complete solar power requirement calculations are included with in Appendix C to this report.

4.1.2.3 Vehicular (Mobile) Sources

Operational emissions from mobile source emissions are associated with project-related vehicle trip generation and trip length. Based on the trip generation rate from the Traffic Impact Analysis (TIA) prepared for the project, the project would generate 1,671 average daily trips (TJW Engineering 2021). To evaluate the project vehicle miles traveled (VMT), the TIA utilized the WRCOG VMT Screening Tool. According to the WRCOG Screening Tool, the project site is located in transportation analysis zone (TAZ) 3,869, which is designated a low VMT generating TAZ based on total VMT. The total daily VMT per service population for TAZ 3,869 is 20.57 miles (WRCOG 2021). The project would have an average household size of 3.9 persons and at full buildout the total project population would be approximately 691 persons (SCAG 2019). Therefore, the daily project VMT would be approximately 14,214 miles (691 persons times 20.57 miles). The CalEEMod trip distances and purposes were set to result in 14,214 miles (14,214 miles divided by 1,671 trips, or 8.51 miles per trip).

4.1.2.4 Solid Waste Sources

The disposal of solid waste produces GHG emissions from anaerobic decomposition in landfills, incineration, and transportation of waste. CalEEMod determines the GHG emissions associated with disposal of solid waste into landfills. Portions of these emissions are biogenic. CalEEMod methods for quantifying GHG emissions from solid waste are based on the IPCC method using the degradable organic content of waste. A conservative 25 percent solid waste diversion rate was applied in CalEEMod to account for mandatory compliance with AB 341 which is not included in the model defaults.

4.1.2.5 Water Sources

Water-related GHG emissions are from the conveyance and treatment of water. CalEEMod uses the CEC's 2006 *Refining Estimates of Water-Related Energy Use in California* to establish default water-related emission factors. Modeling was conducted using these defaults and a 20 percent reduction in potable water use and wastewater generation in accordance with 2019 CALGreen requirements not accounted for in the model defaults.

4.1.3 Localized Significance Threshold Methodology

As part of the SCAQMD's environmental justice program, more attention has been focused on localized air quality effects. Also, while regional impact analysis is based on attaining or maintaining regional emissions standards, localized impact analysis compares the concentration of a pollutant at a receptor site to a health-based standard.

SCAQMD has developed a localized significance threshold (LST) methodology and mass rate look-up tables by source receptor area (SRA) that can be used by public agencies to determine whether a project may generate significant adverse localized air quality impacts. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable

---

[3] Solar kWhr per year can be calculated by: kWhr/year = Power Output (kW) x 24 hours/day x 365 days/year x CF, where CF is a capacity factor which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss. For typical California residential systems, the CF can range between 17% and 22.5%. A CF of 20% was used in the project calculations.

federal or state ambient air quality standard; they are developed based on the ambient concentrations of that pollutant for each SRA (SCAQMD 2009). The LST methodology translates the concentration standards into emissions thresholds that are a function of project site area, source to receptor distance, and the location within the SCAB. The LST methodology is recommended to be limited to projects of 5 acres or less and to avoid the need for complex dispersion modeling. For projects that exceed 5 acres, such as the proposed project, the 5-acre LST look-up values can be used as a screening tool to determine which pollutants require detailed analysis (Sun 2017). This approach is conservative as it assumes that all on-site emissions would occur within a 5-acre area and over-predicts potential localized impacts (i.e., more pollutant emissions occurring within a smaller area and within closer proximity to potential sensitive receptors). If a project exceeds the LST look up values, then the SCAQMD recommends that project-specific localized air quality modeling be performed.

The proposed project is within SRA 24, Moreno Valley. The closest sensitive receptors are three single-family residences adjacent to the northeast corner of the project site. Therefore, the LSTs in SRA 24 for receptors located with 82 feet (25 meters) are used for project sites less than or equal to 5 acres.

4.2 SIGNIFICANCE CRITERIA

4.2.1 Air Quality

Thresholds used to evaluate potential air quality and odor impacts are based on applicable criteria in the State's California Environmental Quality Act (CEQA) Guidelines Appendix G. A significant air quality and/or odor impact could occur if the implementation of the proposed project would:

1. Conflict with or obstruct implementation of the SCAQMD Air Quality Management Plan, or applicable portions of the SIP; or
2. Result in a cumulatively considerable net increase of any criteria pollutant for which the SCAB is non-attainment under an applicable NAAQS or CAAQS; or
3. Expose sensitive receptors to substantial pollutant concentrations; or
4. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Appendix G of the State CEQA Guidelines states that the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. The SCAQMD has established significance thresholds to assess the regional and localized impacts of project-related air pollutant emissions. The significance thresholds are updated, as needed, to appropriately represent the most current technical information and attainment status in the SCAB. Table 10, *SCAQMD Thresholds of Significance*, presents the most current significance thresholds, including regional daily thresholds for short-term construction and long-term operational emissions; maximum incremental cancer risk and hazard indices for TACs; and maximum ambient concentrations for exposure of sensitive receptors to localized pollutants. A project with daily emission rates, risk values, or concentrations below these thresholds is generally considered to have a less than significant effect on air quality.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 10
SCAQMD THRESHOLDS OF SIGNIFICANCE

Pollutant	Construction	Operation
Mass Daily Thresholds (pounds per day)		
VOC	75	55
NO_X	100	55
CO	550	550
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
Lead	3	3
Toxic Air Contaminants		
TACs	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)	
Ambient Air Quality for Criteria Pollutants		
NO_2	1-hour average ≥ 0.18 ppm Annual average ≥ 0.03 ppm	
CO	1-hour average ≥ 20.0 ppm (state) 8-hour average ≥ 9.0 ppm (state/federal)	
PM_{10}	24-hour average ≥ 10.4 $\mu g/m^3$ (construction) 24-hour average ≥ 2.5 $\mu g/m^3$ (operation) Annual average ≥ 1.0 $\mu g/m^3$	
$PM_{2.5}$	24-hour average ≥ 10.4 $\mu g/m^3$ (construction) 24-hour average ≥ 2.5 $\mu g/m^3$ (operation)	
SO_2	1-hour average ≥ 0.075 ppm 24-hour average ≥ 0.04 ppm	

Source: SCAQMD 2015
lbs/day = pounds per day; VOC = volatile organic compound; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} = respirable particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = fine particulate matter with a diameter of 2.5 microns or less; SO_X = sulfur oxides; TACs = toxic air contaminants; GHG = greenhouse gas emissions; MT/yr = metric tons per year; CO_2e = carbon dioxide equivalent; NO_2 = nitrogen dioxide; ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter

4.2.2 Greenhouse Gases

Given the relatively small levels of emissions generated by a typical development in relationship to the total amount of GHG emissions generated on a national or global basis, individual development projects are not expected to result in significant, direct impacts with respect to climate change. However, given the magnitude of the impact of GHG emissions on the global climate, GHG emissions from new development could result in significant, cumulative impacts with respect to climate change. Therefore, the potential for a significant GHG impact is limited to cumulative impacts.

According to Appendix G of the CEQA Guidelines, a project would have a significant environmental impact if it would:

(1) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

(2) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

As discussed in Section 2.2.5, on June 15, 2021, the City Council adopted the City CAP. As a Qualified GHG Reduction Strategy, the City CAP will enables streamlined environmental review of future development projects, in accordance with CEQA Guidelines Section 15183.5. Projects which are consistent with the control measures and 2040 GHG reduction target of 4.0 MT CO_2e per year per service population in the City CAP would have GHG emissions that are less than significant (City 2021a).

5.0 AIR QUALITY IMPACT ANALYSIS

This section evaluates potential direct impacts of the proposed project related to the air pollutant emissions. Project-level air quality modeling was completed as part of this analysis. Complete modeling results are included as Appendix A of this report.

5.1 ISSUE 1: CONSISTENCY WITH AIR QUALITY PLANS

5.1.1 Impacts

SCAG is the regional planning agency for Los Angeles, Orange, Ventura, Riverside, San Bernardino, and Imperial Counties, and addresses regional issues relating to transportation, economy, community development, and environment. With regard to air quality planning, SCAG has prepared the RTP/SCS, a long-range transportation plan that uses growth forecasts to project trends out over a 20-year period to identify regional transportation strategies to address mobility needs. These growth forecasts form the basis for the land use and transportation control portions of the AQMP. These documents are utilized in the preparation of the air quality forecasts and consistency analysis included in the AQMP. Both the RTP/SCS and AQMP are based, in part, on projections originating with County and City General Plans.[4]

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center (City 2021b). The project would be consistent with the General Plan and zoning designations for the site. Because the project is consistent with the local general plan, the project would be consistent with the growth assumption used to develop the region’s AQMP. As such, residential growth in the City as a result of the project, and the related changes in regional emissions, are accounted for in the AQMP, which is crafted to bring the basin into attainment for all criteria pollutants. Therefore, the proposed project would not conflict with or obstruct implementation of the AQMP.

5.1.2 Significance of Impacts

Implementation of the project would not conflict with or obstruct implementation of the SCAQMD’s AQMP, and the impact would be less than significant.

---

[4] SCAG serves as the federally designated metropolitan planning organization for the southern California region.

5.1.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.1.4 Significance After Mitigation

Impacts related to conflicts with the applicable air quality plan would be less than significant.

5.2 ISSUE 2: CUMULATIVELY CONSIDERABLE NET INCREASE OF NONATTAINMENT CRITERIA POLLUTANTS

By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development within the SCAB. The region is a federal and/or state nonattainment area for ozone, PM_{10} and $PM_{2.5}$. In accordance with CEQA Guidelines Section 15064(h)(3), the SCAQMD's approach for assessing cumulative impacts is based on the AQMP forecasts of attainment of ambient air quality standards in accordance with the requirements of the federal and State Clean Air Acts. If a project conflicts with the AQMP, which is intended to bring the SCAB into attainment for all criteria pollutants, that project can be considered cumulatively considerable. Additionally, if the mass regional emissions calculated for a project exceed the applicable SCAQMD daily significance thresholds that are designed to assist the region in attaining the applicable state and national ambient air quality standards, that project can be considered cumulatively considerable. As discussed in Issue 1, above, the project would not conflict with or obstruct implementation of the AQMP. A comparison of the project mass regional emissions with the applicable SCAQMD daily significance thresholds is provided below.

5.2.1 Impacts

The project would generate criteria pollutants and precursors in the short-term during construction and the long-term during operation. To determine whether a project would result in cumulatively considerable emissions that would violate an air quality standard or contribute substantially to an existing or projected air quality violation, a project's emissions are evaluated based on the quantitative emission thresholds established by the SCAQMD (as shown in Table 10).

5.2.1.1 Construction

The project's construction emissions were estimated using the CalEEMod model as described in Section 4.1.1. Additional details of phasing, selection of construction equipment, and other input parameters, including CalEEMod data, are included in Appendix A.

The results of the calculations for project construction are shown in Table 11, *Unmitigated Daily Construction Emissions*. The data are presented as the maximum anticipated daily emissions for comparison with the SCAQMD thresholds.

Table 11
UNMITIGATED DAILY CONSTRUCTION EMISSIONS

Phase	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading	10.7	109.0	74.7	0.2	10.3	5.7
Soil Hauling	1.7	54.6	13.7	0.2	27.7	4.5
Blasting Drilling Fugitive Dust	-	-	-	-	5.2	1.0
Blasting	-	75.9	299.3	8.9	37.8	2.2
Underground Utilities	0.7	6.7	9.4	0.0	0.5	0.4
Paving	1.6	11.2	15.1	0.0	0.7	0.6
Building Construction	2.5	18.7	23.8	0.1	4.1	1.6
Architectural Coating	3.9	1.3	2.4	0.0	0.3	0.1
Maximum Daily Emissions[1,2]	**12.4**	**163.6**	**299.3**	**8.9**	**38.0**	**10.2**
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***Yes***	***No***	***No***	***No***	***No***

Source: CalEEMod; USEPA AP-42 (output data is provided in Appendices A and B)

[1] Maximum daily emissions of CO and SO_2 would occur during blasting; maximum daily emissions of ROG, NO_X, PM_{10} and $PM_{2.5}$ would occur during concurrent grading, soil hauling and borehole drilling.

[2] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 11, emissions of NO_X would exceed the SCAQMD significance threshold, and the impact would be potentially significant.

5.2.1.2 Operation

The project's operational emissions were estimated using the CalEEMod model as described in Section 4.1.2. Model outputs are provided in Appendix A. Table 12, *Daily Operational Emissions*, presents the summary of operational emissions for the project. The data are presented as the maximum anticipated daily emissions for comparison with the SCAQMD thresholds.

Table 12
DAILY OPERATIONAL EMISSIONS

Category	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Area	8.2	2.8	15.7	<0.1	0.3	0.3
Energy	0.1	1.2	0.5	<0.1	0.1	0.1
Mobile	3.9	5.9	38.4	<0.1	11.0	3.0
Maximum Daily Emissions[1]	**12.2**	**10.0**	**55.6**	**0.1**	**11.4**	**3.4**
SCAQMD Thresholds	*55*	*55*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod (output data is provided in Appendix A)

[1] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 12, project emissions during operation would not exceed the daily thresholds set by the SCAQMD.

5.2.2 Significance of Impacts

While long-term operation of the project would not result in criteria pollutant and precursor pollutant emissions that would exceed the SCAQMD significance thresholds, short-term construction activities would result in emissions of NO_X exceeding the threshold, and the impact would be potentially significant.

5.2.3 Mitigation Framework

The following mitigation measure would be required or reduce NO_X emissions during project construction.

AQ-1 **Tier 4 Off-Road Construction Equipment.** All off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction of the project shall be USEPA Tier 4 certified or have CARB approved engine/exhaust retrofit kits to result in equivalent emissions. Prior to issuing permits, the City shall verify that construction contracts specify the off-road equipment certification or retrofit requirements. The applicant shall compile and maintain an inventory, including documentation of engine certification or emissions retrofits, of all off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction. The inventory shall be available for review and verification by the City on demand.

5.2.4 Significance After Mitigation

The results of the calculations for project construction, with mitigation measure AQ-1 implemented, are shown in Table 13, *Mitigated Daily Construction Emissions*.

Table 13
MITIGATED DAILY CONSTRUCTION EMISSIONS

Phase	ROG (lb/day)	NO_X (lb/day)	CO (lb/day)	SO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading	2.9	12.1	103.1	0.2	6.6	2.3
Soil Hauling	1.3	49.2	16.3	0.2	27.5	4.3
Blasting Drilling Fugitive Dust	-	-	-	-	5.2	1.0
Blasting	-	75.9	299.3	8.9	37.8	2.2
Underground Utilities	0.2	1.2	10.2	0.0	0.2	0.1
Paving	0.8	1.3	17.8	0.0	0.2	0.1
Building Construction	1.3	5.8	25.1	0.1	3.4	1.0
Architectural Coating	3.7	0.2	2.4	0.0	0.2	0.1
Maximum Daily Emissions[1,2]	**4.9**	**75.9**	**299.3**	**8.9**	**37.8**	**6.6**
SCAQMD Thresholds	*75*	*100*	*550*	*150*	*150*	*55*
Significant Impact?	***No***	***No***	***No***	***No***	***No***	***No***

Source: CalEEMod; USEPA AP-42 (output data is provided in Appendices A and B)

[1] Maximum daily emissions of ROG would occur during concurrent building construction and architectural coatings; maximum daily emissions of NO_X, CO, SO_2 and PM_{10} would occur during blasting; maximum daily emissions of $PM_{2.5}$ would occur during concurrent grading, soil hauling and borehole drilling.

[2] Totals may not sum due to rounding.

lb/day = pounds per day; ROG = reactive organic gas; NO_X = nitrogen oxides; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

As shown in Table 13, with implementation of mitigation measure AQ-1, emissions of criteria pollutants and precursors would not exceed the SCAQMD significance thresholds.

The project would not result in a cumulatively considerable net increase of any criteria pollutant for which the SCAB is non-attainment, and the impact would less than significant with mitigation incorporated.

5.3 ISSUE 3: IMPACTS TO SENSITIVE RECEPTORS

5.3.1 Impacts

5.3.1.1 Construction Activities

Criteria Pollutants

The localized effects from the on-site portion of daily construction emissions were evaluated at sensitive receptor locations potentially impacted by the project according to the SCAQMD's LST method, described above. The proposed project is within SRA 24, Moreno Valley. Consistent with the LST guidelines, when quantifying mass emissions for localized analysis, only emissions that occur on site are considered. Emissions related to off-site delivery/haul truck activity and construction worker trips are not considered in the evaluation of construction-related localized impacts, as these do not contribute to emissions generated on a project site. The closest sensitive receptors are the three single-family residences adjacent to the northeast corner of the project site. Therefore, the LSTs in SRA 24 for receptors located less than 82 feet (25 meters) are used for project sites greater than 5 acres. Table 14, *Maximum Localized Daily Construction Emissions*, shows the localized construction emissions without implementation of mitigation measure AQ-1.

Table 14
MAXIMUM LOCALIZED DAILY CONSTRUCTION EMISSIONS

Activity	NO_X (lb/day)	CO (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Grading, Soil Hauling and Blasting Drilling	115.0	76.5	10.1	5.8
Blasting	75.9	299.3	37.8	2.2
Underground Utilities	6.2	8.9	0.3	0.3
Paving	11.1	14.6	0.6	0.5
Building Construction and Architectural Coating	14.3	16.4	0.7	0.7
Maximum Daily Emissions	**115.0**	**299.3**	**37.8**	**5.8**
SCAQMD LST Thresholds (25 meters)	*270*	*1,577*	*13*	*8*
SCAQMD LST Thresholds (50 meters)	*302*	*2,178*	*40*	*10*
Exceed LST (25 meters/50 meters)?	***No/No***	***No/No***	***Yes/No***	***No/No***

Source: CalEEMod (output data is provided in Appendix A)
lb/day = pounds per day; NO_X = nitrogen oxides; CO = carbon monoxide; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter

As shown in Table 14, localized emissions for all criteria pollutants would remain below their respective SCAQMD LSTs at 82 feet (25 meters), except for emissions of PM_{10} during blasting. However, the northeast portion of the project site, near the closest sensitive receptors, does not contain rock formations that would require blasting. There are no sensitive receptors within 164 feet (50 meters) of potential blasting areas. As shown in Table 14, the calculated blasting PM_{10} emissions would not exceed

SCAQMD LST for receptors at 164 feet (50 meters). In addition, blasting would be a short event lasting less than a minute that would not create sustained fugitive dust emissions resulting elevated 24-hour average PM_{10} concentrations. Therefore, construction of the project would not result in exposure of sensitive receptors to substantial localized concentrations of criteria pollutants and precursors. Mitigation measure AQ-1 would not be required to reduce the severity of this impact.

Toxic Air Contaminants

Implementation of the project would result in the use of heavy-duty construction equipment, haul trucks, on-site generators, and construction worker vehicles. These vehicles and equipment could generate the TAC DPM. Generation of DPM from construction projects typically occurs in a localized area (e.g., at the project site) for a short period of time. Because construction activities and subsequent emissions vary depending on the phase of construction (e.g., grading, building construction), the construction-related emissions to which nearby receptors are exposed to would also vary throughout the construction period. During some equipment-intensive phases such as grading, construction-related emissions would be higher than other less equipment-intensive phases such as building construction. Concentrations of mobile-source DPM emissions are typically reduced by 70 percent at approximately 500 feet (CARB 2005).

The dose (of TAC) to which receptors are exposed is the primary factor used to determine health risk. Dose is a function of the concentration of a substance in the environment and the extent of exposure a person has with the substance; a longer exposure period to a fixed quantity of emissions would result in higher health risks. Current models and methodologies for conducting cancer health risk assessments are associated with longer-term exposure periods (typically 30 years for individual residents based on guidance from OEHHA) and are best suited for evaluation of long duration TAC emissions with predictable schedules and locations. These assessment models and methodologies do not correlate well with the temporary and highly variable nature of construction activities. Cancer potency factors are based on animal lifetime studies or worker studies where there is long-term exposure to the carcinogenic agent. There is considerable uncertainty in trying to evaluate the cancer risk from projects that will only last a small fraction of a lifetime (Office of Environmental Health Hazard Assessment [OEHHA] 2015). Considering this information, the highly dispersive nature of DPM, and the fact that construction activities would occur at various locations throughout the project site, it is not anticipated that construction of the project would expose sensitive receptors to substantial DPM concentrations.

5.3.1.2 Operational Activities

CO Hotspots

Vehicle exhaust is the primary source of CO. In an urban setting, the highest CO concentrations are generally found within close proximity to congested intersections. Under typical meteorological conditions, CO concentrations tend to decrease as distance from the emissions source (i.e., congested intersection) increase. Project-generated traffic has the potential of contributing to localized "hot spots" of CO off-site. Because CO is a byproduct of incomplete combustion, exhaust emissions are worse when fossil-fueled vehicles are operated inefficiently, such as in stop-and-go traffic or through heavily congested intersections, where the level of service (LOS) is severely degraded.

CARB recommends evaluation of the potential for the formation of locally high concentrations of CO, known as CO hot spots. A CO hot spot is a localized concentration of CO that is above the state or national 1-hour or 8-hour CO ambient air standards. To verify that the project would not cause or contribute to a violation of the 1-hour and 8-hour CO standards, an evaluation of the potential for CO hot spots at nearby intersections was conducted.

The TIA (TJW Engineering 2021) evaluated whether there would be a change in the LOS at the intersections affected by the proposed project. In accordance with the Transportation Project-Level Carbon Monoxide Protocol, CO hot spots are typically evaluated when: (a) the LOS of an intersection decreases to a LOS E or worse because of the project; (b) signalization and/or channelization is added to an intersection; and (c) sensitive receptors such as residences, schools, hospitals, etc., are located in the vicinity of the affected intersection or roadway segment (California Department of Transportation [Caltrans] 1998).

According to the TIA, all of the analyzed intersections are forecast to operate at LOS C or better in the project opening year condition, without implementation of the project. Implementation of the project would not result in the LOS of any of the analyzed intersections degrading (TJW Engineering 2021). Therefore, consistent with the CO Protocol, operation of the project would not result in exposure of sensitive receptors to substantial localized CO concentrations.

New Sensitive Receptors

As a residential development, the project would site new sensitive receptors. The CARB siting recommendations within the Air Quality and Land Use Handbook suggest a detailed health risk assessment should be conducted for proposed sensitive receptors within 1,000 feet of a warehouse distribution center, within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater), 50 feet of a typical gas dispensing facilities or within 300 feet of a dry cleaning facility that uses perchloroethylene (PCE), among other siting recommendations (CARB 2005). There are no facilities of this type within 1,000 feet of the project site. In addition, the closest high-volume roadway (more than 10,000 ADT) would be State Route 60, approximately 1.3 miles north of the project site. Therefore, future project residents would not be exposed to substantial concentrations of TACs.

5.3.2 Significance of Impacts

Implementation of the project would not expose sensitive receptors to substantial pollutant concentrations, and the impact would be less than significant.

5.3.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.3.4 Significance After Mitigation

Mitigation measure AQ-1 would not be required to reduce the severity of this impact. However, implementation of mitigation measure would reduce on-site emissions of NO_X and PM during grading up to 86 percent, reducing the localized concentrations of those pollutants. Implementation of the project would not expose sensitive receptors to substantial pollutant concentrations, and the impact would be less than significant.

5.4 ISSUE 4: OTHER EMISSIONS (SUCH AS THOSE LEADING TO ODORS)

5.4.1 Impacts

According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting activities, refineries, landfills, dairies, and fiberglass molding operations (SCAQMD 1993). The project, involving a residential development, would not include any of these uses nor are there any of these land uses in the project vicinity.

Emissions from construction equipment, such as diesel exhaust, and VOCs from architectural coatings and paving activities may generate odors; however, these odors would be temporary, intermittent, and not expected to affect a substantial number of people. Additionally, noxious odors would be confined to the immediate vicinity of construction equipment. By the time such emissions reach any sensitive receptor sites, they would be diluted to well below any level of air quality concern. Furthermore, short-term construction-related odors are expected to cease upon the drying or hardening of the odor-producing materials. Long-term operation of the project would not be a substantial source of objectionable odors. Therefore, the project would not create objectionable odors affecting a substantial number of people, and the impact would be less than significant.

5.4.2 Significance of Impacts

Implementation of the project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and the impact would be less than significant.

5.4.3 Mitigation Framework

Impacts would be less than significant; therefore, no mitigation measures are required.

5.4.4 Significance After Mitigation

Implementation of the project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people, and the impact would be less than significant.

6.0 GREENHOUSE GAS IMPACT ANALYSIS

This section evaluates potential impacts of the proposed project related to the generation of GHG emissions. Complete modeling results are included as Appendix A of this report.

6.1 ISSUE 1: GREENHOUSE GAS EMISSIONS

6.1.1 Construction Emissions

Project construction GHG emissions were estimated using the CalEEMod model as described in Section 4.1. Project-specific input was based on general information provided in Section 1.0 and default model settings to estimate reasonably conservative conditions. Additional details of phasing, selection of construction equipment, and other input parameters, including CalEEMod data, are included in Appendix A.

Emissions of GHGs related to the construction of the project would be temporary. As shown in Table 15, *Estimated Construction GHG Emissions*, total GHG emissions associated with construction of the project are estimated at 2,044.3 MT CO_2e. For construction emissions, SCAQMD guidance recommends that the emissions be amortized (i.e., averaged) over 30 years and added to operational emissions. Averaged over 30 years, the proposed construction activities would contribute approximately 68.1 MT CO_2e emissions per year.

Table 15
ESTIMATED CONSTRUCTION GHG EMISSIONS

Year/Activity	Emissions (MT CO_2e)
2022 Grading, Soil Hauling Underground Utilities, Paving and Building Construction	798.5
2022 Blasting	64.2
2023 Building Construction and Architectural Coating	793.5
2024 Building Construction and Architectural Coating	798.4
2025 Building Construction and Architectural Coating	388.0
TOTAL[1]	**2044.3**
Amortized Construction Emissions[2]	*68.1*

Source: CalEEMod (output data is provided in Appendices A and B)

[1] Totals may not sum due to rounding.

[2] Construction emissions are amortized over 30 years in accordance with SCAQMD guidance.

GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

6.1.2 Operational Emissions

As discussed in Section 4.2.2, the City CAP is a qualified GHG reduction plan in accordance with CEQA Guidelines Section 15183.5. Projects which are consistent with the control measures and 2040 GHG reduction target of 4.0 MT CO_2e per year per capita in the City CAP would have GHG emissions that are less than significant.

The project’s per capita GHG emissions are the total emissions divided by the project population. At full buildout, the total project population would be approximately 690 persons (3.9 persons per household; SCAG 2019). Table 16, *Total Estimated Operational GHG Emissions*, shows the calculated total annual emissions for the project and the emissions per capita. The emissions include the amortized annual construction emissions anticipated for the project. Appendix A contains the CalEEMod output files for the project.

Table 16
TOTAL ESTIMATED OPERATIONAL GHG EMISSIONS

Emission Sources	2020 Emissions ($MT\ CO_2e$)
Area Sources	41.5
Energy Sources	389.9
Vehicular (Mobile) Sources	1,673.8
Solid Waste Sources	78.3
Water Sources	49.7
Subtotal[1]	**2,233.2**
Construction (Annualized over 30 years)	68.1
TOTAL[1]	**2,301.3**
Emissions per Capita[2]	**3.3**
CAP 2040 Target Emissions per Capita	**4.0**
Exceed Threshold?	**No**

Source: CalEEMod (output data is provided in Appendix A)

[1] Totals may not sum due to rounding.

[2] Emission per capita is the project total emissions divided by the project population (2,301.3/690).

GHG = greenhouse gas; MT = metric tons; CO_2e = carbon dioxide equivalent

As shown in Table 16, the project emissions per capita of 3.3 MT CO_2e per year per capita would not exceed the City CAP 2040 GHG reduction target of 4.0 MT CO_2e per year per capita.

Chapter 4 of the City CAP contains additional GHG reduction measure (measures beyond state and federal policies) organized into sectors: Transportation, Industrial, Residential, Commercial, Off-Road Equipment, Public Services, and Natural Resources. Of the additional GHG reduction measures, only residential measure R-2 would be applicable for implementation by the project. Measure R-2 requires new construction and major remodels to install interior real-time energy smart meters in line with current utility provider efforts.

6.1.3 Significance of Impacts

Because there is no uniformly applicable development code that would enforce the City CAP GHG reduction measure R-2, the project may not be consistent with the City CAP and the impact would be potentially significant.

6.1.4 Mitigation Framework

The following mitigation measure would ensure the project would be consistent with the City CAP GHG reduction measures:

GHG-1 **Smart Meters.** Real-time energy smart meters shall be installed on all project residences. Prior to issuing building permits, the City shall verify that project plans include the requirement for smart meters. Prior to finalizing each project residence building permit, the City shall verify that a smart meter has been installed on the residence.

6.1.5 Significance After Mitigation

With implementation of mitigation measure GHG-1, the project would be consistent the City GAP GHG reduction measures. As shown in Table 16, the project emissions per capita of 3.3 MT CO_2e per year per capita would not exceed the City CAP 2040 GHG reduction target of 4.0 MT CO_2e per year per capita. Therefore, the project would be consistent with the City CAP and implementation of the project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and the impact would be less than significant with mitigation implemented.

6.2 ISSUE 2: CONFLICT WITH APPLICABLE PLANS ADOPTED FOR THE PURPOSE OF REDUCING GHG EMISSIONS

6.2.1 Impacts

There are numerous State plans, policies, and regulations adopted for the purpose of reducing GHG emissions. The principal overall State plan and policy is AB 32, the California Global Warming Solutions Act of 2006. The quantitative goal of AB 32 is to reduce GHG emissions to 1990 levels by 2020. SB 32 would require further reductions of 40 percent below 1990 levels by 2030. Because the project's operational year is post-2020, the project aims to reach the quantitative goals set by SB 32. Statewide plans and regulations such as GHG emissions standards for vehicles (AB 1493), the LCFS, and regulations requiring an increasing fraction of electricity to be generated from renewable sources are being implemented at the statewide level; as such, compliance at the project level is not addressed. Therefore, the proposed project would not conflict with those plans and regulations.

As shown in Section 3.2, transportation-related emissions consistently contribute the most GHG emissions in California (41 percent in 2017). According to the TIA VMT analysis, using the WRCOG VMT Screening Tool, the project is located in a low VMT area and would have a less than significant impact related to VMT. The project would be consistent with the General Plan and zoning designations for the site (City of Moreno Valley 2021b). Because the project would be consistent with the local general plan, residential growth in the City as a result of the project, and the related changes in regional VMT, would be accounted for in the SCAG's RTP/SCS.

The project must also be constructed in accordance with the energy-efficiency standards, water reduction goals, and other standards contained in the 2019 Title 24 Part 6 Building Energy Efficiency Standards and Part 11 (CALGreen) Building Standards, including the requirement for onsite solar electricity generation. As discussed in Issue 1, the project would be consistent with the City CAP.

6.2.2 Significance of Impacts

Because there is no uniformly applicable development code that would enforce the City CAP GHG reduction measure R-2, the project may not be consistent with the City CAP and the impact would be potentially significant.

6.2.3 Mitigation Framework

Mitigation measure GHG-1 would ensure the project would be consistent with the City CAP.

6.2.4 Significance After Mitigation

The project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs, and the impact would be less than significant with mitigation incorporated.

7.0 LIST OF PREPARERS

Martin Rolph	Air Quality Specialist
Victor Ortiz	Senior Air Quality Specialist
Joanne M. Dramko, AICP	Principal Air Quality Specialist, QA/QC
David Crook, AICP	Project Manager

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

8.0 REFERENCES

California Air Pollution Control Officers Association (CAPCOA). 2021a. Health Effects. Available at: http://www.capcoa.org/health-effects/. Accessed June 2021.

2021b. User's Guide for CalEEMod Version 2020.4.0. Available at: http://www.caleemod.com/.

California Air Resources Board (CARB). 2021a. Overview: Diesel Exhaust and Health. Available at: https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health. Accessed October 18. 2020.

2021b. Clean Car Standards – Pavley, Assembly Bill 1493. Accessed December. Available at: http://www.arb.ca.gov/cc/ccms/ccms.htm. Accessed June 2021.

2021c. ADAM Air Quality Data Statistics: Top 4 Summary. Available at: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed June 2021.

2021d. Current California GHG Emission Inventory Data. Available at: https://ww2.arb.ca.gov/ghg-inventory-data. Accessed October 2021

2017. California's 2017 Climate Change Scoping Plan. Available at: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf.

2016. Ambient Air Quality Standards. May 4. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-03/aaqs2_0.pdf.

2014. First Update to the Climate Change Scoping Plan: Building on the Framework. Available at: http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

2009. State Implementation Plan Background. April 13. Available at: https://ww3.arb.ca.gov/planning/sip/background.htm.

2008. Climate Change Scoping Plan – A Framework for Change. December. Available at: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/document/adopted_scoping_plan.pdf.

2007. California Greenhouse Gas Inventory – By Sector and Activity. November 19. Available at: https://ww3.arb.ca.gov/cc/inventory/archive/tables/ghg_inventory_sector_sum_90-04_ar4.pdf.

2005. Air Quality and Land Use Handbook: A Community Health Perspective. April. Available at: https://ww3.arb.ca.gov/ch/handbook.pdf.

California Building Standards Commission (CBSC). 2019. CALGreen (CCR Title 24, Part 11). Available at: https://www.dgs.ca.gov/BSC/Resources/Page-Content/Building-Standards-Commission-Resources-List-Folder/CALGreen.

California Department of Transportation (CalTrans). 1998. Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

California Energy Commission (CEC). 2019a. CCR Title 24 Part 6, 2019 Residential Compliance Manual, Chapter 7 – Photovoltaic, Community Shared Solar, Battery Storage, and Solar Ready Buildings. Available at: https://www.energy.ca.gov/sites/default/files/2020-06/07-PV_BatteryStorage_and_SolarReady_ada.pdf.

Intergovernmental Panel on Climate Change (IPCC). 2014. Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/report/ar5/wg3/.

2013. Climate Change 2013: The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/report/ar5/wg1/.

2007. Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. February. Available at: https://www.ipcc.ch/report/ar4/wg1/.

Iowa Environmental Mesonet (IEM). 2021. March Air Force Base Windrose Plot. Available at: IEM :: Site Wind Roses (iastate.edu).

Moreno Valley, City of (City). 2021b. Climate Action Plan. Adopted June 15. Draft Climate Action Plan Available at: http://www.moval.org/cdd/documents/general-plan-update/draft-docs/ClimateActionPlan/Draft-MV-CAP.pdf.

2021a. MoVal 2040 General Plan Update. Adopted June 15. Draft General Plan Update Available at: http://www.moval.org/cdd/documents/general-plan-public-hearings.html.

National Aeronautics and Space Administration, Goddard Institute for Space Studies (NASA). 2021. NASA News & Features Releases. 2020 Tied for Warmest Year on Record, NASA Analysis Show. January 14. https://www.giss.nasa.gov/research/news/20210114/.

National Oceanic and Atmospheric Administration (NOAA). 2021. Trends in Atmospheric Carbon Dioxide. Available at: https://www.esrl.noaa.gov/gmd/ccgg/trends. Accessed March 2021.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. February. Available at: https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.

Southern California Association of Governments (SCAG). 2019. Profile of the City of Moreno Valley. May. Available at: https://scag.ca.gov/sites/main/files/file-attachments/morenovalley_localprofile.pdf.

South Coast Air Quality Management District (SCAQMD). 2020. Rule 445, Wood-Burning Devices. Amended October 27. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-445.pdf?sfvrsn=4.

2017. Final 2016 Air Quality Management Plan. March. Available at: http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2016-aqmp.

2016a. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) Attainment Status for South Coast Air Basin. February. Available at: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf.

2016b. Rule 1113, Architectural Coatings. Amended February 5. Available at: http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf?sfvrsn=24.

2015. SCAQMD Air Quality Significance Thresholds. March. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.

2009. Mass Rate Localized Significance Thresholds Look-up Tables. October. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/appendix-c-mass-rate-lst-look-up-tables.pdf?sfvrsn=2.

2005. Rule 403, Fugitive Dust. Amended June 3. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.

2001. Rule 401, Visible emissions. Amended November 9. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-401.pdf?sfvrsn=4.

1993. *CEQA Air Quality Handbook*.

1976. Rule 402, Nuisance. Adopted May 7. Available at: http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-402.pdf?sfvrsn=4.

Sun, L. 2017 (December 29). Personal Communication. Telephone Conversation between L. Sun, Program Supervisor (SCAQMD) and V. Ortiz, Senior Air Quality Specialist (HELIX Environmental Planning).

TJW Engineering, Inc. 2021. Darco Tract 38123 Traffic impact Analysis. March 26.

U.S. Environmental Protection Agency (USEPA). 2021. Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act. Last updated September 10. Available at: https://www.epa.gov/ghgemissions/endangerment-and-cause-or-contribute-findings-greenhouse-gases-under-section-202a-clean. Accessed June 2021.

1998. AP 42, Fifth Edition, Volume I Chapter 11: Mineral Products Industry, Section 11.9 Western Surface Coal Mining. Available at: https://www3.epa.gov/ttn/chief/ap42/ch11/final/c11s09.pdf.

1980. AP 42, Fifth Edition, Volume I Chapter 13: Miscellaneous Sources, Section 13.3 Explosive Detonation. Available at: https://www.epa.gov/sites/production/files/2020-10/documents/13.3_explosives_detonation.pdf.

U.S. Environmental Protection Agency and U.S. Department of Transportation, National Highway Traffic Safety Administration. 2020. The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light. Corrected July 2020. Available at: https://www.govinfo.gov/content/pkg/FR-2020-04-30/pdf/2020-06967.pdf.

Western Regional Climate Center. 2017. Period of Record Monthly Climate Summary, Riverside Fire Station 3, California (047470). Available at: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7470.

Western Riverside Council of Governments (WRCOG). 2021. WRCOG VMT Screening Tool. Available at: https://apps.fehrandpeers.com/WRCOGVMT/. Accessed June 2021.

2014. Subregional Climate Action Plan. September. Available at: https://wrcog.us/DocumentCenter/View/188/Subregional-Climate-Action-Plan-CAP-PDF?bidId=.

World Resources Institute (WRI). 2020. CAIT Climate Data Explorer. Available: http://cait.wri.org/historical. Accessed June 2021.

This page intentionally left blank

Appendix A

CalEEMod Output

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

TTM 38213 Residential Project

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	7.48	Acre	7.48	325,828.80	0
City Park	2.21	Acre	2.21	96,267.60	0
Single Family Housing	177.00	Dwelling Unit	21.67	337,494.80	506

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2026
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run R2: Revises TTM, 177 DU and new 2.21 acre park.

Land Use - Land use per tentative map.
Residential area per PD average home SF
Other Asphalt Surfaces = internal streets and sidewalks.

Construction Phase - Construction schedule per applicant.
Soil hauling to occur on 15 days during grading.
Architectural coating concurrent with building construction as units are completed.
Blasting emissions calculated off-model.

Off-road Equipment - Defaults are correct, CalEEMod bug.

Off-road Equipment - Wood frame construction anticipated, no welders.

Off-road Equipment - Grading equipment and horsepoower per applicant.
Off-highway trucks = 3 rock trucks and 1 water truck.
Bore/Drill Rigs for blasting drilling.

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment -

Off-road Equipment - Soil hauling for loading and export of material on 15 days during grading.

Off-road Equipment - Equipment for trenching/installation of underground utuliites.

Trips and VMT - Soil hauling per applicant (180 loads per day over 15 days).
Max architectural coating crew of 10 assumed to complete 1 house at a time.

On-road Fugitive Dust - 0.125 mile of each soil hauling trip assumed to be on on-site unpaved access roads.

Grading - Soil export trips entered in VMT tab.

Architectural Coating -

Vehicle Trips - Trip generation per project Traffic Impact Anlaysis.
VMT (trip distance) per WRCOG VMT Screening Tool and housing data.

Road Dust -

Woodstoves -

Consumer Products -

Area Coating -

Landscape Equipment -

Energy Use -

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation to comply with SCAQMD Rule 55.

Area Mitigation - No woood burning devices in new construction per SCAQMD Rule 455.

Energy Mitigation - Solar generation estimated per 2019 Title 24 requirements.

Water Mitigation - 20% water reduction not accounted for in defaults per 2019 CALGreen.

Waste Mitigation - 25% solid waste diversion not accounted for in defaults per local/state regulations in compliance with AB 341.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	45.00	15.00
tblConstructionPhase	NumDays	35.00	43.00

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

tblConstructionPhase	NumDays	500.00	684.00
tblConstructionPhase	NumDays	35.00	609.00
tblLandUse	LandUseSquareFeet	318,600.00	337,494.80
tblLandUse	LotAcreage	57.47	21.67
tblOffRoadEquipment	HorsePower	158.00	236.00
tblOffRoadEquipment	HorsePower	187.00	309.00
tblOffRoadEquipment	HorsePower	247.00	319.00
tblOffRoadEquipment	HorsePower	367.00	395.00
tblOffRoadEquipment	HorsePower	367.00	700.00
tblOffRoadEquipment	HorsePower	212.00	309.00
tblOffRoadEquipment	HorsePower	402.00	260.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOnRoadDust	HaulingPercentPave	100.00	99.40
tblTripsAndVMT	HaulingTripNumber	0.00	5,400.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	48.00	20.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	8.51
tblVehicleTrips	HW_TTP	40.20	100.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	ST_TR	1.96	0.00
tblVehicleTrips	ST_TR	9.54	9.44
tblVehicleTrips	SU_TR	2.19	0.00
tblVehicleTrips	SU_TR	8.55	9.44

tblVehicleTrips	WD_TR	0.78	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	12.4269	163.5820	88.4276	0.4496	83.2449	4.8372	88.0820	12.2466	4.4698	16.7164	0.0000	45,592.5950	45,592.5950	7.7756	3.4922	46,827.6559
2023	6.1120	17.9277	25.3759	0.0660	3.4810	0.7542	4.2352	0.9360	0.7108	1.6468	0.0000	6,643.1752	6,643.1752	0.6781	0.3044	6,750.8363
2024	5.9590	16.8759	24.8069	0.0651	3.4810	0.6648	4.1458	0.9360	0.6263	1.5623	0.0000	6,561.5210	6,561.5210	0.6701	0.2959	6,666.4348
2025	5.8075	15.7859	24.2354	0.0640	3.4810	0.5756	4.0566	0.9360	0.5422	1.4782	0.0000	6,477.6391	6,477.6391	0.6631	0.2873	6,579.8278
Maximum	**12.4269**	**163.5820**	**88.4276**	**0.4496**	**83.2449**	**4.8372**	**88.0820**	**12.2466**	**4.4698**	**16.7164**	**0.0000**	**45,592.5950**	**45,592.5950**	**7.7756**	**3.4922**	**46,827.6559**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	12.4269	163.5820	88.4276	0.4496	33.1703	4.8372	38.0075	5.7195	4.4698	10.1893	0.0000	45,592.5950	45,592.5950	7.7756	3.4922	46,827.6559
2023	6.1120	17.9277	25.3759	0.0660	3.4810	0.7542	4.2352	0.9360	0.7108	1.6468	0.0000	6,643.1752	6,643.1752	0.6781	0.3044	6,750.8363
2024	5.9590	16.8759	24.8069	0.0651	3.4810	0.6648	4.1458	0.9360	0.6263	1.5623	0.0000	6,561.5210	6,561.5210	0.6701	0.2959	6,666.4348
2025	5.8075	15.7859	24.2354	0.0640	3.4810	0.5756	4.0566	0.9360	0.5422	1.4782	0.0000	6,477.6391	6,477.6391	0.6631	0.2873	6,579.8278
Maximum	**12.4269**	**163.5820**	**88.4276**	**0.4496**	**33.1703**	**4.8372**	**38.0075**	**5.7195**	**4.4698**	**10.1893**	**0.0000**	**45,592.5950**	**45,592.5950**	**7.7756**	**3.4922**	**46,827.6559**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.45**	**0.00**	**49.82**	**43.36**	**0.00**	**30.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	54.2247	3.8405	104.6036	0.2304		13.6017	13.6017		13.6017	13.6017	1,657.9446	3,212.2959	4,870.2404	4.9695	0.1125	5,028.0116
Energy	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Mobile	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Total	**58.2580**	**11.0261**	**143.5347**	**0.3320**	**10.9326**	**13.7802**	**24.7128**	**2.9162**	**13.7754**	**16.6916**	**1,657.9446**	**14,652.1338**	**16,310.0784**	**5.5052**	**0.6234**	**16,633.4730**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	8.1535	2.8106	15.7144	0.0176		0.2946	0.2946		0.2946	0.2946	0.0000	3,399.7076	3,399.7076	0.0898	0.0619	3,420.3838
Energy	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Mobile	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Total	**12.1868**	**9.9961**	**54.6455**	**0.1193**	**10.9326**	**0.4731**	**11.4057**	**2.9162**	**0.4683**	**3.3845**	**0.0000**	**14,839.5456**	**14,839.5456**	**0.6255**	**0.5727**	**15,025.8451**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	79.08	9.34	61.93	64.08	0.00	96.57	53.85	0.00	96.60	79.72	100.00	-1.28	9.02	88.64	8.13	9.67

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	5/1/2022	6/30/2022	5	44	
2	Soil Hauling	Grading	5/1/2022	5/20/2022	5	15	
3	Underground Utilities	Trenching	7/1/2022	9/15/2022	5	55	
4	Paving	Paving	9/16/2022	11/15/2022	5	43	
5	Building Construction	Building Construction	11/16/2022	6/30/2025	5	684	
6	Architectural Coating	Architectural Coating	3/1/2023	6/30/2025	5	609	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 286

Acres of Paving: 7.48

Residential Indoor: 683,427; Residential Outdoor: 227,809; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 19,550 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Bore/Drill Rigs	2	8.00	221	0.50
Grading	Crawler Tractors	1	8.00	309	0.43
Grading	Excavators	1	8.00	236	0.38
Grading	Graders	1	8.00	309	0.41
Grading	Off-Highway Trucks	4	8.00	260	0.38

Grading	Rubber Tired Dozers	1	8.00	319	0.40
Grading	Scrapers	1	8.00	395	0.48
Grading	Scrapers	4	8.00	700	0.48
Soil Hauling	Rubber Tired Loaders	2	8.00	203	0.36
Underground Utilities	Excavators	1	8.00	158	0.38
Underground Utilities	Forklifts	1	8.00	89	0.20
Underground Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Hauling	2	5.00	0.00	5,400.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Utilities	4	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	241.00	88.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					12.9153	0.0000	12.9153	4.0545	0.0000	4.0545			0.0000			0.0000
Off-Road	10.6017	108.9228	73.4710	0.2260		4.0967	4.0967		3.7690	3.7690		21,881.1851	21,881.1851	7.0768		22,058.1056
Total	**10.6017**	**108.9228**	**73.4710**	**0.2260**	**12.9153**	**4.0967**	**17.0121**	**4.0545**	**3.7690**	**7.8235**		**21,881.1851**	**21,881.1851**	**7.0768**		**22,058.1056**

3.2 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1399	0.1007	1.2277	3.5000e-003	0.4248	2.1200e-003	0.4269	0.1127	1.9500e-003	0.1146		355.7461	355.7461	9.6600e-003	9.8900e-003	358.9344
Total	**0.1399**	**0.1007**	**1.2277**	**3.5000e-003**	**0.4248**	**2.1200e-003**	**0.4269**	**0.1127**	**1.9500e-003**	**0.1146**		**355.7461**	**355.7461**	**9.6600e-003**	**9.8900e-003**	**358.9344**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.8119	0.0000	5.8119	1.8245	0.0000	1.8245			0.0000			0.0000
Off-Road	10.6017	108.9228	73.4710	0.2260		4.0967	4.0967		3.7690	3.7690	0.0000	21,881.1851	21,881.1851	7.0768		22,058.1055
Total	**10.6017**	**108.9228**	**73.4710**	**0.2260**	**5.8119**	**4.0967**	**9.9086**	**1.8245**	**3.7690**	**5.5935**	**0.0000**	**21,881.1851**	**21,881.1851**	**7.0768**		**22,058.1055**

3.2 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1399	0.1007	1.2277	3.5000e-003	0.4248	2.1200e-003	0.4269	0.1127	1.9500e-003	0.1146		355.7461	355.7461	9.6600e-003	9.8900e-003	358.9344
Total	**0.1399**	**0.1007**	**1.2277**	**3.5000e-003**	**0.4248**	**2.1200e-003**	**0.4269**	**0.1127**	**1.9500e-003**	**0.1146**		**355.7461**	**355.7461**	**9.6600e-003**	**9.8900e-003**	**358.9344**

3.3 Soil Hauling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.5828	6.0500	3.0625	0.0125		0.2029	0.2029		0.1867	0.1867		1,211.3286	1,211.3286	0.3918		1,221.1228
Total	**0.5828**	**6.0500**	**3.0625**	**0.0125**	**0.0000**	**0.2029**	**0.2029**	**0.0000**	**0.1867**	**0.1867**		**1,211.3286**	**1,211.3286**	**0.3918**		**1,221.1228**

3.3 Soil Hauling - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0842	48.4953	10.5049	0.2071	69.8489	0.5351	70.3840	8.0646	0.5120	8.5766		22,097.5266	22,097.5266	0.2960	3.4810	23,142.2649
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0184	0.0133	0.1615	4.6000e-004	0.0559	2.8000e-004	0.0562	0.0148	2.6000e-004	0.0151		46.8087	46.8087	1.2700e-003	1.3000e-003	47.2282
Total	**1.1026**	**48.5086**	**10.6664**	**0.2076**	**69.9048**	**0.5354**	**70.4402**	**8.0794**	**0.5122**	**8.5916**		**22,144.3352**	**22,144.3352**	**0.2973**	**3.4823**	**23,189.4931**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.5828	6.0500	3.0625	0.0125		0.2029	0.2029		0.1867	0.1867	0.0000	1,211.3286	1,211.3286	0.3918		1,221.1228
Total	**0.5828**	**6.0500**	**3.0625**	**0.0125**	**0.0000**	**0.2029**	**0.2029**	**0.0000**	**0.1867**	**0.1867**	**0.0000**	**1,211.3286**	**1,211.3286**	**0.3918**		**1,221.1228**

3.3 Soil Hauling - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0842	48.4953	10.5049	0.2071	26.8778	0.5351	27.4129	3.7675	0.5120	4.2794		22,097.5266	22,097.5266	0.2960	3.4810	23,142.2649
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0184	0.0133	0.1615	4.6000e-004	0.0559	2.8000e-004	0.0562	0.0148	2.6000e-004	0.0151		46.8087	46.8087	1.2700e-003	1.3000e-003	47.2282
Total	**1.1026**	**48.5086**	**10.6664**	**0.2076**	**26.9337**	**0.5354**	**27.4691**	**3.7823**	**0.5122**	**4.2945**		**22,144.3352**	**22,144.3352**	**0.2973**	**3.4823**	**23,189.4931**

3.4 Underground Utilities - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6454	6.1832	8.8848	0.0129		0.3360	0.3360		0.3092	0.3092		1,250.5240	1,250.5240	0.4044		1,260.6351
Total	**0.6454**	**6.1832**	**8.8848**	**0.0129**		**0.3360**	**0.3360**		**0.3092**	**0.3092**		**1,250.5240**	**1,250.5240**	**0.4044**		**1,260.6351**

3.4 Underground Utilities - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.4455	0.1527	1.8200e-003	0.0641	6.1100e-003	0.0702	0.0184	5.8500e-003	0.0243		193.1558	193.1558	2.0100e-003	0.0287	201.7487
Worker	0.0368	0.0265	0.3231	9.2000e-004	0.1118	5.6000e-004	0.1123	0.0296	5.1000e-004	0.0302		93.6174	93.6174	2.5400e-003	2.6000e-003	94.4564
Total	**0.0524**	**0.4720**	**0.4758**	**2.7400e-003**	**0.1758**	**6.6700e-003**	**0.1825**	**0.0481**	**6.3600e-003**	**0.0545**		**286.7732**	**286.7732**	**4.5500e-003**	**0.0313**	**296.2051**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6454	6.1832	8.8848	0.0129		0.3360	0.3360		0.3092	0.3092	0.0000	1,250.5240	1,250.5240	0.4044		1,260.6351
Total	**0.6454**	**6.1832**	**8.8848**	**0.0129**		**0.3360**	**0.3360**		**0.3092**	**0.3092**	**0.0000**	**1,250.5240**	**1,250.5240**	**0.4044**		**1,260.6351**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.4 Underground Utilities - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.4455	0.1527	1.8200e-003	0.0641	6.1100e-003	0.0702	0.0184	5.8500e-003	0.0243		193.1558	193.1558	2.0100e-003	0.0287	201.7487
Worker	0.0368	0.0265	0.3231	9.2000e-004	0.1118	5.6000e-004	0.1123	0.0296	5.1000e-004	0.0302		93.6174	93.6174	2.5400e-003	2.6000e-003	94.4564
Total	**0.0524**	**0.4720**	**0.4758**	**2.7400e-003**	**0.1758**	**6.6700e-003**	**0.1825**	**0.0481**	**6.3600e-003**	**0.0545**		**286.7732**	**286.7732**	**4.5500e-003**	**0.0313**	**296.2051**

3.5 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.4558					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5586**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.5 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0552	0.0398	0.4846	1.3800e-003	0.1677	8.4000e-004	0.1685	0.0445	7.7000e-004	0.0452		140.4261	140.4261	3.8100e-003	3.9000e-003	141.6847
Total	**0.0552**	**0.0398**	**0.4846**	**1.3800e-003**	**0.1677**	**8.4000e-004**	**0.1685**	**0.0445**	**7.7000e-004**	**0.0452**		**140.4261**	**140.4261**	**3.8100e-003**	**3.9000e-003**	**141.6847**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.4558					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5586**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.5 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0552	0.0398	0.4846	1.3800e-003	0.1677	8.4000e-004	0.1685	0.0445	7.7000e-004	0.0452		140.4261	140.4261	3.8100e-003	3.9000e-003	141.6847
Total	**0.0552**	**0.0398**	**0.4846**	**1.3800e-003**	**0.1677**	**8.4000e-004**	**0.1685**	**0.0445**	**7.7000e-004**	**0.0452**		**140.4261**	**140.4261**	**3.8100e-003**	**3.9000e-003**	**141.6847**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4295	14.1527	14.6676	0.0244		0.7451	0.7451		0.6973	0.6973		2,346.8559	2,346.8559	0.5871		2,361.5338
Total	**1.4295**	**14.1527**	**14.6676**	**0.0244**		**0.7451**	**0.7451**		**0.6973**	**0.6973**		**2,346.8559**	**2,346.8559**	**0.5871**		**2,361.5338**

3.6 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1371	3.9203	1.3436	0.0160	0.5637	0.0538	0.6174	0.1623	0.0515	0.2138		1,699.7708	1,699.7708	0.0177	0.2523	1,775.3885
Worker	0.8872	0.6389	7.7864	0.0222	2.6938	0.0134	2.7072	0.7144	0.0124	0.7268		2,256.1789	2,256.1789	0.0613	0.0627	2,276.4000
Total	**1.0243**	**4.5592**	**9.1299**	**0.0382**	**3.2575**	**0.0672**	**3.3247**	**0.8767**	**0.0638**	**0.9405**		**3,955.9497**	**3,955.9497**	**0.0790**	**0.3150**	**4,051.7885**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4295	14.1527	14.6676	0.0244		0.7451	0.7451		0.6973	0.6973	0.0000	2,346.8559	2,346.8559	0.5871		2,361.5338
Total	**1.4295**	**14.1527**	**14.6676**	**0.0244**		**0.7451**	**0.7451**		**0.6973**	**0.6973**	**0.0000**	**2,346.8559**	**2,346.8559**	**0.5871**		**2,361.5338**

3.6 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1371	3.9203	1.3436	0.0160	0.5637	0.0538	0.6174	0.1623	0.0515	0.2138		1,699.7708	1,699.7708	0.0177	0.2523	1,775.3885
Worker	0.8872	0.6389	7.7864	0.0222	2.6938	0.0134	2.7072	0.7144	0.0124	0.7268		2,256.1789	2,256.1789	0.0613	0.0627	2,276.4000
Total	**1.0243**	**4.5592**	**9.1299**	**0.0382**	**3.2575**	**0.0672**	**3.3247**	**0.8767**	**0.0638**	**0.9405**		**3,955.9497**	**3,955.9497**	**0.0790**	**0.3150**	**4,051.7885**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3183	12.9643	14.5661	0.0244		0.6446	0.6446		0.6033	0.6033		2,347.7322	2,347.7322	0.5852		2,362.3625
Total	**1.3183**	**12.9643**	**14.5661**	**0.0244**		**0.6446**	**0.6446**		**0.6033**	**0.6033**		**2,347.7322**	**2,347.7322**	**0.5852**		**2,362.3625**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0919	3.0490	1.2237	0.0154	0.5636	0.0251	0.5888	0.1623	0.0240	0.1863		1,634.4310	1,634.4310	0.0163	0.2417	1,706.8723
Worker	0.8253	0.5645	7.1793	0.0215	2.6938	0.0126	2.7065	0.7144	0.0116	0.7261		2,197.2219	2,197.2219	0.0552	0.0579	2,215.8450
Total	**0.9171**	**3.6135**	**8.4029**	**0.0369**	**3.2575**	**0.0378**	**3.2952**	**0.8767**	**0.0357**	**0.9124**		**3,831.6529**	**3,831.6529**	**0.0715**	**0.2996**	**3,922.7173**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3183	12.9643	14.5661	0.0244		0.6446	0.6446		0.6033	0.6033	0.0000	2,347.7322	2,347.7322	0.5852		2,362.3624
Total	**1.3183**	**12.9643**	**14.5661**	**0.0244**		**0.6446**	**0.6446**		**0.6033**	**0.6033**	**0.0000**	**2,347.7322**	**2,347.7322**	**0.5852**		**2,362.3624**

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0919	3.0490	1.2237	0.0154	0.5636	0.0251	0.5888	0.1623	0.0240	0.1863		1,634.4310	1,634.4310	0.0163	0.2417	1,706.8723
Worker	0.8253	0.5645	7.1793	0.0215	2.6938	0.0126	2.7065	0.7144	0.0116	0.7261		2,197.2219	2,197.2219	0.0552	0.0579	2,215.8450
Total	**0.9171**	**3.6135**	**8.4029**	**0.0369**	**3.2575**	**0.0378**	**3.2952**	**0.8767**	**0.0357**	**0.9124**		**3,831.6529**	**3,831.6529**	**0.0715**	**0.2996**	**3,922.7173**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2357	12.0630	14.5031	0.0244		0.5659	0.5659		0.5294	0.5294		2,348.2212	2,348.2212	0.5832		2,362.8006
Total	**1.2357**	**12.0630**	**14.5031**	**0.0244**		**0.5659**	**0.5659**		**0.5294**	**0.5294**		**2,348.2212**	**2,348.2212**	**0.5832**		**2,362.8006**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	3.0494	1.2100	0.0152	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,609.2688	1,609.2688	0.0169	0.2376	1,680.5062
Worker	0.7718	0.5029	6.7256	0.0208	2.6938	0.0121	2.7059	0.7144	0.0111	0.7255		2,144.6073	2,144.6073	0.0501	0.0538	2,161.8751
Total	**0.8621**	**3.5523**	**7.9355**	**0.0360**	**3.2574**	**0.0370**	**3.2945**	**0.8767**	**0.0350**	**0.9117**		**3,753.8761**	**3,753.8761**	**0.0670**	**0.2914**	**3,842.3813**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2357	12.0630	14.5031	0.0244		0.5659	0.5659		0.5294	0.5294	0.0000	2,348.2212	2,348.2212	0.5832		2,362.8006
Total	**1.2357**	**12.0630**	**14.5031**	**0.0244**		**0.5659**	**0.5659**		**0.5294**	**0.5294**	**0.0000**	**2,348.2212**	**2,348.2212**	**0.5832**		**2,362.8006**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	3.0494	1.2100	0.0152	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,609.2688	1,609.2688	0.0169	0.2376	1,680.5062
Worker	0.7718	0.5029	6.7256	0.0208	2.6938	0.0121	2.7059	0.7144	0.0111	0.7255		2,144.6073	2,144.6073	0.0501	0.0538	2,161.8751
Total	**0.8621**	**3.5523**	**7.9355**	**0.0360**	**3.2574**	**0.0370**	**3.2945**	**0.8767**	**0.0350**	**0.9117**		**3,753.8761**	**3,753.8761**	**0.0670**	**0.2914**	**3,842.3813**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1476	11.1276	14.4330	0.0244		0.4867	0.4867		0.4554	0.4554		2,348.9966	2,348.9966	0.5812		2,363.5275
Total	**1.1476**	**11.1276**	**14.4330**	**0.0244**		**0.4867**	**0.4867**		**0.4554**	**0.4554**		**2,348.9966**	**2,348.9966**	**0.5812**		**2,363.5275**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0891	3.0245	1.1967	0.0149	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,580.9246	1,580.9246	0.0175	0.2330	1,650.7898
Worker	0.7235	0.4509	6.2757	0.0201	2.6938	0.0115	2.7053	0.7144	0.0106	0.7250		2,092.6093	2,092.6093	0.0453	0.0501	2,108.6841
Total	**0.8126**	**3.4754**	**7.4725**	**0.0350**	**3.2574**	**0.0365**	**3.2939**	**0.8767**	**0.0345**	**0.9112**		**3,673.5339**	**3,673.5339**	**0.0628**	**0.2831**	**3,759.4739**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1476	11.1276	14.4330	0.0244		0.4867	0.4867		0.4554	0.4554	0.0000	2,348.9966	2,348.9966	0.5812		2,363.5275
Total	**1.1476**	**11.1276**	**14.4330**	**0.0244**		**0.4867**	**0.4867**		**0.4554**	**0.4554**	**0.0000**	**2,348.9966**	**2,348.9966**	**0.5812**		**2,363.5275**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0891	3.0245	1.1967	0.0149	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,580.9246	1,580.9246	0.0175	0.2330	1,650.7898
Worker	0.7235	0.4509	6.2757	0.0201	2.6938	0.0115	2.7053	0.7144	0.0106	0.7250		2,092.6093	2,092.6093	0.0453	0.0501	2,108.6841
Total	**0.8126**	**3.4754**	**7.4725**	**0.0350**	**3.2574**	**0.0365**	**3.2939**	**0.8767**	**0.0345**	**0.9112**		**3,673.5339**	**3,673.5339**	**0.0628**	**0.2831**	**3,759.4739**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**3.8081**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0685	0.0469	0.5958	1.7800e-003	0.2236	1.0500e-003	0.2246	0.0593	9.7000e-004	0.0603		182.3421	182.3421	4.5800e-003	4.8000e-003	183.8876
Total	**0.0685**	**0.0469**	**0.5958**	**1.7800e-003**	**0.2236**	**1.0500e-003**	**0.2246**	**0.0593**	**9.7000e-004**	**0.0603**		**182.3421**	**182.3421**	**4.5800e-003**	**4.8000e-003**	**183.8876**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**3.8081**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0685	0.0469	0.5958	1.7800e-003	0.2236	1.0500e-003	0.2246	0.0593	9.7000e-004	0.0603		182.3421	182.3421	4.5800e-003	4.8000e-003	183.8876
Total	**0.0685**	**0.0469**	**0.5958**	**1.7800e-003**	**0.2236**	**1.0500e-003**	**0.2246**	**0.0593**	**9.7000e-004**	**0.0603**		**182.3421**	**182.3421**	**4.5800e-003**	**4.8000e-003**	**183.8876**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**3.7972**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0641	0.0417	0.5581	1.7300e-003	0.2236	1.0000e-003	0.2246	0.0593	9.2000e-004	0.0602		177.9757	177.9757	4.1600e-003	4.4600e-003	179.4087
Total	**0.0641**	**0.0417**	**0.5581**	**1.7300e-003**	**0.2236**	**1.0000e-003**	**0.2246**	**0.0593**	**9.2000e-004**	**0.0602**		**177.9757**	**177.9757**	**4.1600e-003**	**4.4600e-003**	**179.4087**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**3.7972**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0641	0.0417	0.5581	1.7300e-003	0.2236	1.0000e-003	0.2246	0.0593	9.2000e-004	0.0602		177.9757	177.9757	4.1600e-003	4.4600e-003	179.4087
Total	**0.0641**	**0.0417**	**0.5581**	**1.7300e-003**	**0.2236**	**1.0000e-003**	**0.2246**	**0.0593**	**9.2000e-004**	**0.0602**		**177.9757**	**177.9757**	**4.1600e-003**	**4.4600e-003**	**179.4087**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**3.7873**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0600	0.0374	0.5208	1.6700e-003	0.2236	9.5000e-004	0.2245	0.0593	8.8000e-004	0.0602		173.6605	173.6605	3.7600e-003	4.1600e-003	174.9945
Total	**0.0600**	**0.0374**	**0.5208**	**1.6700e-003**	**0.2236**	**9.5000e-004**	**0.2245**	**0.0593**	**8.8000e-004**	**0.0602**		**173.6605**	**173.6605**	**3.7600e-003**	**4.1600e-003**	**174.9945**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**3.7873**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0600	0.0374	0.5208	1.6700e-003	0.2236	9.5000e-004	0.2245	0.0593	8.8000e-004	0.0602		173.6605	173.6605	3.7600e-003	4.1600e-003	174.9945
Total	**0.0600**	**0.0374**	**0.5208**	**1.6700e-003**	**0.2236**	**9.5000e-004**	**0.2245**	**0.0593**	**8.8000e-004**	**0.0602**		**173.6605**	**173.6605**	**3.7600e-003**	**4.1600e-003**	**174.9945**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Unmitigated	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	1,670.88	1,670.88	1670.88	5,175,785	5,175,785
Total	1,670.88	1,670.88	1,670.88	5,175,785	5,175,785

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	8.51	5.90	8.70	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Other Asphalt Surfaces	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.00109	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Single Family Housing	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
NaturalGas Unmitigated	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	13717.2	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Total		**0.1479**	**1.2641**	**0.5379**	**8.0700e-003**		**0.1022**	**0.1022**		**0.1022**	**0.1022**		**1,613.7916**	**1,613.7916**	**0.0309**	**0.0296**	**1,623.3815**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	13.7172	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Total		**0.1479**	**1.2641**	**0.5379**	**8.0700e-003**		**0.1022**	**0.1022**		**0.1022**	**0.1022**		**1,613.7916**	**1,613.7916**	**0.0309**	**0.0296**	**1,623.3815**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	8.1535	2.8106	15.7144	0.0176		0.2946	0.2946		0.2946	0.2946	0.0000	3,399.7076	3,399.7076	0.0898	0.0619	3,420.3838
Unmitigated	54.2247	3.8405	104.6036	0.2304		13.6017	13.6017		13.6017	13.6017	1,657.9446	3,212.2959	4,870.2404	4.9695	0.1125	5,028.0116

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6034					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.8028					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	46.3804	3.6725	90.0137	0.2296		13.5207	13.5207		13.5207	13.5207	1,657.9446	3,186.0000	4,843.9446	4.9443	0.1125	5,001.0861
Landscaping	0.4381	0.1681	14.5899	7.7000e-004		0.0810	0.0810		0.0810	0.0810		26.2959	26.2959	0.0252		26.9255
Total	**54.2247**	**3.8405**	**104.6036**	**0.2304**		**13.6017**	**13.6017**		**13.6017**	**13.6017**	**1,657.9446**	**3,212.2959**	**4,870.2404**	**4.9695**	**0.1125**	**5,028.0116**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6034					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.8028					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3092	2.6425	1.1245	0.0169		0.2137	0.2137		0.2137	0.2137	0.0000	3,373.4118	3,373.4118	0.0647	0.0619	3,393.4583
Landscaping	0.4381	0.1681	14.5899	7.7000e-004		0.0810	0.0810		0.0810	0.0810		26.2959	26.2959	0.0252		26.9255
Total	**8.1535**	**2.8106**	**15.7144**	**0.0176**		**0.2946**	**0.2946**		**0.2946**	**0.2946**	**0.0000**	**3,399.7076**	**3,399.7076**	**0.0898**	**0.0619**	**3,420.3838**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

TTM 38213 Residential Project

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	7.48	Acre	7.48	325,828.80	0
City Park	2.21	Acre	2.21	96,267.60	0
Single Family Housing	177.00	Dwelling Unit	21.67	337,494.80	506

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2026
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run R2: Revises TTM, 177 DU and new 2.21 acre park.
Run with construction Tier 4 engine mitigation.

Land Use - Land use per tentative map.
Residential area per PD average home SF
Other Asphalt Surfaces = internal streets and sidewalks.

Construction Phase - Construction schedule per applicant.
Soil hauling to occur on 15 days during grading.
Architectural coating concurrent with building construction as units are completed.
Blasting emissions calculated off-model.

Off-road Equipment -

Off-road Equipment - Wood frame construction anticipated, no welders.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment - Grading equipment and horsepoower per applicant.
Off-highway trucks = 3 rock trucks and 1 water truck.
Bore/Drill Rigs for blasting drilling.

Off-road Equipment -

Off-road Equipment - Soil hauling for loading and export of material on 15 days during grading.

Off-road Equipment - Equipment for trenching/installation of underground utuliites.

Trips and VMT - Soil hauling per applicant (180 loads per day over 15 days).
Max architectural coating crew of 10 assumed to complete 1 house at a time.

On-road Fugitive Dust - 0.125 mile of each soil hauling trip assumed to be on on-site unpaved access roads.

Grading - Soil export trips entered in VMT tab.

Architectural Coating -

Vehicle Trips - Trip generation per project Traffic Impact Anlaysis.
VMT (trip distance) per WRCOG VMT Screening Tool and housing data.

Road Dust -

Woodstoves -

Consumer Products -

Area Coating -

Landscape Equipment -

Energy Use -

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation to comply with SCAQMD Rule 55.
Tier 4 engines per Mitigation Measure AQ-1.

Area Mitigation - No woood burning devices in new construction per SCAQMD Rule 455.

Energy Mitigation - Solar generation estimated per 2019 Title 24 requirements.

Water Mitigation - 20% water reduction not accounted for in defaults per 2019 CALGreen.

Waste Mitigation - 25% solid waste diversion not accounted for in defaults per local/state regulations in compliance with AB 341.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	45.00	15.00
tblConstructionPhase	NumDays	35.00	43.00
tblConstructionPhase	NumDays	500.00	684.00
tblConstructionPhase	NumDays	35.00	609.00
tblLandUse	LandUseSquareFeet	318,600.00	337,494.80
tblLandUse	LotAcreage	57.47	21.67
tblOffRoadEquipment	HorsePower	158.00	236.00
tblOffRoadEquipment	HorsePower	187.00	309.00
tblOffRoadEquipment	HorsePower	247.00	319.00
tblOffRoadEquipment	HorsePower	367.00	395.00
tblOffRoadEquipment	HorsePower	367.00	700.00
tblOffRoadEquipment	HorsePower	212.00	309.00
tblOffRoadEquipment	HorsePower	402.00	260.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOnRoadDust	HaulingPercentPave	100.00	99.40
tblTripsAndVMT	HaulingTripNumber	0.00	5,400.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	48.00	20.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	8.51
tblVehicleTrips	HW_TTP	40.20	100.00
tblVehicleTrips	PB_TP	3.00	0.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	ST_TR	1.96	0.00
tblVehicleTrips	ST_TR	9.54	9.44
tblVehicleTrips	SU_TR	2.19	0.00
tblVehicleTrips	SU_TR	8.55	9.44
tblVehicleTrips	WD_TR	0.78	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	12.4269	163.5820	88.4276	0.4496	83.2449	4.8372	88.0820	12.2466	4.4698	16.7164	0.0000	45,592.5950	45,592.5950	7.7756	3.4922	46,827.6559
2023	6.1120	17.9277	25.3759	0.0660	3.4810	0.7542	4.2352	0.9360	0.7108	1.6468	0.0000	6,643.1752	6,643.1752	0.6781	0.3044	6,750.8363
2024	5.9590	16.8759	24.8069	0.0651	3.4810	0.6648	4.1458	0.9360	0.6263	1.5623	0.0000	6,561.5210	6,561.5210	0.6701	0.2959	6,666.4348
2025	5.8075	15.7859	24.2354	0.0640	3.4810	0.5756	4.0566	0.9360	0.5422	1.4782	0.0000	6,477.6391	6,477.6391	0.6631	0.2873	6,579.8278
Maximum	**12.4269**	**163.5820**	**88.4276**	**0.4496**	**83.2449**	**4.8372**	**88.0820**	**12.2466**	**4.4698**	**16.7164**	**0.0000**	**45,592.5950**	**45,592.5950**	**7.7756**	**3.4922**	**46,827.6559**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.1767	61.3243	119.4826	0.4496	33.1703	0.9287	34.0991	5.7195	0.9054	6.6249	0.0000	45,592.5950	45,592.5950	7.7756	3.4922	46,827.6559
2023	4.9158	5.0199	26.7945	0.0660	3.4810	0.0806	3.5617	0.9360	0.0785	1.0145	0.0000	6,643.1752	6,643.1752	0.6781	0.3044	6,750.8363
2024	4.8563	4.9535	26.2895	0.0651	3.4810	0.0799	3.5609	0.9360	0.0777	1.0137	0.0000	6,561.5210	6,561.5210	0.6701	0.2959	6,666.4348
2025	4.8027	4.8723	25.7891	0.0640	3.4810	0.0792	3.5602	0.9360	0.0772	1.0131	0.0000	6,477.6391	6,477.6391	0.6631	0.2873	6,579.8278
Maximum	**4.9158**	**61.3243**	**119.4826**	**0.4496**	**33.1703**	**0.9287**	**34.0991**	**5.7195**	**0.9054**	**6.6249**	**0.0000**	**45,592.5950**	**45,592.5950**	**7.7756**	**3.4922**	**46,827.6559**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**38.12**	**64.44**	**-21.81**	**0.00**	**53.45**	**82.90**	**55.45**	**43.36**	**82.06**	**54.84**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	54.2247	3.8405	104.6036	0.2304		13.6017	13.6017		13.6017	13.6017	1,657.9446	3,212.2959	4,870.2404	4.9695	0.1125	5,028.0116
Energy	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Mobile	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Total	**58.2580**	**11.0261**	**143.5347**	**0.3320**	**10.9326**	**13.7802**	**24.7128**	**2.9162**	**13.7754**	**16.6916**	**1,657.9446**	**14,652.1338**	**16,310.0784**	**5.5052**	**0.6234**	**16,633.4730**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	8.1535	2.8106	15.7144	0.0176		0.2946	0.2946		0.2946	0.2946	0.0000	3,399.7076	3,399.7076	0.0898	0.0619	3,420.3838
Energy	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Mobile	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Total	**12.1868**	**9.9961**	**54.6455**	**0.1193**	**10.9326**	**0.4731**	**11.4057**	**2.9162**	**0.4683**	**3.3845**	**0.0000**	**14,839.5456**	**14,839.5456**	**0.6255**	**0.5727**	**15,025.8451**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	79.08	9.34	61.93	64.08	0.00	96.57	53.85	0.00	96.60	79.72	100.00	-1.28	9.02	88.64	8.13	9.67

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	5/1/2022	6/30/2022	5	44	
2	Soil Hauling	Grading	5/1/2022	5/20/2022	5	15	
3	Underground Utilities	Trenching	7/1/2022	9/15/2022	5	55	
4	Paving	Paving	9/16/2022	11/15/2022	5	43	
5	Building Construction	Building Construction	11/16/2022	6/30/2025	5	684	
6	Architectural Coating	Architectural Coating	3/1/2023	6/30/2025	5	609	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 286

Acres of Paving: 7.48

Residential Indoor: 683,427; Residential Outdoor: 227,809; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 19,550 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Bore/Drill Rigs	2	8.00	221	0.50
Grading	Crawler Tractors	1	8.00	309	0.43
Grading	Excavators	1	8.00	236	0.38
Grading	Graders	1	8.00	309	0.41
Grading	Off-Highway Trucks	4	8.00	260	0.38

Grading	Rubber Tired Dozers	1	8.00	319	0.40
Grading	Scrapers	1	8.00	395	0.48
Grading	Scrapers	4	8.00	700	0.48
Soil Hauling	Rubber Tired Loaders	2	8.00	203	0.36
Underground Utilities	Excavators	1	8.00	158	0.38
Underground Utilities	Forklifts	1	8.00	89	0.20
Underground Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Hauling	2	5.00	0.00	5,400.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Utilities	4	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	241.00	88.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					12.9153	0.0000	12.9153	4.0545	0.0000	4.0545			0.0000			0.0000
Off-Road	10.6017	108.9228	73.4710	0.2260		4.0967	4.0967		3.7690	3.7690		21,881.1851	21,881.1851	7.0768		22,058.1056
Total	**10.6017**	**108.9228**	**73.4710**	**0.2260**	**12.9153**	**4.0967**	**17.0121**	**4.0545**	**3.7690**	**7.8235**		**21,881.1851**	**21,881.1851**	**7.0768**		**22,058.1056**

3.2 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1399	0.1007	1.2277	3.5000e-003	0.4248	2.1200e-003	0.4269	0.1127	1.9500e-003	0.1146		355.7461	355.7461	9.6600e-003	9.8900e-003	358.9344
Total	**0.1399**	**0.1007**	**1.2277**	**3.5000e-003**	**0.4248**	**2.1200e-003**	**0.4269**	**0.1127**	**1.9500e-003**	**0.1146**		**355.7461**	**355.7461**	**9.6600e-003**	**9.8900e-003**	**358.9344**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.8119	0.0000	5.8119	1.8245	0.0000	1.8245			0.0000			0.0000
Off-Road	2.7796	12.0448	101.9172	0.2260		0.3706	0.3706		0.3706	0.3706	0.0000	21,881.1851	21,881.1851	7.0768		22,058.1055
Total	**2.7796**	**12.0448**	**101.9172**	**0.2260**	**5.8119**	**0.3706**	**6.1825**	**1.8245**	**0.3706**	**2.1952**	**0.0000**	**21,881.1851**	**21,881.1851**	**7.0768**		**22,058.1055**

3.2 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1399	0.1007	1.2277	3.5000e-003	0.4248	2.1200e-003	0.4269	0.1127	1.9500e-003	0.1146		355.7461	355.7461	9.6600e-003	9.8900e-003	358.9344
Total	**0.1399**	**0.1007**	**1.2277**	**3.5000e-003**	**0.4248**	**2.1200e-003**	**0.4269**	**0.1127**	**1.9500e-003**	**0.1146**		**355.7461**	**355.7461**	**9.6600e-003**	**9.8900e-003**	**358.9344**

3.3 Soil Hauling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.5828	6.0500	3.0625	0.0125		0.2029	0.2029		0.1867	0.1867		1,211.3286	1,211.3286	0.3918		1,221.1228
Total	**0.5828**	**6.0500**	**3.0625**	**0.0125**	**0.0000**	**0.2029**	**0.2029**	**0.0000**	**0.1867**	**0.1867**		**1,211.3286**	**1,211.3286**	**0.3918**		**1,221.1228**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.3 Soil Hauling - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0842	48.4953	10.5049	0.2071	69.8489	0.5351	70.3840	8.0646	0.5120	8.5766		22,097.5266	22,097.5266	0.2960	3.4810	23,142.2649
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0184	0.0133	0.1615	4.6000e-004	0.0559	2.8000e-004	0.0562	0.0148	2.6000e-004	0.0151		46.8087	46.8087	1.2700e-003	1.3000e-003	47.2282
Total	**1.1026**	**48.5086**	**10.6664**	**0.2076**	**69.9048**	**0.5354**	**70.4402**	**8.0794**	**0.5122**	**8.5916**		**22,144.3352**	**22,144.3352**	**0.2973**	**3.4823**	**23,189.4931**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.1547	0.6702	5.6712	0.0125		0.0206	0.0206		0.0206	0.0206	0.0000	1,211.3286	1,211.3286	0.3918		1,221.1228
Total	**0.1547**	**0.6702**	**5.6712**	**0.0125**	**0.0000**	**0.0206**	**0.0206**	**0.0000**	**0.0206**	**0.0206**	**0.0000**	**1,211.3286**	**1,211.3286**	**0.3918**		**1,221.1228**

3.3 Soil Hauling - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0842	48.4953	10.5049	0.2071	26.8778	0.5351	27.4129	3.7675	0.5120	4.2794		22,097.5266	22,097.5266	0.2960	3.4810	23,142.2649
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0184	0.0133	0.1615	4.6000e-004	0.0559	2.8000e-004	0.0562	0.0148	2.6000e-004	0.0151		46.8087	46.8087	1.2700e-003	1.3000e-003	47.2282
Total	**1.1026**	**48.5086**	**10.6664**	**0.2076**	**26.9337**	**0.5354**	**27.4691**	**3.7823**	**0.5122**	**4.2945**		**22,144.3352**	**22,144.3352**	**0.2973**	**3.4823**	**23,189.4931**

3.4 Underground Utilities - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6454	6.1832	8.8848	0.0129		0.3360	0.3360		0.3092	0.3092		1,250.5240	1,250.5240	0.4044		1,260.6351
Total	**0.6454**	**6.1832**	**8.8848**	**0.0129**		**0.3360**	**0.3360**		**0.3092**	**0.3092**		**1,250.5240**	**1,250.5240**	**0.4044**		**1,260.6351**

3.4 Underground Utilities - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.4455	0.1527	1.8200e-003	0.0641	6.1100e-003	0.0702	0.0184	5.8500e-003	0.0243		193.1558	193.1558	2.0100e-003	0.0287	201.7487
Worker	0.0368	0.0265	0.3231	9.2000e-004	0.1118	5.6000e-004	0.1123	0.0296	5.1000e-004	0.0302		93.6174	93.6174	2.5400e-003	2.6000e-003	94.4564
Total	**0.0524**	**0.4720**	**0.4758**	**2.7400e-003**	**0.1758**	**6.6700e-003**	**0.1825**	**0.0481**	**6.3600e-003**	**0.0545**		**286.7732**	**286.7732**	**4.5500e-003**	**0.0313**	**296.2051**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1583	0.6861	9.7637	0.0129		0.0211	0.0211		0.0211	0.0211	0.0000	1,250.5240	1,250.5240	0.4044		1,260.6351
Total	**0.1583**	**0.6861**	**9.7637**	**0.0129**		**0.0211**	**0.0211**		**0.0211**	**0.0211**	**0.0000**	**1,250.5240**	**1,250.5240**	**0.4044**		**1,260.6351**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.4 Underground Utilities - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.4455	0.1527	1.8200e-003	0.0641	6.1100e-003	0.0702	0.0184	5.8500e-003	0.0243		193.1558	193.1558	2.0100e-003	0.0287	201.7487
Worker	0.0368	0.0265	0.3231	9.2000e-004	0.1118	5.6000e-004	0.1123	0.0296	5.1000e-004	0.0302		93.6174	93.6174	2.5400e-003	2.6000e-003	94.4564
Total	**0.0524**	**0.4720**	**0.4758**	**2.7400e-003**	**0.1758**	**6.6700e-003**	**0.1825**	**0.0481**	**6.3600e-003**	**0.0545**		**286.7732**	**286.7732**	**4.5500e-003**	**0.0313**	**296.2051**

3.5 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.4558					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.5586**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.5 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0552	0.0398	0.4846	1.3800e-003	0.1677	8.4000e-004	0.1685	0.0445	7.7000e-004	0.0452		140.4261	140.4261	3.8100e-003	3.9000e-003	141.6847
Total	**0.0552**	**0.0398**	**0.4846**	**1.3800e-003**	**0.1677**	**8.4000e-004**	**0.1685**	**0.0445**	**7.7000e-004**	**0.0452**		**140.4261**	**140.4261**	**3.8100e-003**	**3.9000e-003**	**141.6847**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2805	1.2154	17.2957	0.0228		0.0374	0.0374		0.0374	0.0374	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.4558					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.7362**	**1.2154**	**17.2957**	**0.0228**		**0.0374**	**0.0374**		**0.0374**	**0.0374**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

3.5 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0552	0.0398	0.4846	1.3800e-003	0.1677	8.4000e-004	0.1685	0.0445	7.7000e-004	0.0452		140.4261	140.4261	3.8100e-003	3.9000e-003	141.6847
Total	**0.0552**	**0.0398**	**0.4846**	**1.3800e-003**	**0.1677**	**8.4000e-004**	**0.1685**	**0.0445**	**7.7000e-004**	**0.0452**		**140.4261**	**140.4261**	**3.8100e-003**	**3.9000e-003**	**141.6847**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4295	14.1527	14.6676	0.0244		0.7451	0.7451		0.6973	0.6973		2,346.8559	2,346.8559	0.5871		2,361.5338
Total	**1.4295**	**14.1527**	**14.6676**	**0.0244**		**0.7451**	**0.7451**		**0.6973**	**0.6973**		**2,346.8559**	**2,346.8559**	**0.5871**		**2,361.5338**

3.6 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1371	3.9203	1.3436	0.0160	0.5637	0.0538	0.6174	0.1623	0.0515	0.2138		1,699.7708	1,699.7708	0.0177	0.2523	1,775.3885
Worker	0.8872	0.6389	7.7864	0.0222	2.6938	0.0134	2.7072	0.7144	0.0124	0.7268		2,256.1789	2,256.1789	0.0613	0.0627	2,276.4000
Total	**1.0243**	**4.5592**	**9.1299**	**0.0382**	**3.2575**	**0.0672**	**3.3247**	**0.8767**	**0.0638**	**0.9405**		**3,955.9497**	**3,955.9497**	**0.0790**	**0.3150**	**4,051.7885**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2840	1.2307	15.9634	0.0244		0.0379	0.0379		0.0379	0.0379	0.0000	2,346.8559	2,346.8559	0.5871		2,361.5338
Total	**0.2840**	**1.2307**	**15.9634**	**0.0244**		**0.0379**	**0.0379**		**0.0379**	**0.0379**	**0.0000**	**2,346.8559**	**2,346.8559**	**0.5871**		**2,361.5338**

3.6 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1371	3.9203	1.3436	0.0160	0.5637	0.0538	0.6174	0.1623	0.0515	0.2138		1,699.7708	1,699.7708	0.0177	0.2523	1,775.3885
Worker	0.8872	0.6389	7.7864	0.0222	2.6938	0.0134	2.7072	0.7144	0.0124	0.7268		2,256.1789	2,256.1789	0.0613	0.0627	2,276.4000
Total	**1.0243**	**4.5592**	**9.1299**	**0.0382**	**3.2575**	**0.0672**	**3.3247**	**0.8767**	**0.0638**	**0.9405**		**3,955.9497**	**3,955.9497**	**0.0790**	**0.3150**	**4,051.7885**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3183	12.9643	14.5661	0.0244		0.6446	0.6446		0.6033	0.6033		2,347.7322	2,347.7322	0.5852		2,362.3625
Total	**1.3183**	**12.9643**	**14.5661**	**0.0244**		**0.6446**	**0.6446**		**0.6033**	**0.6033**		**2,347.7322**	**2,347.7322**	**0.5852**		**2,362.3625**

3.6 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0919	3.0490	1.2237	0.0154	0.5636	0.0251	0.5888	0.1623	0.0240	0.1863		1,634.4310	1,634.4310	0.0163	0.2417	1,706.8723
Worker	0.8253	0.5645	7.1793	0.0215	2.6938	0.0126	2.7065	0.7144	0.0116	0.7261		2,197.2219	2,197.2219	0.0552	0.0579	2,215.8450
Total	**0.9171**	**3.6135**	**8.4029**	**0.0369**	**3.2575**	**0.0378**	**3.2952**	**0.8767**	**0.0357**	**0.9124**		**3,831.6529**	**3,831.6529**	**0.0715**	**0.2996**	**3,922.7173**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2840	1.2307	15.9634	0.0244		0.0379	0.0379		0.0379	0.0379	0.0000	2,347.7322	2,347.7322	0.5852		2,362.3624
Total	**0.2840**	**1.2307**	**15.9634**	**0.0244**		**0.0379**	**0.0379**		**0.0379**	**0.0379**	**0.0000**	**2,347.7322**	**2,347.7322**	**0.5852**		**2,362.3624**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0919	3.0490	1.2237	0.0154	0.5636	0.0251	0.5888	0.1623	0.0240	0.1863		1,634.4310	1,634.4310	0.0163	0.2417	1,706.8723
Worker	0.8253	0.5645	7.1793	0.0215	2.6938	0.0126	2.7065	0.7144	0.0116	0.7261		2,197.2219	2,197.2219	0.0552	0.0579	2,215.8450
Total	**0.9171**	**3.6135**	**8.4029**	**0.0369**	**3.2575**	**0.0378**	**3.2952**	**0.8767**	**0.0357**	**0.9124**		**3,831.6529**	**3,831.6529**	**0.0715**	**0.2996**	**3,922.7173**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2357	12.0630	14.5031	0.0244		0.5659	0.5659		0.5294	0.5294		2,348.2212	2,348.2212	0.5832		2,362.8006
Total	**1.2357**	**12.0630**	**14.5031**	**0.0244**		**0.5659**	**0.5659**		**0.5294**	**0.5294**		**2,348.2212**	**2,348.2212**	**0.5832**		**2,362.8006**

3.6 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	3.0494	1.2100	0.0152	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,609.2688	1,609.2688	0.0169	0.2376	1,680.5062
Worker	0.7718	0.5029	6.7256	0.0208	2.6938	0.0121	2.7059	0.7144	0.0111	0.7255		2,144.6073	2,144.6073	0.0501	0.0538	2,161.8751
Total	**0.8621**	**3.5523**	**7.9355**	**0.0360**	**3.2574**	**0.0370**	**3.2945**	**0.8767**	**0.0350**	**0.9117**		**3,753.8761**	**3,753.8761**	**0.0670**	**0.2914**	**3,842.3813**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2840	1.2307	15.9634	0.0244		0.0379	0.0379		0.0379	0.0379	0.0000	2,348.2212	2,348.2212	0.5832		2,362.8006
Total	**0.2840**	**1.2307**	**15.9634**	**0.0244**		**0.0379**	**0.0379**		**0.0379**	**0.0379**	**0.0000**	**2,348.2212**	**2,348.2212**	**0.5832**		**2,362.8006**

3.6 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0903	3.0494	1.2100	0.0152	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,609.2688	1,609.2688	0.0169	0.2376	1,680.5062
Worker	0.7718	0.5029	6.7256	0.0208	2.6938	0.0121	2.7059	0.7144	0.0111	0.7255		2,144.6073	2,144.6073	0.0501	0.0538	2,161.8751
Total	**0.8621**	**3.5523**	**7.9355**	**0.0360**	**3.2574**	**0.0370**	**3.2945**	**0.8767**	**0.0350**	**0.9117**		**3,753.8761**	**3,753.8761**	**0.0670**	**0.2914**	**3,842.3813**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1476	11.1276	14.4330	0.0244		0.4867	0.4867		0.4554	0.4554		2,348.9966	2,348.9966	0.5812		2,363.5275
Total	**1.1476**	**11.1276**	**14.4330**	**0.0244**		**0.4867**	**0.4867**		**0.4554**	**0.4554**		**2,348.9966**	**2,348.9966**	**0.5812**		**2,363.5275**

3.6 Building Construction - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0891	3.0245	1.1967	0.0149	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,580.9246	1,580.9246	0.0175	0.2330	1,650.7898
Worker	0.7235	0.4509	6.2757	0.0201	2.6938	0.0115	2.7053	0.7144	0.0106	0.7250		2,092.6093	2,092.6093	0.0453	0.0501	2,108.6841
Total	**0.8126**	**3.4754**	**7.4725**	**0.0350**	**3.2574**	**0.0365**	**3.2939**	**0.8767**	**0.0345**	**0.9112**		**3,673.5339**	**3,673.5339**	**0.0628**	**0.2831**	**3,759.4739**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2840	1.2307	15.9634	0.0244		0.0379	0.0379		0.0379	0.0379	0.0000	2,348.9966	2,348.9966	0.5812		2,363.5275
Total	**0.2840**	**1.2307**	**15.9634**	**0.0244**		**0.0379**	**0.0379**		**0.0379**	**0.0379**	**0.0000**	**2,348.9966**	**2,348.9966**	**0.5812**		**2,363.5275**

3.6 Building Construction - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0891	3.0245	1.1967	0.0149	0.5636	0.0250	0.5886	0.1623	0.0239	0.1862		1,580.9246	1,580.9246	0.0175	0.2330	1,650.7898
Worker	0.7235	0.4509	6.2757	0.0201	2.6938	0.0115	2.7053	0.7144	0.0106	0.7250		2,092.6093	2,092.6093	0.0453	0.0501	2,108.6841
Total	**0.8126**	**3.4754**	**7.4725**	**0.0350**	**3.2574**	**0.0365**	**3.2939**	**0.8767**	**0.0345**	**0.9112**		**3,673.5339**	**3,673.5339**	**0.0628**	**0.2831**	**3,759.4739**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**3.8081**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0685	0.0469	0.5958	1.7800e-003	0.2236	1.0500e-003	0.2246	0.0593	9.7000e-004	0.0603		182.3421	182.3421	4.5800e-003	4.8000e-003	183.8876
Total	**0.0685**	**0.0469**	**0.5958**	**1.7800e-003**	**0.2236**	**1.0500e-003**	**0.2246**	**0.0593**	**9.7000e-004**	**0.0603**		**182.3421**	**182.3421**	**4.5800e-003**	**4.8000e-003**	**183.8876**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**3.6461**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0685	0.0469	0.5958	1.7800e-003	0.2236	1.0500e-003	0.2246	0.0593	9.7000e-004	0.0603		182.3421	182.3421	4.5800e-003	4.8000e-003	183.8876
Total	**0.0685**	**0.0469**	**0.5958**	**1.7800e-003**	**0.2236**	**1.0500e-003**	**0.2246**	**0.0593**	**9.7000e-004**	**0.0603**		**182.3421**	**182.3421**	**4.5800e-003**	**4.8000e-003**	**183.8876**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**3.7972**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0641	0.0417	0.5581	1.7300e-003	0.2236	1.0000e-003	0.2246	0.0593	9.2000e-004	0.0602		177.9757	177.9757	4.1600e-003	4.4600e-003	179.4087
Total	**0.0641**	**0.0417**	**0.5581**	**1.7300e-003**	**0.2236**	**1.0000e-003**	**0.2246**	**0.0593**	**9.2000e-004**	**0.0602**		**177.9757**	**177.9757**	**4.1600e-003**	**4.4600e-003**	**179.4087**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**3.6461**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0641	0.0417	0.5581	1.7300e-003	0.2236	1.0000e-003	0.2246	0.0593	9.2000e-004	0.0602		177.9757	177.9757	4.1600e-003	4.4600e-003	179.4087
Total	**0.0641**	**0.0417**	**0.5581**	**1.7300e-003**	**0.2236**	**1.0000e-003**	**0.2246**	**0.0593**	**9.2000e-004**	**0.0602**		**177.9757**	**177.9757**	**4.1600e-003**	**4.4600e-003**	**179.4087**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1709	1.1455	1.8091	2.9700e-003		0.0515	0.0515		0.0515	0.0515		281.4481	281.4481	0.0154		281.8319
Total	**3.7873**	**1.1455**	**1.8091**	**2.9700e-003**		**0.0515**	**0.0515**		**0.0515**	**0.0515**		**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0600	0.0374	0.5208	1.6700e-003	0.2236	9.5000e-004	0.2245	0.0593	8.8000e-004	0.0602		173.6605	173.6605	3.7600e-003	4.1600e-003	174.9945
Total	**0.0600**	**0.0374**	**0.5208**	**1.6700e-003**	**0.2236**	**9.5000e-004**	**0.2245**	**0.0593**	**8.8000e-004**	**0.0602**		**173.6605**	**173.6605**	**3.7600e-003**	**4.1600e-003**	**174.9945**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.6164					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.0297	0.1288	1.8324	2.9700e-003		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003	0.0000	281.4481	281.4481	0.0154		281.8319
Total	**3.6461**	**0.1288**	**1.8324**	**2.9700e-003**		**3.9600e-003**	**3.9600e-003**		**3.9600e-003**	**3.9600e-003**	**0.0000**	**281.4481**	**281.4481**	**0.0154**		**281.8319**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0600	0.0374	0.5208	1.6700e-003	0.2236	9.5000e-004	0.2245	0.0593	8.8000e-004	0.0602		173.6605	173.6605	3.7600e-003	4.1600e-003	174.9945
Total	**0.0600**	**0.0374**	**0.5208**	**1.6700e-003**	**0.2236**	**9.5000e-004**	**0.2245**	**0.0593**	**8.8000e-004**	**0.0602**		**173.6605**	**173.6605**	**3.7600e-003**	**4.1600e-003**	**174.9945**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798
Unmitigated	3.8854	5.9214	38.3932	0.0935	10.9326	0.0763	11.0089	2.9162	0.0715	2.9877		9,826.0464	9,826.0464	0.5047	0.4813	9,982.0798

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	1,670.88	1,670.88	1670.88	5,175,785	5,175,785
Total	1,670.88	1,670.88	1,670.88	5,175,785	5,175,785

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	8.51	5.90	8.70	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Other Asphalt Surfaces	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.00109	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Single Family Housing	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
NaturalGas Unmitigated	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	13717.2	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Total		**0.1479**	**1.2641**	**0.5379**	**8.0700e-003**		**0.1022**	**0.1022**		**0.1022**	**0.1022**		**1,613.7916**	**1,613.7916**	**0.0309**	**0.0296**	**1,623.3815**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	13.7172	0.1479	1.2641	0.5379	8.0700e-003		0.1022	0.1022		0.1022	0.1022		1,613.7916	1,613.7916	0.0309	0.0296	1,623.3815
Total		**0.1479**	**1.2641**	**0.5379**	**8.0700e-003**		**0.1022**	**0.1022**		**0.1022**	**0.1022**		**1,613.7916**	**1,613.7916**	**0.0309**	**0.0296**	**1,623.3815**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	8.1535	2.8106	15.7144	0.0176		0.2946	0.2946		0.2946	0.2946	0.0000	3,399.7076	3,399.7076	0.0898	0.0619	3,420.3838
Unmitigated	54.2247	3.8405	104.6036	0.2304		13.6017	13.6017		13.6017	13.6017	1,657.9446	3,212.2959	4,870.2404	4.9695	0.1125	5,028.0116

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6034					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.8028					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	46.3804	3.6725	90.0137	0.2296		13.5207	13.5207		13.5207	13.5207	1,657.9446	3,186.0000	4,843.9446	4.9443	0.1125	5,001.0861
Landscaping	0.4381	0.1681	14.5899	7.7000e-004		0.0810	0.0810		0.0810	0.0810		26.2959	26.2959	0.0252		26.9255
Total	**54.2247**	**3.8405**	**104.6036**	**0.2304**		**13.6017**	**13.6017**		**13.6017**	**13.6017**	**1,657.9446**	**3,212.2959**	**4,870.2404**	**4.9695**	**0.1125**	**5,028.0116**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6034					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.8028					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3092	2.6425	1.1245	0.0169		0.2137	0.2137		0.2137	0.2137	0.0000	3,373.4118	3,373.4118	0.0647	0.0619	3,393.4583
Landscaping	0.4381	0.1681	14.5899	7.7000e-004		0.0810	0.0810		0.0810	0.0810		26.2959	26.2959	0.0252		26.9255
Total	**8.1535**	**2.8106**	**15.7144**	**0.0176**		**0.2946**	**0.2946**		**0.2946**	**0.2946**	**0.0000**	**3,399.7076**	**3,399.7076**	**0.0898**	**0.0619**	**3,420.3838**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

TTM 38213 Residential Project

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	7.48	Acre	7.48	325,828.80	0
City Park	2.21	Acre	2.21	96,267.60	0
Single Family Housing	177.00	Dwelling Unit	21.67	337,494.80	506

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2026
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run R2: Revises TTM, 177 DU and new 2.21 acre park.

Land Use - Land use per tentative map.
Residential area per PD average home SF
Other Asphalt Surfaces = internal streets and sidewalks.

Construction Phase - Construction schedule per applicant.
Soil hauling to occur on 15 days during grading.
Architectural coating concurrent with building construction as units are completed.
Blasting emissions calculated off-model.

Off-road Equipment - Defaults are correct, CalEEMod bug.

Off-road Equipment - Wood frame construction anticipated, no welders.

Off-road Equipment - Grading equipment and horsepoower per applicant.
Off-highway trucks = 3 rock trucks and 1 water truck.
Bore/Drill Rigs for blasting drilling.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment -

Off-road Equipment - Soil hauling for loading and export of material on 15 days during grading.

Off-road Equipment - Equipment for trenching/installation of underground utuliites.

Trips and VMT - Soil hauling per applicant (180 loads per day over 15 days).
Max architectural coating crew of 10 assumed to complete 1 house at a time.

On-road Fugitive Dust - 0.125 mile of each soil hauling trip assumed to be on on-site unpaved access roads.

Grading - Soil export trips entered in VMT tab.

Architectural Coating -

Vehicle Trips - Trip generation per project Traffic Impact Anlaysis.
VMT (trip distance) per WRCOG VMT Screening Tool and housing data.

Road Dust -

Woodstoves -

Consumer Products -

Area Coating -

Landscape Equipment -

Energy Use -

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation to comply with SCAQMD Rule 55.

Area Mitigation - No woood burning devices in new construction per SCAQMD Rule 455.

Energy Mitigation - Solar generation estimated per 2019 Title 24 requirements.

Water Mitigation - 20% water reduction not accounted for in defaults per 2019 CALGreen.

Waste Mitigation - 25% solid waste diversion not accounted for in defaults per local/state regulations in compliance with AB 341.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	45.00	15.00
tblConstructionPhase	NumDays	35.00	43.00

tblConstructionPhase	NumDays	500.00	684.00
tblConstructionPhase	NumDays	35.00	609.00
tblLandUse	LandUseSquareFeet	318,600.00	337,494.80
tblLandUse	LotAcreage	57.47	21.67
tblOffRoadEquipment	HorsePower	158.00	236.00
tblOffRoadEquipment	HorsePower	187.00	309.00
tblOffRoadEquipment	HorsePower	247.00	319.00
tblOffRoadEquipment	HorsePower	367.00	395.00
tblOffRoadEquipment	HorsePower	367.00	700.00
tblOffRoadEquipment	HorsePower	212.00	309.00
tblOffRoadEquipment	HorsePower	402.00	260.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOnRoadDust	HaulingPercentPave	100.00	99.40
tblTripsAndVMT	HaulingTripNumber	0.00	5,400.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	48.00	20.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	8.51
tblVehicleTrips	HW_TTP	40.20	100.00
tblVehicleTrips	PB_TP	3.00	0.00
tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	ST_TR	1.96	0.00
tblVehicleTrips	ST_TR	9.54	9.44
tblVehicleTrips	SU_TR	2.19	0.00
tblVehicleTrips	SU_TR	8.55	9.44

tblVehicleTrips	WD_TR	0.78	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3426	3.5395	2.7281	8.6900e-003	0.8415	0.1308	0.9723	0.1649	0.1207	0.2856	0.0000	782.2042	782.2042	0.1803	0.0295	795.4948
2023	0.7076	2.3002	3.2993	8.5500e-003	0.4406	0.0965	0.5371	0.1187	0.0909	0.2095	0.0000	780.7923	780.7923	0.0796	0.0359	793.4804
2024	0.7752	2.2084	3.2983	8.5900e-003	0.4486	0.0871	0.5357	0.1208	0.0820	0.2028	0.0000	785.9203	785.9203	0.0797	0.0352	798.4146
2025	0.3720	1.0170	1.5852	4.1600e-003	0.2209	0.0371	0.2580	0.0595	0.0350	0.0945	0.0000	381.9679	381.9679	0.0388	0.0169	387.9589
Maximum	**0.7752**	**3.5395**	**3.2993**	**8.6900e-003**	**0.8415**	**0.1308**	**0.9723**	**0.1649**	**0.1207**	**0.2856**	**0.0000**	**785.9203**	**785.9203**	**0.1803**	**0.0359**	**798.4146**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3426	3.5395	2.7281	8.6900e-003	0.3877	0.1308	0.5185	0.0861	0.1207	0.2068	0.0000	782.2035	782.2035	0.1803	0.0295	795.4941
2023	0.7076	2.3002	3.2993	8.5500e-003	0.4406	0.0965	0.5371	0.1187	0.0909	0.2095	0.0000	780.7919	780.7919	0.0796	0.0359	793.4800
2024	0.7752	2.2084	3.2983	8.5900e-003	0.4486	0.0871	0.5357	0.1208	0.0820	0.2028	0.0000	785.9199	785.9199	0.0797	0.0352	798.4142
2025	0.3720	1.0170	1.5852	4.1600e-003	0.2209	0.0371	0.2580	0.0595	0.0350	0.0945	0.0000	381.9677	381.9677	0.0388	0.0169	387.9587
Maximum	**0.7752**	**3.5395**	**3.2993**	**8.6900e-003**	**0.4486**	**0.1308**	**0.5371**	**0.1208**	**0.1207**	**0.2095**	**0.0000**	**785.9199**	**785.9199**	**0.1803**	**0.0359**	**798.4142**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**23.25**	**0.00**	**19.70**	**16.99**	**0.00**	**9.95**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**5-1-2022**	**7-31-2022**	3.0746	3.0746
2	**8-1-2022**	**10-31-2022**	0.3304	0.3304
3	**11-1-2022**	**1-31-2023**	0.6245	0.6245
4	**2-1-2023**	**4-30-2023**	0.7105	0.7105
5	**5-1-2023**	**7-31-2023**	0.7856	0.7856
6	**8-1-2023**	**10-31-2023**	0.7871	0.7871
7	**11-1-2023**	**1-31-2024**	0.7765	0.7765
8	**2-1-2024**	**4-30-2024**	0.7326	0.7326

TTM 38213 Residential Project - Riverside-South Coast County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

9	**5-1-2024**	**7-31-2024**	0.7459	0.7459
10	**8-1-2024**	**10-31-2024**	0.7474	0.7474
11	**11-1-2024**	**1-31-2025**	0.7365	0.7365
12	**2-1-2025**	**4-30-2025**	0.6849	0.6849
13	**5-1-2025**	**7-31-2025**	0.4675	0.4675
		Highest	3.0746	3.0746

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.9861	0.0669	2.9489	2.9700e-003		0.1791	0.1791		0.1791	0.1791	18.8008	39.1105	57.9113	0.0589	1.2800e-003	59.7647
Energy	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	517.1933	517.1933	0.0262	7.4600e-003	520.0708
Mobile	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Waste						0.0000	0.0000		0.0000	0.0000	42.1511	0.0000	42.1511	2.4911	0.0000	104.4275
Water						0.0000	0.0000		0.0000	0.0000	3.6587	46.1435	49.8021	0.3797	9.3500e-003	62.0788
Total	**2.7291**	**1.3795**	**10.2546**	**0.0217**	**1.9569**	**0.2116**	**2.1686**	**0.5227**	**0.2108**	**0.7335**	**64.6105**	**2,250.3963**	**2,315.0068**	**3.0390**	**0.0979**	**2,420.1559**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.4103	0.0540	1.8378	3.1000e-004		0.0128	0.0128		0.0128	0.0128	0.0000	41.2358	41.2358	3.5900e-003	7.0000e-004	41.5345
Energy	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	387.6934	387.6934	0.0153	6.1300e-003	389.9029
Mobile	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Waste						0.0000	0.0000		0.0000	0.0000	31.6133	0.0000	31.6133	1.8683	0.0000	78.3206
Water						0.0000	0.0000		0.0000	0.0000	2.9269	36.9148	39.8417	0.3037	7.4800e-003	49.6630
Total	**2.1532**	**1.3666**	**9.1435**	**0.0191**	**1.9569**	**0.0453**	**2.0022**	**0.5227**	**0.0444**	**0.5671**	**34.5402**	**2,113.7930**	**2,148.3332**	**2.2740**	**0.0941**	**2,233.2351**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**21.10**	**0.93**	**10.84**	**12.24**	**0.00**	**78.60**	**7.67**	**0.00**	**78.92**	**22.68**	**46.54**	**6.07**	**7.20**	**25.17**	**3.86**	**7.72**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	5/1/2022	6/30/2022	5	44	
2	Soil Hauling	Grading	5/1/2022	5/20/2022	5	15	
3	Underground Utilities	Trenching	7/1/2022	9/15/2022	5	55	

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

4	Paving	Paving	9/16/2022	11/15/2022	5	43	
5	Building Construction	Building Construction	11/16/2022	6/30/2025	5	684	
6	Architectural Coating	Architectural Coating	3/1/2023	6/30/2025	5	609	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 286

Acres of Paving: 7.48

Residential Indoor: 683,427; Residential Outdoor: 227,809; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 19,550 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Bore/Drill Rigs	2	8.00	221	0.50
Grading	Crawler Tractors	1	8.00	309	0.43
Grading	Excavators	1	8.00	236	0.38
Grading	Graders	1	8.00	309	0.41
Grading	Off-Highway Trucks	4	8.00	260	0.38
Grading	Rubber Tired Dozers	1	8.00	319	0.40
Grading	Scrapers	1	8.00	395	0.48
Grading	Scrapers	4	8.00	700	0.48
Soil Hauling	Rubber Tired Loaders	2	8.00	203	0.36
Underground Utilities	Excavators	1	8.00	158	0.38
Underground Utilities	Forklifts	1	8.00	89	0.20
Underground Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Hauling	2	5.00	0.00	5,400.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Utilities	4	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	241.00	88.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2841	0.0000	0.2841	0.0892	0.0000	0.0892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2332	2.3963	1.6164	4.9700e-003		0.0901	0.0901		0.0829	0.0829	0.0000	436.7061	436.7061	0.1412	0.0000	440.2371
Total	**0.2332**	**2.3963**	**1.6164**	**4.9700e-003**	**0.2841**	**0.0901**	**0.3743**	**0.0892**	**0.0829**	**0.1721**	**0.0000**	**436.7061**	**436.7061**	**0.1412**	**0.0000**	**440.2371**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9200e-003	2.2800e-003	0.0285	8.0000e-005	9.1900e-003	5.0000e-005	9.2400e-003	2.4400e-003	4.0000e-005	2.4800e-003	0.0000	7.2658	7.2658	1.9000e-004	2.0000e-004	7.3306
Total	**2.9200e-003**	**2.2800e-003**	**0.0285**	**8.0000e-005**	**9.1900e-003**	**5.0000e-005**	**9.2400e-003**	**2.4400e-003**	**4.0000e-005**	**2.4800e-003**	**0.0000**	**7.2658**	**7.2658**	**1.9000e-004**	**2.0000e-004**	**7.3306**

3.2 Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1279	0.0000	0.1279	0.0401	0.0000	0.0401	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2332	2.3963	1.6164	4.9700e-003		0.0901	0.0901		0.0829	0.0829	0.0000	436.7056	436.7056	0.1412	0.0000	440.2366
Total	**0.2332**	**2.3963**	**1.6164**	**4.9700e-003**	**0.1279**	**0.0901**	**0.2180**	**0.0401**	**0.0829**	**0.1231**	**0.0000**	**436.7056**	**436.7056**	**0.1412**	**0.0000**	**440.2366**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9200e-003	2.2800e-003	0.0285	8.0000e-005	9.1900e-003	5.0000e-005	9.2400e-003	2.4400e-003	4.0000e-005	2.4800e-003	0.0000	7.2658	7.2658	1.9000e-004	2.0000e-004	7.3306
Total	**2.9200e-003**	**2.2800e-003**	**0.0285**	**8.0000e-005**	**9.1900e-003**	**5.0000e-005**	**9.2400e-003**	**2.4400e-003**	**4.0000e-005**	**2.4800e-003**	**0.0000**	**7.2658**	**7.2658**	**1.9000e-004**	**2.0000e-004**	**7.3306**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.3 Soil Hauling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.3700e-003	0.0454	0.0230	9.0000e-005		1.5200e-003	1.5200e-003		1.4000e-003	1.4000e-003	0.0000	8.2417	8.2417	2.6700e-003	0.0000	8.3084
Total	**4.3700e-003**	**0.0454**	**0.0230**	**9.0000e-005**	**0.0000**	**1.5200e-003**	**1.5200e-003**	**0.0000**	**1.4000e-003**	**1.4000e-003**	**0.0000**	**8.2417**	**8.2417**	**2.6700e-003**	**0.0000**	**8.3084**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.3700e-003	0.3636	0.0776	1.5500e-003	0.4866	4.0100e-003	0.4906	0.0567	3.8400e-003	0.0605	0.0000	150.2825	150.2825	2.0200e-003	0.0237	157.3879
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-004	1.0000e-004	1.2800e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3259	0.3259	1.0000e-005	1.0000e-005	0.3288
Total	**8.5000e-003**	**0.3637**	**0.0788**	**1.5500e-003**	**0.4870**	**4.0100e-003**	**0.4910**	**0.0568**	**3.8400e-003**	**0.0606**	**0.0000**	**150.6084**	**150.6084**	**2.0300e-003**	**0.0237**	**157.7168**

3.3 Soil Hauling - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.3700e-003	0.0454	0.0230	9.0000e-005		1.5200e-003	1.5200e-003		1.4000e-003	1.4000e-003	0.0000	8.2417	8.2417	2.6700e-003	0.0000	8.3084
Total	**4.3700e-003**	**0.0454**	**0.0230**	**9.0000e-005**	**0.0000**	**1.5200e-003**	**1.5200e-003**	**0.0000**	**1.4000e-003**	**1.4000e-003**	**0.0000**	**8.2417**	**8.2417**	**2.6700e-003**	**0.0000**	**8.3084**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.3700e-003	0.3636	0.0776	1.5500e-003	0.1891	4.0100e-003	0.1931	0.0269	3.8400e-003	0.0308	0.0000	150.2825	150.2825	2.0200e-003	0.0237	157.3879
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-004	1.0000e-004	1.2800e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3259	0.3259	1.0000e-005	1.0000e-005	0.3288
Total	**8.5000e-003**	**0.3637**	**0.0788**	**1.5500e-003**	**0.1895**	**4.0100e-003**	**0.1935**	**0.0270**	**3.8400e-003**	**0.0309**	**0.0000**	**150.6084**	**150.6084**	**2.0300e-003**	**0.0237**	**157.7168**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.4 Underground Utilities - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0178	0.1700	0.2443	3.6000e-004		9.2400e-003	9.2400e-003		8.5000e-003	8.5000e-003	0.0000	31.1976	31.1976	0.0101	0.0000	31.4498
Total	**0.0178**	**0.1700**	**0.2443**	**3.6000e-004**		**9.2400e-003**	**9.2400e-003**		**8.5000e-003**	**8.5000e-003**	**0.0000**	**31.1976**	**31.1976**	**0.0101**	**0.0000**	**31.4498**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0122	4.1100e-003	5.0000e-005	1.7400e-003	1.7000e-004	1.9100e-003	5.0000e-004	1.6000e-004	6.6000e-004	0.0000	4.8157	4.8157	5.0000e-005	7.1000e-004	5.0300
Worker	9.6000e-004	7.5000e-004	9.3700e-003	3.0000e-005	3.0200e-003	2.0000e-005	3.0400e-003	8.0000e-004	1.0000e-005	8.2000e-004	0.0000	2.3901	2.3901	6.0000e-005	7.0000e-005	2.4114
Total	**1.4000e-003**	**0.0130**	**0.0135**	**8.0000e-005**	**4.7600e-003**	**1.9000e-004**	**4.9500e-003**	**1.3000e-003**	**1.7000e-004**	**1.4800e-003**	**0.0000**	**7.2058**	**7.2058**	**1.1000e-004**	**7.8000e-004**	**7.4413**

3.4 Underground Utilities - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0178	0.1700	0.2443	3.6000e-004		9.2400e-003	9.2400e-003		8.5000e-003	8.5000e-003	0.0000	31.1975	31.1975	0.0101	0.0000	31.4498
Total	**0.0178**	**0.1700**	**0.2443**	**3.6000e-004**		**9.2400e-003**	**9.2400e-003**		**8.5000e-003**	**8.5000e-003**	**0.0000**	**31.1975**	**31.1975**	**0.0101**	**0.0000**	**31.4498**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0122	4.1100e-003	5.0000e-005	1.7400e-003	1.7000e-004	1.9100e-003	5.0000e-004	1.6000e-004	6.6000e-004	0.0000	4.8157	4.8157	5.0000e-005	7.1000e-004	5.0300
Worker	9.6000e-004	7.5000e-004	9.3700e-003	3.0000e-005	3.0200e-003	2.0000e-005	3.0400e-003	8.0000e-004	1.0000e-005	8.2000e-004	0.0000	2.3901	2.3901	6.0000e-005	7.0000e-005	2.4114
Total	**1.4000e-003**	**0.0130**	**0.0135**	**8.0000e-005**	**4.7600e-003**	**1.9000e-004**	**4.9500e-003**	**1.3000e-003**	**1.7000e-004**	**1.4800e-003**	**0.0000**	**7.2058**	**7.2058**	**1.1000e-004**	**7.8000e-004**	**7.4413**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.5 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2392	0.3135	4.9000e-004		0.0122	0.0122		0.0112	0.0112	0.0000	43.0593	43.0593	0.0139	0.0000	43.4074
Paving	9.8000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0335**	**0.2392**	**0.3135**	**4.9000e-004**		**0.0122**	**0.0122**		**0.0112**	**0.0112**	**0.0000**	**43.0593**	**43.0593**	**0.0139**	**0.0000**	**43.4074**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	8.8000e-004	0.0110	3.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	2.8029	2.8029	7.0000e-005	8.0000e-005	2.8279
Total	**1.1300e-003**	**8.8000e-004**	**0.0110**	**3.0000e-005**	**3.5400e-003**	**2.0000e-005**	**3.5600e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8029**	**2.8029**	**7.0000e-005**	**8.0000e-005**	**2.8279**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.5 Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2392	0.3135	4.9000e-004		0.0122	0.0122		0.0112	0.0112	0.0000	43.0592	43.0592	0.0139	0.0000	43.4074
Paving	9.8000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0335**	**0.2392**	**0.3135**	**4.9000e-004**		**0.0122**	**0.0122**		**0.0112**	**0.0112**	**0.0000**	**43.0592**	**43.0592**	**0.0139**	**0.0000**	**43.4074**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	8.8000e-004	0.0110	3.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	2.8029	2.8029	7.0000e-005	8.0000e-005	2.8279
Total	**1.1300e-003**	**8.8000e-004**	**0.0110**	**3.0000e-005**	**3.5400e-003**	**2.0000e-005**	**3.5600e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8029**	**2.8029**	**7.0000e-005**	**8.0000e-005**	**2.8279**

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0236	0.2335	0.2420	4.0000e-004		0.0123	0.0123		0.0115	0.0115	0.0000	35.1290	35.1290	8.7900e-003	0.0000	35.3487
Total	**0.0236**	**0.2335**	**0.2420**	**4.0000e-004**		**0.0123**	**0.0123**		**0.0115**	**0.0115**	**0.0000**	**35.1290**	**35.1290**	**8.7900e-003**	**0.0000**	**35.3487**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3100e-003	0.0645	0.0217	2.6000e-004	9.1700e-003	8.9000e-004	0.0101	2.6500e-003	8.5000e-004	3.4900e-003	0.0000	25.4271	25.4271	2.7000e-004	3.7700e-003	26.5581
Worker	0.0139	0.0108	0.1355	3.7000e-004	0.0437	2.2000e-004	0.0439	0.0116	2.0000e-004	0.0118	0.0000	34.5605	34.5605	9.2000e-004	9.6000e-004	34.8686
Total	**0.0162**	**0.0753**	**0.1572**	**6.3000e-004**	**0.0529**	**1.1100e-003**	**0.0540**	**0.0143**	**1.0500e-003**	**0.0153**	**0.0000**	**59.9875**	**59.9875**	**1.1900e-003**	**4.7300e-003**	**61.4268**

3.6 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0236	0.2335	0.2420	4.0000e-004		0.0123	0.0123		0.0115	0.0115	0.0000	35.1290	35.1290	8.7900e-003	0.0000	35.3487
Total	**0.0236**	**0.2335**	**0.2420**	**4.0000e-004**		**0.0123**	**0.0123**		**0.0115**	**0.0115**	**0.0000**	**35.1290**	**35.1290**	**8.7900e-003**	**0.0000**	**35.3487**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3100e-003	0.0645	0.0217	2.6000e-004	9.1700e-003	8.9000e-004	0.0101	2.6500e-003	8.5000e-004	3.4900e-003	0.0000	25.4271	25.4271	2.7000e-004	3.7700e-003	26.5581
Worker	0.0139	0.0108	0.1355	3.7000e-004	0.0437	2.2000e-004	0.0439	0.0116	2.0000e-004	0.0118	0.0000	34.5605	34.5605	9.2000e-004	9.6000e-004	34.8686
Total	**0.0162**	**0.0753**	**0.1572**	**6.3000e-004**	**0.0529**	**1.1100e-003**	**0.0540**	**0.0143**	**1.0500e-003**	**0.0153**	**0.0000**	**59.9875**	**59.9875**	**1.1900e-003**	**4.7300e-003**	**61.4268**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1714	1.6854	1.8936	3.1700e-003		0.0838	0.0838		0.0784	0.0784	0.0000	276.8775	276.8775	0.0690	0.0000	278.6029
Total	**0.1714**	**1.6854**	**1.8936**	**3.1700e-003**		**0.0838**	**0.0838**		**0.0784**	**0.0784**	**0.0000**	**276.8775**	**276.8775**	**0.0690**	**0.0000**	**278.6029**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0124	0.3922	0.1563	2.0000e-003	0.0723	3.2600e-003	0.0755	0.0209	3.1200e-003	0.0240	0.0000	192.4786	192.4786	1.9500e-003	0.0285	201.0086
Worker	0.1017	0.0753	0.9836	2.8600e-003	0.3444	1.6400e-003	0.3460	0.0914	1.5100e-003	0.0930	0.0000	265.1557	265.1557	6.5400e-003	6.9500e-003	267.3912
Total	**0.1141**	**0.4676**	**1.1398**	**4.8600e-003**	**0.4166**	**4.9000e-003**	**0.4215**	**0.1123**	**4.6300e-003**	**0.1169**	**0.0000**	**457.6343**	**457.6343**	**8.4900e-003**	**0.0354**	**468.3998**

3.6 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1714	1.6854	1.8936	3.1700e-003		0.0838	0.0838		0.0784	0.0784	0.0000	276.8772	276.8772	0.0690	0.0000	278.6026
Total	**0.1714**	**1.6854**	**1.8936**	**3.1700e-003**		**0.0838**	**0.0838**		**0.0784**	**0.0784**	**0.0000**	**276.8772**	**276.8772**	**0.0690**	**0.0000**	**278.6026**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0124	0.3922	0.1563	2.0000e-003	0.0723	3.2600e-003	0.0755	0.0209	3.1200e-003	0.0240	0.0000	192.4786	192.4786	1.9500e-003	0.0285	201.0086
Worker	0.1017	0.0753	0.9836	2.8600e-003	0.3444	1.6400e-003	0.3460	0.0914	1.5100e-003	0.0930	0.0000	265.1557	265.1557	6.5400e-003	6.9500e-003	267.3912
Total	**0.1141**	**0.4676**	**1.1398**	**4.8600e-003**	**0.4166**	**4.9000e-003**	**0.4215**	**0.1123**	**4.6300e-003**	**0.1169**	**0.0000**	**457.6343**	**457.6343**	**8.4900e-003**	**0.0354**	**468.3998**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1619	1.5803	1.8999	3.2000e-003		0.0741	0.0741		0.0694	0.0694	0.0000	279.0654	279.0654	0.0693	0.0000	280.7981
Total	**0.1619**	**1.5803**	**1.8999**	**3.2000e-003**		**0.0741**	**0.0741**		**0.0694**	**0.0694**	**0.0000**	**279.0654**	**279.0654**	**0.0693**	**0.0000**	**280.7981**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0123	0.3953	0.1557	1.9800e-003	0.0728	3.2600e-003	0.0761	0.0210	3.1200e-003	0.0241	0.0000	190.9712	190.9712	2.0300e-003	0.0282	199.4240
Worker	0.0957	0.0676	0.9285	2.7900e-003	0.3470	1.5800e-003	0.3486	0.0921	1.4600e-003	0.0936	0.0000	260.7934	260.7934	5.9700e-003	6.5100e-003	262.8819
Total	**0.1080**	**0.4629**	**1.0842**	**4.7700e-003**	**0.4198**	**4.8400e-003**	**0.4247**	**0.1132**	**4.5800e-003**	**0.1177**	**0.0000**	**451.7647**	**451.7647**	**8.0000e-003**	**0.0347**	**462.3059**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1619	1.5803	1.8999	3.2000e-003		0.0741	0.0741		0.0694	0.0694	0.0000	279.0651	279.0651	0.0693	0.0000	280.7977
Total	**0.1619**	**1.5803**	**1.8999**	**3.2000e-003**		**0.0741**	**0.0741**		**0.0694**	**0.0694**	**0.0000**	**279.0651**	**279.0651**	**0.0693**	**0.0000**	**280.7977**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0123	0.3953	0.1557	1.9800e-003	0.0728	3.2600e-003	0.0761	0.0210	3.1200e-003	0.0241	0.0000	190.9712	190.9712	2.0300e-003	0.0282	199.4240
Worker	0.0957	0.0676	0.9285	2.7900e-003	0.3470	1.5800e-003	0.3486	0.0921	1.4600e-003	0.0936	0.0000	260.7934	260.7934	5.9700e-003	6.5100e-003	262.8819
Total	**0.1080**	**0.4629**	**1.0842**	**4.7700e-003**	**0.4198**	**4.8400e-003**	**0.4247**	**0.1132**	**4.5800e-003**	**0.1177**	**0.0000**	**451.7647**	**451.7647**	**8.0000e-003**	**0.0347**	**462.3059**

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0740	0.7177	0.9309	1.5700e-003		0.0314	0.0314		0.0294	0.0294	0.0000	137.4478	137.4478	0.0340	0.0000	138.2981
Total	**0.0740**	**0.7177**	**0.9309**	**1.5700e-003**		**0.0314**	**0.0314**		**0.0294**	**0.0294**	**0.0000**	**137.4478**	**137.4478**	**0.0340**	**0.0000**	**138.2981**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9800e-003	0.1930	0.0758	9.6000e-004	0.0359	1.6100e-003	0.0375	0.0104	1.5400e-003	0.0119	0.0000	92.3709	92.3709	1.0400e-003	0.0136	96.4526
Worker	0.0441	0.0298	0.4264	1.3300e-003	0.1709	7.4000e-004	0.1716	0.0454	6.8000e-004	0.0461	0.0000	125.2837	125.2837	2.6600e-003	2.9900e-003	126.2409
Total	**0.0501**	**0.2229**	**0.5022**	**2.2900e-003**	**0.2067**	**2.3500e-003**	**0.2091**	**0.0557**	**2.2200e-003**	**0.0579**	**0.0000**	**217.6546**	**217.6546**	**3.7000e-003**	**0.0166**	**222.6934**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0740	0.7177	0.9309	1.5700e-003		0.0314	0.0314		0.0294	0.0294	0.0000	137.4477	137.4477	0.0340	0.0000	138.2979
Total	**0.0740**	**0.7177**	**0.9309**	**1.5700e-003**		**0.0314**	**0.0314**		**0.0294**	**0.0294**	**0.0000**	**137.4477**	**137.4477**	**0.0340**	**0.0000**	**138.2979**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9800e-003	0.1930	0.0758	9.6000e-004	0.0359	1.6100e-003	0.0375	0.0104	1.5400e-003	0.0119	0.0000	92.3709	92.3709	1.0400e-003	0.0136	96.4526
Worker	0.0441	0.0298	0.4264	1.3300e-003	0.1709	7.4000e-004	0.1716	0.0454	6.8000e-004	0.0461	0.0000	125.2837	125.2837	2.6600e-003	2.9900e-003	126.2409
Total	**0.0501**	**0.2229**	**0.5022**	**2.2900e-003**	**0.2067**	**2.3500e-003**	**0.2091**	**0.0557**	**2.2200e-003**	**0.0579**	**0.0000**	**217.6546**	**217.6546**	**3.7000e-003**	**0.0166**	**222.6934**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3942					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0209	0.1420	0.1974	3.2000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	27.8305	27.8305	1.6700e-003	0.0000	27.8721
Total	**0.4151**	**0.1420**	**0.1974**	**3.2000e-004**		**7.7200e-003**	**7.7200e-003**		**7.7200e-003**	**7.7200e-003**	**0.0000**	**27.8305**	**27.8305**	**1.6700e-003**	**0.0000**	**27.8721**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0800e-003	5.2400e-003	0.0684	2.0000e-004	0.0240	1.1000e-004	0.0241	6.3600e-003	1.1000e-004	6.4700e-003	0.0000	18.4500	18.4500	4.5000e-004	4.8000e-004	18.6056
Total	**7.0800e-003**	**5.2400e-003**	**0.0684**	**2.0000e-004**	**0.0240**	**1.1000e-004**	**0.0241**	**6.3600e-003**	**1.1000e-004**	**6.4700e-003**	**0.0000**	**18.4500**	**18.4500**	**4.5000e-004**	**4.8000e-004**	**18.6056**

3.7 Architectural Coating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3942					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0209	0.1420	0.1974	3.2000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	27.8304	27.8304	1.6700e-003	0.0000	27.8721
Total	**0.4151**	**0.1420**	**0.1974**	**3.2000e-004**		**7.7200e-003**	**7.7200e-003**		**7.7200e-003**	**7.7200e-003**	**0.0000**	**27.8304**	**27.8304**	**1.6700e-003**	**0.0000**	**27.8721**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0800e-003	5.2400e-003	0.0684	2.0000e-004	0.0240	1.1000e-004	0.0241	6.3600e-003	1.1000e-004	6.4700e-003	0.0000	18.4500	18.4500	4.5000e-004	4.8000e-004	18.6056
Total	**7.0800e-003**	**5.2400e-003**	**0.0684**	**2.0000e-004**	**0.0240**	**1.1000e-004**	**0.0241**	**6.3600e-003**	**1.1000e-004**	**6.4700e-003**	**0.0000**	**18.4500**	**18.4500**	**4.5000e-004**	**4.8000e-004**	**18.6056**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**0.4974**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9400e-003	5.6100e-003	0.0771	2.3000e-004	0.0288	1.3000e-004	0.0289	7.6500e-003	1.2000e-004	7.7700e-003	0.0000	21.6426	21.6426	5.0000e-004	5.4000e-004	21.8159
Total	**7.9400e-003**	**5.6100e-003**	**0.0771**	**2.3000e-004**	**0.0288**	**1.3000e-004**	**0.0289**	**7.6500e-003**	**1.2000e-004**	**7.7700e-003**	**0.0000**	**21.6426**	**21.6426**	**5.0000e-004**	**5.4000e-004**	**21.8159**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**0.4974**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9400e-003	5.6100e-003	0.0771	2.3000e-004	0.0288	1.3000e-004	0.0289	7.6500e-003	1.2000e-004	7.7700e-003	0.0000	21.6426	21.6426	5.0000e-004	5.4000e-004	21.8159
Total	**7.9400e-003**	**5.6100e-003**	**0.0771**	**2.3000e-004**	**0.0288**	**1.3000e-004**	**0.0289**	**7.6500e-003**	**1.2000e-004**	**7.7700e-003**	**0.0000**	**21.6426**	**21.6426**	**5.0000e-004**	**5.4000e-004**	**21.8159**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0110	0.0739	0.1167	1.9000e-004		3.3200e-003	3.3200e-003		3.3200e-003	3.3200e-003	0.0000	16.4685	16.4685	9.0000e-004	0.0000	16.4910
Total	**0.2443**	**0.0739**	**0.1167**	**1.9000e-004**		**3.3200e-003**	**3.3200e-003**		**3.3200e-003**	**3.3200e-003**	**0.0000**	**16.4685**	**16.4685**	**9.0000e-004**	**0.0000**	**16.4910**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6600e-003	2.4800e-003	0.0354	1.1000e-004	0.0142	6.0000e-005	0.0142	3.7700e-003	6.0000e-005	3.8200e-003	0.0000	10.3970	10.3970	2.2000e-004	2.5000e-004	10.4764
Total	**3.6600e-003**	**2.4800e-003**	**0.0354**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0142**	**3.7700e-003**	**6.0000e-005**	**3.8200e-003**	**0.0000**	**10.3970**	**10.3970**	**2.2000e-004**	**2.5000e-004**	**10.4764**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.7 Architectural Coating - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0110	0.0739	0.1167	1.9000e-004		3.3200e-003	3.3200e-003		3.3200e-003	3.3200e-003	0.0000	16.4685	16.4685	9.0000e-004	0.0000	16.4909
Total	**0.2443**	**0.0739**	**0.1167**	**1.9000e-004**		**3.3200e-003**	**3.3200e-003**		**3.3200e-003**	**3.3200e-003**	**0.0000**	**16.4685**	**16.4685**	**9.0000e-004**	**0.0000**	**16.4909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6600e-003	2.4800e-003	0.0354	1.1000e-004	0.0142	6.0000e-005	0.0142	3.7700e-003	6.0000e-005	3.8200e-003	0.0000	10.3970	10.3970	2.2000e-004	2.5000e-004	10.4764
Total	**3.6600e-003**	**2.4800e-003**	**0.0354**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0142**	**3.7700e-003**	**6.0000e-005**	**3.8200e-003**	**0.0000**	**10.3970**	**10.3970**	**2.2000e-004**	**2.5000e-004**	**10.4764**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Unmitigated	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	1,670.88	1,670.88	1670.88	5,175,785	5,175,785
Total	1,670.88	1,670.88	1,670.88	5,175,785	5,175,785

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	8.51	5.90	8.70	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Other Asphalt Surfaces	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Single Family Housing	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	120.5121	120.5121	0.0102	1.2300e-003	121.1338
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	250.0120	250.0120	0.0211	2.5600e-003	251.3017
NaturalGas Mitigated	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
NaturalGas Unmitigated	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	5.00679e +006	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
Total		**0.0270**	**0.2307**	**0.0982**	**1.4700e-003**		**0.0187**	**0.0187**		**0.0187**	**0.0187**	**0.0000**	**267.1813**	**267.1813**	**5.1200e-003**	**4.9000e-003**	**268.7690**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	5.00679e+006	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
Total		**0.0270**	**0.2307**	**0.0982**	**1.4700e-003**		**0.0187**	**0.0187**		**0.0187**	**0.0187**	**0.0000**	**267.1813**	**267.1813**	**5.1200e-003**	**4.9000e-003**	**268.7690**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.40974e +006	250.0120	0.0211	2.5600e-003	251.3017
Total		**250.0120**	**0.0211**	**2.5600e-003**	**251.3017**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	-243404	-43.1666	-0.0036	-0.0004	-43.3893
Other Asphalt Surfaces	-243404	-43.1666	-0.0036	-0.0004	-43.3893
Single Family Housing	1.16634e+006	206.8454	0.0175	2.1200e-003	207.9124
Total		**120.5121**	**0.0102**	**1.2400e-003**	**121.1338**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.4103	0.0540	1.8378	3.1000e-004		0.0128	0.0128		0.0128	0.0128	0.0000	41.2358	41.2358	3.5900e-003	7.0000e-004	41.5345
Unmitigated	1.9861	0.0669	2.9489	2.9700e-003		0.1791	0.1791		0.1791	0.1791	18.8008	39.1105	57.9113	0.0589	1.2800e-003	59.7647

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1101					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.2415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.5798	0.0459	1.1252	2.8700e-003		0.1690	0.1690		0.1690	0.1690	18.8008	36.1286	54.9294	0.0561	1.2800e-003	56.7114
Landscaping	0.0548	0.0210	1.8237	1.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	2.9819	2.9819	2.8600e-003	0.0000	3.0533
Total	**1.9861**	**0.0669**	**2.9489**	**2.9700e-003**		**0.1791**	**0.1791**		**0.1791**	**0.1791**	**18.8008**	**39.1105**	**57.9113**	**0.0589**	**1.2800e-003**	**59.7647**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1101					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.2415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.8700e-003	0.0330	0.0141	2.1000e-004		2.6700e-003	2.6700e-003		2.6700e-003	2.6700e-003	0.0000	38.2539	38.2539	7.3000e-004	7.0000e-004	38.4812
Landscaping	0.0548	0.0210	1.8237	1.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	2.9819	2.9819	2.8600e-003	0.0000	3.0533
Total	**1.4103**	**0.0540**	**1.8378**	**3.1000e-004**		**0.0128**	**0.0128**		**0.0128**	**0.0128**	**0.0000**	**41.2358**	**41.2358**	**3.5900e-003**	**7.0000e-004**	**41.5345**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	39.8417	0.3037	7.4800e-003	49.6630
Unmitigated	49.8021	0.3797	9.3500e-003	62.0788

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 2.63317	5.1882	4.4000e-004	5.0000e-005	5.2149
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	11.5323 / 7.27034	44.6140	0.3792	9.2900e-003	56.8639
Total		**49.8021**	**0.3797**	**9.3400e-003**	**62.0788**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 2.10654	4.1505	3.5000e-004	4.0000e-005	4.1719
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	9.22581 / 5.81627	35.6912	0.3034	7.4300e-003	45.4911
Total		**39.8417**	**0.3037**	**7.4700e-003**	**49.6630**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	31.6133	1.8683	0.0000	78.3206
Unmitigated	42.1511	2.4911	0.0000	104.4275

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.19	0.0386	2.2800e-003	0.0000	0.0956
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	207.46	42.1125	2.4888	0.0000	104.3320
Total		**42.1511**	**2.4911**	**0.0000**	**104.4275**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.1425	0.0289	1.7100e-003	0.0000	0.0717
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	155.595	31.5844	1.8666	0.0000	78.2490
Total		**31.6133**	**1.8683**	**0.0000**	**78.3206**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

TTM 38213 Residential Project

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	7.48	Acre	7.48	325,828.80	0
City Park	2.21	Acre	2.21	96,267.60	0
Single Family Housing	177.00	Dwelling Unit	21.67	337,494.80	506

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2026
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Run R2: Revises TTM, 177 DU and new 2.21 acre park.
Run with construction Tier 4 engine mitigation.

Land Use - Land use per tentative map.
Residential area per PD average home SF
Other Asphalt Surfaces = internal streets and sidewalks.

Construction Phase - Construction schedule per applicant.
Soil hauling to occur on 15 days during grading.
Architectural coating concurrent with building construction as units are completed.
Blasting emissions calculated off-model.

Off-road Equipment -

Off-road Equipment - Wood frame construction anticipated, no welders.

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Off-road Equipment - Grading equipment and horsepoower per applicant.
Off-highway trucks = 3 rock trucks and 1 water truck.
Bore/Drill Rigs for blasting drilling.

Off-road Equipment -

Off-road Equipment - Soil hauling for loading and export of material on 15 days during grading.

Off-road Equipment - Equipment for trenching/installation of underground utuliites.

Trips and VMT - Soil hauling per applicant (180 loads per day over 15 days).
Max architectural coating crew of 10 assumed to complete 1 house at a time.

On-road Fugitive Dust - 0.125 mile of each soil hauling trip assumed to be on on-site unpaved access roads.

Grading - Soil export trips entered in VMT tab.

Architectural Coating -

Vehicle Trips - Trip generation per project Traffic Impact Anlaysis.
VMT (trip distance) per WRCOG VMT Screening Tool and housing data.

Road Dust -

Woodstoves -

Consumer Products -

Area Coating -

Landscape Equipment -

Energy Use -

Solid Waste -

Construction Off-road Equipment Mitigation - Fugitive dust mitigation to comply with SCAQMD Rule 55.
Tier 4 engines per Mitigation Measure AQ-1.

Area Mitigation - No woood burning devices in new construction per SCAQMD Rule 455.

Energy Mitigation - Solar generation estimated per 2019 Title 24 requirements.

Water Mitigation - 20% water reduction not accounted for in defaults per 2019 CALGreen.

Waste Mitigation - 25% solid waste diversion not accounted for in defaults per local/state regulations in compliance with AB 341.

Fleet Mix -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	12
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00

tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	5.00
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstructionPhase	NumDays	45.00	44.00
tblConstructionPhase	NumDays	45.00	15.00
tblConstructionPhase	NumDays	35.00	43.00
tblConstructionPhase	NumDays	500.00	684.00
tblConstructionPhase	NumDays	35.00	609.00
tblLandUse	LandUseSquareFeet	318,600.00	337,494.80
tblLandUse	LotAcreage	57.47	21.67
tblOffRoadEquipment	HorsePower	158.00	236.00
tblOffRoadEquipment	HorsePower	187.00	309.00
tblOffRoadEquipment	HorsePower	247.00	319.00
tblOffRoadEquipment	HorsePower	367.00	395.00
tblOffRoadEquipment	HorsePower	367.00	700.00
tblOffRoadEquipment	HorsePower	212.00	309.00
tblOffRoadEquipment	HorsePower	402.00	260.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOnRoadDust	HaulingPercentPave	100.00	99.40
tblTripsAndVMT	HaulingTripNumber	0.00	5,400.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	48.00	20.00
tblVehicleTrips	DV_TP	11.00	0.00
tblVehicleTrips	HO_TTP	40.60	0.00
tblVehicleTrips	HS_TTP	19.20	0.00
tblVehicleTrips	HW_TL	14.70	8.51
tblVehicleTrips	HW_TTP	40.20	100.00
tblVehicleTrips	PB_TP	3.00	0.00

tblVehicleTrips	PR_TP	86.00	100.00
tblVehicleTrips	ST_TR	1.96	0.00
tblVehicleTrips	ST_TR	9.54	9.44
tblVehicleTrips	SU_TR	2.19	0.00
tblVehicleTrips	SU_TR	8.55	9.44
tblVehicleTrips	WD_TR	0.78	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3426	3.5395	2.7281	8.6900e-003	0.8415	0.1308	0.9723	0.1649	0.1207	0.2856	0.0000	782.2042	782.2042	0.1803	0.0295	795.4948
2023	0.7076	2.3002	3.2993	8.5500e-003	0.4406	0.0965	0.5371	0.1187	0.0909	0.2095	0.0000	780.7923	780.7923	0.0796	0.0359	793.4804
2024	0.7752	2.2084	3.2983	8.5900e-003	0.4486	0.0871	0.5357	0.1208	0.0820	0.2028	0.0000	785.9203	785.9203	0.0797	0.0352	798.4146
2025	0.3720	1.0170	1.5852	4.1600e-003	0.2209	0.0371	0.2580	0.0595	0.0350	0.0945	0.0000	381.9679	381.9679	0.0388	0.0169	387.9589
Maximum	**0.7752**	**3.5395**	**3.2993**	**8.6900e-003**	**0.8415**	**0.1308**	**0.9723**	**0.1649**	**0.1207**	**0.2856**	**0.0000**	**785.9203**	**785.9203**	**0.1803**	**0.0359**	**798.4146**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.1173	0.7904	3.4774	8.6900e-003	0.3877	0.0157	0.4034	0.0861	0.0154	0.1015	0.0000	782.2035	782.2035	0.1803	0.0295	795.4941
2023	0.5555	0.6468	3.4832	8.5500e-003	0.4406	0.0104	0.4510	0.1187	0.0101	0.1288	0.0000	780.7919	780.7919	0.0796	0.0359	793.4800
2024	0.6308	0.6466	3.4925	8.5900e-003	0.4486	0.0105	0.4591	0.1208	0.0102	0.1310	0.0000	785.9199	785.9199	0.0797	0.0352	798.4142
2025	0.3072	0.3130	1.6855	4.1600e-003	0.2209	5.1100e-003	0.2260	0.0595	4.9700e-003	0.0645	0.0000	381.9677	381.9677	0.0388	0.0169	387.9587
Maximum	**0.6308**	**0.7904**	**3.4925**	**8.6900e-003**	**0.4486**	**0.0157**	**0.4591**	**0.1208**	**0.0154**	**0.1310**	**0.0000**	**785.9199**	**785.9199**	**0.1803**	**0.0359**	**798.4142**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**26.70**	**73.56**	**-11.25**	**0.00**	**23.25**	**88.16**	**33.16**	**16.99**	**87.62**	**46.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**5-1-2022**	**7-31-2022**	3.0746	0.6859
2	**8-1-2022**	**10-31-2022**	0.3304	0.0558
3	**11-1-2022**	**1-31-2023**	0.6245	0.1945
4	**2-1-2023**	**4-30-2023**	0.7105	0.2755
5	**5-1-2023**	**7-31-2023**	0.7856	0.3222
6	**8-1-2023**	**10-31-2023**	0.7871	0.3236
7	**11-1-2023**	**1-31-2024**	0.7765	0.3251
8	**2-1-2024**	**4-30-2024**	0.7326	0.3139

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

9	**5-1-2024**	**7-31-2024**	0.7459	0.3179
10	**8-1-2024**	**10-31-2024**	0.7474	0.3194
11	**11-1-2024**	**1-31-2025**	0.7365	0.3208
12	**2-1-2025**	**4-30-2025**	0.6849	0.3061
13	**5-1-2025**	**7-31-2025**	0.4675	0.2078
		Highest	3.0746	0.6859

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.9861	0.0669	2.9489	2.9700e-003		0.1791	0.1791		0.1791	0.1791	18.8008	39.1105	57.9113	0.0589	1.2800e-003	59.7647
Energy	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	517.1933	517.1933	0.0262	7.4600e-003	520.0708
Mobile	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Waste						0.0000	0.0000		0.0000	0.0000	42.1511	0.0000	42.1511	2.4911	0.0000	104.4275
Water						0.0000	0.0000		0.0000	0.0000	3.6587	46.1435	49.8021	0.3797	9.3500e-003	62.0788
Total	**2.7291**	**1.3795**	**10.2546**	**0.0217**	**1.9569**	**0.2116**	**2.1686**	**0.5227**	**0.2108**	**0.7335**	**64.6105**	**2,250.3963**	**2,315.0068**	**3.0390**	**0.0979**	**2,420.1559**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.4103	0.0540	1.8378	3.1000e-004		0.0128	0.0128		0.0128	0.0128	0.0000	41.2358	41.2358	3.5900e-003	7.0000e-004	41.5345
Energy	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	387.6934	387.6934	0.0153	6.1300e-003	389.9029
Mobile	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Waste						0.0000	0.0000		0.0000	0.0000	31.6133	0.0000	31.6133	1.8683	0.0000	78.3206
Water						0.0000	0.0000		0.0000	0.0000	2.9269	36.9148	39.8417	0.3037	7.4800e-003	49.6630
Total	**2.1532**	**1.3666**	**9.1435**	**0.0191**	**1.9569**	**0.0453**	**2.0022**	**0.5227**	**0.0444**	**0.5671**	**34.5402**	**2,113.7930**	**2,148.3332**	**2.2740**	**0.0941**	**2,233.2351**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**21.10**	**0.93**	**10.84**	**12.24**	**0.00**	**78.60**	**7.67**	**0.00**	**78.92**	**22.68**	**46.54**	**6.07**	**7.20**	**25.17**	**3.86**	**7.72**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	5/1/2022	6/30/2022	5	44	
2	Soil Hauling	Grading	5/1/2022	5/20/2022	5	15	
3	Underground Utilities	Trenching	7/1/2022	9/15/2022	5	55	

4	Paving	Paving	9/16/2022	11/15/2022	5	43	
5	Building Construction	Building Construction	11/16/2022	6/30/2025	5	684	
6	Architectural Coating	Architectural Coating	3/1/2023	6/30/2025	5	609	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 286

Acres of Paving: 7.48

Residential Indoor: 683,427; Residential Outdoor: 227,809; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 19,550 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Bore/Drill Rigs	2	8.00	221	0.50
Grading	Crawler Tractors	1	8.00	309	0.43
Grading	Excavators	1	8.00	236	0.38
Grading	Graders	1	8.00	309	0.41
Grading	Off-Highway Trucks	4	8.00	260	0.38
Grading	Rubber Tired Dozers	1	8.00	319	0.40
Grading	Scrapers	1	8.00	395	0.48
Grading	Scrapers	4	8.00	700	0.48
Soil Hauling	Rubber Tired Loaders	2	8.00	203	0.36
Underground Utilities	Excavators	1	8.00	158	0.38
Underground Utilities	Forklifts	1	8.00	89	0.20
Underground Utilities	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	15	38.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Hauling	2	5.00	0.00	5,400.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Utilities	4	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	241.00	88.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

3.2 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2841	0.0000	0.2841	0.0892	0.0000	0.0892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2332	2.3963	1.6164	4.9700e-003		0.0901	0.0901		0.0829	0.0829	0.0000	436.7061	436.7061	0.1412	0.0000	440.2371
Total	**0.2332**	**2.3963**	**1.6164**	**4.9700e-003**	**0.2841**	**0.0901**	**0.3743**	**0.0892**	**0.0829**	**0.1721**	**0.0000**	**436.7061**	**436.7061**	**0.1412**	**0.0000**	**440.2371**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9200e-003	2.2800e-003	0.0285	8.0000e-005	9.1900e-003	5.0000e-005	9.2400e-003	2.4400e-003	4.0000e-005	2.4800e-003	0.0000	7.2658	7.2658	1.9000e-004	2.0000e-004	7.3306
Total	**2.9200e-003**	**2.2800e-003**	**0.0285**	**8.0000e-005**	**9.1900e-003**	**5.0000e-005**	**9.2400e-003**	**2.4400e-003**	**4.0000e-005**	**2.4800e-003**	**0.0000**	**7.2658**	**7.2658**	**1.9000e-004**	**2.0000e-004**	**7.3306**

3.2 Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1279	0.0000	0.1279	0.0401	0.0000	0.0401	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0612	0.2650	2.2422	4.9700e-003		8.1500e-003	8.1500e-003		8.1500e-003	8.1500e-003	0.0000	436.7056	436.7056	0.1412	0.0000	440.2366
Total	**0.0612**	**0.2650**	**2.2422**	**4.9700e-003**	**0.1279**	**8.1500e-003**	**0.1360**	**0.0401**	**8.1500e-003**	**0.0483**	**0.0000**	**436.7056**	**436.7056**	**0.1412**	**0.0000**	**440.2366**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.9200e-003	2.2800e-003	0.0285	8.0000e-005	9.1900e-003	5.0000e-005	9.2400e-003	2.4400e-003	4.0000e-005	2.4800e-003	0.0000	7.2658	7.2658	1.9000e-004	2.0000e-004	7.3306
Total	**2.9200e-003**	**2.2800e-003**	**0.0285**	**8.0000e-005**	**9.1900e-003**	**5.0000e-005**	**9.2400e-003**	**2.4400e-003**	**4.0000e-005**	**2.4800e-003**	**0.0000**	**7.2658**	**7.2658**	**1.9000e-004**	**2.0000e-004**	**7.3306**

3.3 Soil Hauling - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.3700e-003	0.0454	0.0230	9.0000e-005		1.5200e-003	1.5200e-003		1.4000e-003	1.4000e-003	0.0000	8.2417	8.2417	2.6700e-003	0.0000	8.3084
Total	**4.3700e-003**	**0.0454**	**0.0230**	**9.0000e-005**	**0.0000**	**1.5200e-003**	**1.5200e-003**	**0.0000**	**1.4000e-003**	**1.4000e-003**	**0.0000**	**8.2417**	**8.2417**	**2.6700e-003**	**0.0000**	**8.3084**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.3700e-003	0.3636	0.0776	1.5500e-003	0.4866	4.0100e-003	0.4906	0.0567	3.8400e-003	0.0605	0.0000	150.2825	150.2825	2.0200e-003	0.0237	157.3879
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-004	1.0000e-004	1.2800e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3259	0.3259	1.0000e-005	1.0000e-005	0.3288
Total	**8.5000e-003**	**0.3637**	**0.0788**	**1.5500e-003**	**0.4870**	**4.0100e-003**	**0.4910**	**0.0568**	**3.8400e-003**	**0.0606**	**0.0000**	**150.6084**	**150.6084**	**2.0300e-003**	**0.0237**	**157.7168**

3.3 Soil Hauling - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.1600e-003	5.0300e-003	0.0425	9.0000e-005		1.5000e-004	1.5000e-004		1.5000e-004	1.5000e-004	0.0000	8.2417	8.2417	2.6700e-003	0.0000	8.3084
Total	**1.1600e-003**	**5.0300e-003**	**0.0425**	**9.0000e-005**	**0.0000**	**1.5000e-004**	**1.5000e-004**	**0.0000**	**1.5000e-004**	**1.5000e-004**	**0.0000**	**8.2417**	**8.2417**	**2.6700e-003**	**0.0000**	**8.3084**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	8.3700e-003	0.3636	0.0776	1.5500e-003	0.1891	4.0100e-003	0.1931	0.0269	3.8400e-003	0.0308	0.0000	150.2825	150.2825	2.0200e-003	0.0237	157.3879
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3000e-004	1.0000e-004	1.2800e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3259	0.3259	1.0000e-005	1.0000e-005	0.3288
Total	**8.5000e-003**	**0.3637**	**0.0788**	**1.5500e-003**	**0.1895**	**4.0100e-003**	**0.1935**	**0.0270**	**3.8400e-003**	**0.0309**	**0.0000**	**150.6084**	**150.6084**	**2.0300e-003**	**0.0237**	**157.7168**

3.4 Underground Utilities - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0178	0.1700	0.2443	3.6000e-004		9.2400e-003	9.2400e-003		8.5000e-003	8.5000e-003	0.0000	31.1976	31.1976	0.0101	0.0000	31.4498
Total	**0.0178**	**0.1700**	**0.2443**	**3.6000e-004**		**9.2400e-003**	**9.2400e-003**		**8.5000e-003**	**8.5000e-003**	**0.0000**	**31.1976**	**31.1976**	**0.0101**	**0.0000**	**31.4498**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0122	4.1100e-003	5.0000e-005	1.7400e-003	1.7000e-004	1.9100e-003	5.0000e-004	1.6000e-004	6.6000e-004	0.0000	4.8157	4.8157	5.0000e-005	7.1000e-004	5.0300
Worker	9.6000e-004	7.5000e-004	9.3700e-003	3.0000e-005	3.0200e-003	2.0000e-005	3.0400e-003	8.0000e-004	1.0000e-005	8.2000e-004	0.0000	2.3901	2.3901	6.0000e-005	7.0000e-005	2.4114
Total	**1.4000e-003**	**0.0130**	**0.0135**	**8.0000e-005**	**4.7600e-003**	**1.9000e-004**	**4.9500e-003**	**1.3000e-003**	**1.7000e-004**	**1.4800e-003**	**0.0000**	**7.2058**	**7.2058**	**1.1000e-004**	**7.8000e-004**	**7.4413**

3.4 Underground Utilities - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.3500e-003	0.0189	0.2685	3.6000e-004		5.8000e-004	5.8000e-004		5.8000e-004	5.8000e-004	0.0000	31.1975	31.1975	0.0101	0.0000	31.4498
Total	**4.3500e-003**	**0.0189**	**0.2685**	**3.6000e-004**		**5.8000e-004**	**5.8000e-004**		**5.8000e-004**	**5.8000e-004**	**0.0000**	**31.1975**	**31.1975**	**0.0101**	**0.0000**	**31.4498**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.4000e-004	0.0122	4.1100e-003	5.0000e-005	1.7400e-003	1.7000e-004	1.9100e-003	5.0000e-004	1.6000e-004	6.6000e-004	0.0000	4.8157	4.8157	5.0000e-005	7.1000e-004	5.0300
Worker	9.6000e-004	7.5000e-004	9.3700e-003	3.0000e-005	3.0200e-003	2.0000e-005	3.0400e-003	8.0000e-004	1.0000e-005	8.2000e-004	0.0000	2.3901	2.3901	6.0000e-005	7.0000e-005	2.4114
Total	**1.4000e-003**	**0.0130**	**0.0135**	**8.0000e-005**	**4.7600e-003**	**1.9000e-004**	**4.9500e-003**	**1.3000e-003**	**1.7000e-004**	**1.4800e-003**	**0.0000**	**7.2058**	**7.2058**	**1.1000e-004**	**7.8000e-004**	**7.4413**

3.5 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0237	0.2392	0.3135	4.9000e-004		0.0122	0.0122		0.0112	0.0112	0.0000	43.0593	43.0593	0.0139	0.0000	43.4074
Paving	9.8000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0335**	**0.2392**	**0.3135**	**4.9000e-004**		**0.0122**	**0.0122**		**0.0112**	**0.0112**	**0.0000**	**43.0593**	**43.0593**	**0.0139**	**0.0000**	**43.4074**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	8.8000e-004	0.0110	3.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	2.8029	2.8029	7.0000e-005	8.0000e-005	2.8279
Total	**1.1300e-003**	**8.8000e-004**	**0.0110**	**3.0000e-005**	**3.5400e-003**	**2.0000e-005**	**3.5600e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8029**	**2.8029**	**7.0000e-005**	**8.0000e-005**	**2.8279**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.5 Paving - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	6.0300e-003	0.0261	0.3719	4.9000e-004		8.0000e-004	8.0000e-004		8.0000e-004	8.0000e-004	0.0000	43.0592	43.0592	0.0139	0.0000	43.4074
Paving	9.8000e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0158**	**0.0261**	**0.3719**	**4.9000e-004**		**8.0000e-004**	**8.0000e-004**		**8.0000e-004**	**8.0000e-004**	**0.0000**	**43.0592**	**43.0592**	**0.0139**	**0.0000**	**43.4074**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1300e-003	8.8000e-004	0.0110	3.0000e-005	3.5400e-003	2.0000e-005	3.5600e-003	9.4000e-004	2.0000e-005	9.6000e-004	0.0000	2.8029	2.8029	7.0000e-005	8.0000e-005	2.8279
Total	**1.1300e-003**	**8.8000e-004**	**0.0110**	**3.0000e-005**	**3.5400e-003**	**2.0000e-005**	**3.5600e-003**	**9.4000e-004**	**2.0000e-005**	**9.6000e-004**	**0.0000**	**2.8029**	**2.8029**	**7.0000e-005**	**8.0000e-005**	**2.8279**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0236	0.2335	0.2420	4.0000e-004		0.0123	0.0123		0.0115	0.0115	0.0000	35.1290	35.1290	8.7900e-003	0.0000	35.3487
Total	**0.0236**	**0.2335**	**0.2420**	**4.0000e-004**		**0.0123**	**0.0123**		**0.0115**	**0.0115**	**0.0000**	**35.1290**	**35.1290**	**8.7900e-003**	**0.0000**	**35.3487**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3100e-003	0.0645	0.0217	2.6000e-004	9.1700e-003	8.9000e-004	0.0101	2.6500e-003	8.5000e-004	3.4900e-003	0.0000	25.4271	25.4271	2.7000e-004	3.7700e-003	26.5581
Worker	0.0139	0.0108	0.1355	3.7000e-004	0.0437	2.2000e-004	0.0439	0.0116	2.0000e-004	0.0118	0.0000	34.5605	34.5605	9.2000e-004	9.6000e-004	34.8686
Total	**0.0162**	**0.0753**	**0.1572**	**6.3000e-004**	**0.0529**	**1.1100e-003**	**0.0540**	**0.0143**	**1.0500e-003**	**0.0153**	**0.0000**	**59.9875**	**59.9875**	**1.1900e-003**	**4.7300e-003**	**61.4268**

3.6 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.6900e-003	0.0203	0.2634	4.0000e-004		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	35.1290	35.1290	8.7900e-003	0.0000	35.3487
Total	**4.6900e-003**	**0.0203**	**0.2634**	**4.0000e-004**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**35.1290**	**35.1290**	**8.7900e-003**	**0.0000**	**35.3487**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3100e-003	0.0645	0.0217	2.6000e-004	9.1700e-003	8.9000e-004	0.0101	2.6500e-003	8.5000e-004	3.4900e-003	0.0000	25.4271	25.4271	2.7000e-004	3.7700e-003	26.5581
Worker	0.0139	0.0108	0.1355	3.7000e-004	0.0437	2.2000e-004	0.0439	0.0116	2.0000e-004	0.0118	0.0000	34.5605	34.5605	9.2000e-004	9.6000e-004	34.8686
Total	**0.0162**	**0.0753**	**0.1572**	**6.3000e-004**	**0.0529**	**1.1100e-003**	**0.0540**	**0.0143**	**1.0500e-003**	**0.0153**	**0.0000**	**59.9875**	**59.9875**	**1.1900e-003**	**4.7300e-003**	**61.4268**

3.6 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1714	1.6854	1.8936	3.1700e-003		0.0838	0.0838		0.0784	0.0784	0.0000	276.8775	276.8775	0.0690	0.0000	278.6029
Total	**0.1714**	**1.6854**	**1.8936**	**3.1700e-003**		**0.0838**	**0.0838**		**0.0784**	**0.0784**	**0.0000**	**276.8775**	**276.8775**	**0.0690**	**0.0000**	**278.6029**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0124	0.3922	0.1563	2.0000e-003	0.0723	3.2600e-003	0.0755	0.0209	3.1200e-003	0.0240	0.0000	192.4786	192.4786	1.9500e-003	0.0285	201.0086
Worker	0.1017	0.0753	0.9836	2.8600e-003	0.3444	1.6400e-003	0.3460	0.0914	1.5100e-003	0.0930	0.0000	265.1557	265.1557	6.5400e-003	6.9500e-003	267.3912
Total	**0.1141**	**0.4676**	**1.1398**	**4.8600e-003**	**0.4166**	**4.9000e-003**	**0.4215**	**0.1123**	**4.6300e-003**	**0.1169**	**0.0000**	**457.6343**	**457.6343**	**8.4900e-003**	**0.0354**	**468.3998**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0369	0.1600	2.0752	3.1700e-003		4.9200e-003	4.9200e-003		4.9200e-003	4.9200e-003	0.0000	276.8772	276.8772	0.0690	0.0000	278.6026
Total	**0.0369**	**0.1600**	**2.0752**	**3.1700e-003**		**4.9200e-003**	**4.9200e-003**		**4.9200e-003**	**4.9200e-003**	**0.0000**	**276.8772**	**276.8772**	**0.0690**	**0.0000**	**278.6026**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0124	0.3922	0.1563	2.0000e-003	0.0723	3.2600e-003	0.0755	0.0209	3.1200e-003	0.0240	0.0000	192.4786	192.4786	1.9500e-003	0.0285	201.0086
Worker	0.1017	0.0753	0.9836	2.8600e-003	0.3444	1.6400e-003	0.3460	0.0914	1.5100e-003	0.0930	0.0000	265.1557	265.1557	6.5400e-003	6.9500e-003	267.3912
Total	**0.1141**	**0.4676**	**1.1398**	**4.8600e-003**	**0.4166**	**4.9000e-003**	**0.4215**	**0.1123**	**4.6300e-003**	**0.1169**	**0.0000**	**457.6343**	**457.6343**	**8.4900e-003**	**0.0354**	**468.3998**

3.6 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1619	1.5803	1.8999	3.2000e-003		0.0741	0.0741		0.0694	0.0694	0.0000	279.0654	279.0654	0.0693	0.0000	280.7981
Total	**0.1619**	**1.5803**	**1.8999**	**3.2000e-003**		**0.0741**	**0.0741**		**0.0694**	**0.0694**	**0.0000**	**279.0654**	**279.0654**	**0.0693**	**0.0000**	**280.7981**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0123	0.3953	0.1557	1.9800e-003	0.0728	3.2600e-003	0.0761	0.0210	3.1200e-003	0.0241	0.0000	190.9712	190.9712	2.0300e-003	0.0282	199.4240
Worker	0.0957	0.0676	0.9285	2.7900e-003	0.3470	1.5800e-003	0.3486	0.0921	1.4600e-003	0.0936	0.0000	260.7934	260.7934	5.9700e-003	6.5100e-003	262.8819
Total	**0.1080**	**0.4629**	**1.0842**	**4.7700e-003**	**0.4198**	**4.8400e-003**	**0.4247**	**0.1132**	**4.5800e-003**	**0.1177**	**0.0000**	**451.7647**	**451.7647**	**8.0000e-003**	**0.0347**	**462.3059**

3.6 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0372	0.1612	2.0912	3.2000e-003		4.9600e-003	4.9600e-003		4.9600e-003	4.9600e-003	0.0000	279.0651	279.0651	0.0693	0.0000	280.7977
Total	**0.0372**	**0.1612**	**2.0912**	**3.2000e-003**		**4.9600e-003**	**4.9600e-003**		**4.9600e-003**	**4.9600e-003**	**0.0000**	**279.0651**	**279.0651**	**0.0693**	**0.0000**	**280.7977**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0123	0.3953	0.1557	1.9800e-003	0.0728	3.2600e-003	0.0761	0.0210	3.1200e-003	0.0241	0.0000	190.9712	190.9712	2.0300e-003	0.0282	199.4240
Worker	0.0957	0.0676	0.9285	2.7900e-003	0.3470	1.5800e-003	0.3486	0.0921	1.4600e-003	0.0936	0.0000	260.7934	260.7934	5.9700e-003	6.5100e-003	262.8819
Total	**0.1080**	**0.4629**	**1.0842**	**4.7700e-003**	**0.4198**	**4.8400e-003**	**0.4247**	**0.1132**	**4.5800e-003**	**0.1177**	**0.0000**	**451.7647**	**451.7647**	**8.0000e-003**	**0.0347**	**462.3059**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0740	0.7177	0.9309	1.5700e-003		0.0314	0.0314		0.0294	0.0294	0.0000	137.4478	137.4478	0.0340	0.0000	138.2981
Total	**0.0740**	**0.7177**	**0.9309**	**1.5700e-003**		**0.0314**	**0.0314**		**0.0294**	**0.0294**	**0.0000**	**137.4478**	**137.4478**	**0.0340**	**0.0000**	**138.2981**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9800e-003	0.1930	0.0758	9.6000e-004	0.0359	1.6100e-003	0.0375	0.0104	1.5400e-003	0.0119	0.0000	92.3709	92.3709	1.0400e-003	0.0136	96.4526
Worker	0.0441	0.0298	0.4264	1.3300e-003	0.1709	7.4000e-004	0.1716	0.0454	6.8000e-004	0.0461	0.0000	125.2837	125.2837	2.6600e-003	2.9900e-003	126.2409
Total	**0.0501**	**0.2229**	**0.5022**	**2.2900e-003**	**0.2067**	**2.3500e-003**	**0.2091**	**0.0557**	**2.2200e-003**	**0.0579**	**0.0000**	**217.6546**	**217.6546**	**3.7000e-003**	**0.0166**	**222.6934**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.6 Building Construction - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0183	0.0794	1.0296	1.5700e-003		2.4400e-003	2.4400e-003		2.4400e-003	2.4400e-003	0.0000	137.4477	137.4477	0.0340	0.0000	138.2979
Total	**0.0183**	**0.0794**	**1.0296**	**1.5700e-003**		**2.4400e-003**	**2.4400e-003**		**2.4400e-003**	**2.4400e-003**	**0.0000**	**137.4477**	**137.4477**	**0.0340**	**0.0000**	**138.2979**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	5.9800e-003	0.1930	0.0758	9.6000e-004	0.0359	1.6100e-003	0.0375	0.0104	1.5400e-003	0.0119	0.0000	92.3709	92.3709	1.0400e-003	0.0136	96.4526
Worker	0.0441	0.0298	0.4264	1.3300e-003	0.1709	7.4000e-004	0.1716	0.0454	6.8000e-004	0.0461	0.0000	125.2837	125.2837	2.6600e-003	2.9900e-003	126.2409
Total	**0.0501**	**0.2229**	**0.5022**	**2.2900e-003**	**0.2067**	**2.3500e-003**	**0.2091**	**0.0557**	**2.2200e-003**	**0.0579**	**0.0000**	**217.6546**	**217.6546**	**3.7000e-003**	**0.0166**	**222.6934**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3942					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0209	0.1420	0.1974	3.2000e-004		7.7200e-003	7.7200e-003		7.7200e-003	7.7200e-003	0.0000	27.8305	27.8305	1.6700e-003	0.0000	27.8721
Total	**0.4151**	**0.1420**	**0.1974**	**3.2000e-004**		**7.7200e-003**	**7.7200e-003**		**7.7200e-003**	**7.7200e-003**	**0.0000**	**27.8305**	**27.8305**	**1.6700e-003**	**0.0000**	**27.8721**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0800e-003	5.2400e-003	0.0684	2.0000e-004	0.0240	1.1000e-004	0.0241	6.3600e-003	1.1000e-004	6.4700e-003	0.0000	18.4500	18.4500	4.5000e-004	4.8000e-004	18.6056
Total	**7.0800e-003**	**5.2400e-003**	**0.0684**	**2.0000e-004**	**0.0240**	**1.1000e-004**	**0.0241**	**6.3600e-003**	**1.1000e-004**	**6.4700e-003**	**0.0000**	**18.4500**	**18.4500**	**4.5000e-004**	**4.8000e-004**	**18.6056**

3.7 Architectural Coating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3942					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.2400e-003	0.0140	0.1997	3.2000e-004		4.3000e-004	4.3000e-004		4.3000e-004	4.3000e-004	0.0000	27.8304	27.8304	1.6700e-003	0.0000	27.8721
Total	**0.3974**	**0.0140**	**0.1997**	**3.2000e-004**		**4.3000e-004**	**4.3000e-004**		**4.3000e-004**	**4.3000e-004**	**0.0000**	**27.8304**	**27.8304**	**1.6700e-003**	**0.0000**	**27.8721**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0800e-003	5.2400e-003	0.0684	2.0000e-004	0.0240	1.1000e-004	0.0241	6.3600e-003	1.1000e-004	6.4700e-003	0.0000	18.4500	18.4500	4.5000e-004	4.8000e-004	18.6056
Total	**7.0800e-003**	**5.2400e-003**	**0.0684**	**2.0000e-004**	**0.0240**	**1.1000e-004**	**0.0241**	**6.3600e-003**	**1.1000e-004**	**6.4700e-003**	**0.0000**	**18.4500**	**18.4500**	**4.5000e-004**	**4.8000e-004**	**18.6056**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**0.4974**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9400e-003	5.6100e-003	0.0771	2.3000e-004	0.0288	1.3000e-004	0.0289	7.6500e-003	1.2000e-004	7.7700e-003	0.0000	21.6426	21.6426	5.0000e-004	5.4000e-004	21.8159
Total	**7.9400e-003**	**5.6100e-003**	**0.0771**	**2.3000e-004**	**0.0288**	**1.3000e-004**	**0.0289**	**7.6500e-003**	**1.2000e-004**	**7.7700e-003**	**0.0000**	**21.6426**	**21.6426**	**5.0000e-004**	**5.4000e-004**	**21.8159**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4738					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.8900e-003	0.0169	0.2401	3.9000e-004		5.2000e-004	5.2000e-004		5.2000e-004	5.2000e-004	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**0.4776**	**0.0169**	**0.2401**	**3.9000e-004**		**5.2000e-004**	**5.2000e-004**		**5.2000e-004**	**5.2000e-004**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9400e-003	5.6100e-003	0.0771	2.3000e-004	0.0288	1.3000e-004	0.0289	7.6500e-003	1.2000e-004	7.7700e-003	0.0000	21.6426	21.6426	5.0000e-004	5.4000e-004	21.8159
Total	**7.9400e-003**	**5.6100e-003**	**0.0771**	**2.3000e-004**	**0.0288**	**1.3000e-004**	**0.0289**	**7.6500e-003**	**1.2000e-004**	**7.7700e-003**	**0.0000**	**21.6426**	**21.6426**	**5.0000e-004**	**5.4000e-004**	**21.8159**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0110	0.0739	0.1167	1.9000e-004		3.3200e-003	3.3200e-003		3.3200e-003	3.3200e-003	0.0000	16.4685	16.4685	9.0000e-004	0.0000	16.4910
Total	**0.2443**	**0.0739**	**0.1167**	**1.9000e-004**		**3.3200e-003**	**3.3200e-003**		**3.3200e-003**	**3.3200e-003**	**0.0000**	**16.4685**	**16.4685**	**9.0000e-004**	**0.0000**	**16.4910**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6600e-003	2.4800e-003	0.0354	1.1000e-004	0.0142	6.0000e-005	0.0142	3.7700e-003	6.0000e-005	3.8200e-003	0.0000	10.3970	10.3970	2.2000e-004	2.5000e-004	10.4764
Total	**3.6600e-003**	**2.4800e-003**	**0.0354**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0142**	**3.7700e-003**	**6.0000e-005**	**3.8200e-003**	**0.0000**	**10.3970**	**10.3970**	**2.2000e-004**	**2.5000e-004**	**10.4764**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

3.7 Architectural Coating - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2333					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9200e-003	8.3100e-003	0.1182	1.9000e-004		2.6000e-004	2.6000e-004		2.6000e-004	2.6000e-004	0.0000	16.4685	16.4685	9.0000e-004	0.0000	16.4909
Total	**0.2352**	**8.3100e-003**	**0.1182**	**1.9000e-004**		**2.6000e-004**	**2.6000e-004**		**2.6000e-004**	**2.6000e-004**	**0.0000**	**16.4685**	**16.4685**	**9.0000e-004**	**0.0000**	**16.4909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6600e-003	2.4800e-003	0.0354	1.1000e-004	0.0142	6.0000e-005	0.0142	3.7700e-003	6.0000e-005	3.8200e-003	0.0000	10.3970	10.3970	2.2000e-004	2.5000e-004	10.4764
Total	**3.6600e-003**	**2.4800e-003**	**0.0354**	**1.1000e-004**	**0.0142**	**6.0000e-005**	**0.0142**	**3.7700e-003**	**6.0000e-005**	**3.8200e-003**	**0.0000**	**10.3970**	**10.3970**	**2.2000e-004**	**2.5000e-004**	**10.4764**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142
Unmitigated	0.7159	1.0819	7.2075	0.0173	1.9569	0.0139	1.9708	0.5227	0.0130	0.5357	0.0000	1,647.9490	1,647.9490	0.0831	0.0798	1,673.8142

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	0.00	0.00	0.00		
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	1,670.88	1,670.88	1670.88	5,175,785	5,175,785
Total	1,670.88	1,670.88	1,670.88	5,175,785	5,175,785

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	66	28	6
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	8.51	5.90	8.70	100.00	0.00	0.00	100	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Other Asphalt Surfaces	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689
Single Family Housing	0.542916	0.056689	0.174450	0.134041	0.024680	0.006960	0.011589	0.018600	0.000608	0.000298	0.023389	0.001091	0.004689

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Kilowatt Hours of Renewable Electricity Generated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	120.5121	120.5121	0.0102	1.2300e-003	121.1338
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	250.0120	250.0120	0.0211	2.5600e-003	251.3017
NaturalGas Mitigated	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
NaturalGas Unmitigated	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	5.00679e+006	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
Total		**0.0270**	**0.2307**	**0.0982**	**1.4700e-003**		**0.0187**	**0.0187**		**0.0187**	**0.0187**	**0.0000**	**267.1813**	**267.1813**	**5.1200e-003**	**4.9000e-003**	**268.7690**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	5.00679e +006	0.0270	0.2307	0.0982	1.4700e-003		0.0187	0.0187		0.0187	0.0187	0.0000	267.1813	267.1813	5.1200e-003	4.9000e-003	268.7690
Total		**0.0270**	**0.2307**	**0.0982**	**1.4700e-003**		**0.0187**	**0.0187**		**0.0187**	**0.0187**	**0.0000**	**267.1813**	**267.1813**	**5.1200e-003**	**4.9000e-003**	**268.7690**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.40974e +006	250.0120	0.0211	2.5600e-003	251.3017
Total		**250.0120**	**0.0211**	**2.5600e-003**	**251.3017**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	-243404	-43.1666	-0.0036	-0.0004	-43.3893
Other Asphalt Surfaces	-243404	-43.1666	-0.0036	-0.0004	-43.3893
Single Family Housing	1.16634e +006	206.8454	0.0175	2.1200e-003	207.9124
Total		**120.5121**	**0.0102**	**1.2400e-003**	**121.1338**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.4103	0.0540	1.8378	3.1000e-004		0.0128	0.0128		0.0128	0.0128	0.0000	41.2358	41.2358	3.5900e-003	7.0000e-004	41.5345
Unmitigated	1.9861	0.0669	2.9489	2.9700e-003		0.1791	0.1791		0.1791	0.1791	18.8008	39.1105	57.9113	0.0589	1.2800e-003	59.7647

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1101					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.2415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.5798	0.0459	1.1252	2.8700e-003		0.1690	0.1690		0.1690	0.1690	18.8008	36.1286	54.9294	0.0561	1.2800e-003	56.7114
Landscaping	0.0548	0.0210	1.8237	1.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	2.9819	2.9819	2.8600e-003	0.0000	3.0533
Total	**1.9861**	**0.0669**	**2.9489**	**2.9700e-003**		**0.1791**	**0.1791**		**0.1791**	**0.1791**	**18.8008**	**39.1105**	**57.9113**	**0.0589**	**1.2800e-003**	**59.7647**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1101					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.2415					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	3.8700e-003	0.0330	0.0141	2.1000e-004		2.6700e-003	2.6700e-003		2.6700e-003	2.6700e-003	0.0000	38.2539	38.2539	7.3000e-004	7.0000e-004	38.4812
Landscaping	0.0548	0.0210	1.8237	1.0000e-004		0.0101	0.0101		0.0101	0.0101	0.0000	2.9819	2.9819	2.8600e-003	0.0000	3.0533
Total	**1.4103**	**0.0540**	**1.8378**	**3.1000e-004**		**0.0128**	**0.0128**		**0.0128**	**0.0128**	**0.0000**	**41.2358**	**41.2358**	**3.5900e-003**	**7.0000e-004**	**41.5345**

7.0 Water Detail

7.1 Mitigation Measures Water

Apply Water Conservation Strategy

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	39.8417	0.3037	7.4800e-003	49.6630
Unmitigated	49.8021	0.3797	9.3500e-003	62.0788

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 2.63317	5.1882	4.4000e-004	5.0000e-005	5.2149
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	11.5323 / 7.27034	44.6140	0.3792	9.2900e-003	56.8639
Total		**49.8021**	**0.3797**	**9.3400e-003**	**62.0788**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 2.10654	4.1505	3.5000e-004	4.0000e-005	4.1719
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	9.22581 / 5.81627	35.6912	0.3034	7.4300e-003	45.4911
Total		**39.8417**	**0.3037**	**7.4700e-003**	**49.6630**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	31.6133	1.8683	0.0000	78.3206
Unmitigated	42.1511	2.4911	0.0000	104.4275

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.19	0.0386	2.2800e-003	0.0000	0.0956
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	207.46	42.1125	2.4888	0.0000	104.3320
Total		**42.1511**	**2.4911**	**0.0000**	**104.4275**

Attachment: Appendix A - Air Quality GHG Report [Revision 1] (5660 : TTM and CUP for PUD for 177

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.1425	0.0289	1.7100e-003	0.0000	0.0717
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	155.595	31.5844	1.8666	0.0000	78.2490
Total		**31.6133**	**1.8683**	**0.0000**	**78.3206**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix B

Blasting Emissions Calculations

Drilling and Blasting

Blast Parameters

Area/Blast (SF)	Hole Spacing (ft)	Hole Diamter (in)	Hole Depth (ft)	Holes/ Blast	Density ANFO (lb/CF)	ANFO/Hole (lb)	Tons ANFO/ Blast
30000	15	4	15	133	51.19	67.008	4.467

Blast Frequency

Drill Rigs	Days Drilling	blasts/ day	blasts/ month	blasts/ year
2	4.2	1	4	8

Fugitive Dust

Source	PM10 EF Drilling (lb/hole)	PM2.5 EF Drilling (lb/hole)	Drilling Control Efficiency	PM10 EF Blasting (lb/blast)	PM2.5 EF Blasting (lb/blast)	PM10 (lb/day)	PM10 (TPY)	PM2.5 (lb/day)	PM2.5 (TPY)
Blasting	-	-	-	37.8280	2.1824	37.83	0.1513	2.18	0.0087
Drilling	0.65	0.12	75%	-	-	5.20	0.0867	0.96	0.0160
					Total	43.03	0.2380	3.14	0.0248

Notes:

1. Drilling emissions Factor Source: AP-42 5th Edition, Section 11.9, Table 11.9-4, October 1998. Assumes PM10 = TSP/2 = 1.3 lbs/hole / 2 = 0.65 lb/hole.
2. Drilling emissions factor for PM2.5 is calculated based on a similar mechanical process for aggreagte roock crushing. The emission factors for tertiary rock crushing will be used, based on AP-42 11.19.2, Table 11.19.2-2, Final Section, updated August 2004. The tertiary crushing emission factor for PM10 is 0.00054 lb/ton and the emissions factor for PM2.5 us 0.00010 lb/ton. The ratio of PM2.5 to PM10 is 0.00010/0.00054 = 0.185. Since the PM10 emission factor is estimated to be 0.65 lb/hole (see note 1), the emission factor for PM2.5 is estimated to be 0.65 lb/hole x 0.185 = 0.12 lb/hole.
3. Drilling Control Efficiency estimated to be between 63% and 88%, based on drill rotoclone or similar dust shroud device. Assumed midpoint of range reported.
4. Blasting emissions factors from AP-42 5th Edition, Section 11.9, Table 11.9-1. Also referenced Appendix E.2 of Background document to AP-42 5th Edition, Section 11.9:

   PM10 EF = $0.000014(A)^{1.5}(0.52)$, where A = horizontal area in ft2 with a scaling factor for ≤10um of 0.52
   PM2.5 EF = $0.000014(A)^{1.5}(0.03)$, where A = horizontal area in ft2 with a scaling factor for ≤2.5um of 0.03
5. Daily drilling emissions based on ability to drill two holes per hour per drill rig for up to 8 hours per day.

Blasting Gases - ANFO Emission Factors

CO EF (lb/ton)	NOX EF (lb/ton)	SOx EF (lb/ton)	CO2 EF (lb/ton)	CH4 EF (lb/ton)	N2O EF (lb/ton)
67	17	2	566	0.02	0.005

Blasting Gases - ANFO Emission Criteria Pollutants

CO (lb/day)	CO (TPY)	NOX (lb/day)	NOX (TPY)	SOX (lb/yr)	SOX (TPX)
299.30	1.20	75.94	0.30	8.93	0.04

Blasting Gases - ANFO Emission Greenhouse Gases

CO2 (lb/day)	CO2 (TPY)	CH4 (lb/day)	CH4 (TPY)	N2O (lb/day)	N2O (TPY)	Total CO2e (MT/year)
2,528.42	10.1137	0.09	0.0004	0.0223	0.1787	64.226

Notes:

1. Emission Factor Source: AP-42 5th Edition, Section 13.3, Table 13.3-1, February 1980, ND = no data. Uncontrolled CO2, CH4, and N2O emissions are calculated using the emission factors of 73.96 kg/MMBtu, $3*10^{-3}$ kg/MMBtu, and $6*10^{-4}$ kg/MMBtu, respectively, from 40 CFR 98, Tables C-1 and C-2 for distillate fuel oil No. 2. A diesel fuel oil to ammonium nitrate ratio of 9% and a diesel heating value of 19,300 Btu/pound of diesel fuel were used to express the CO2, CH4, and N2O emission factors in terms of lb/ton of ANFO.

This page intentionally left blank

Appendix C

Title 24 Solar Requirement Calculations

TTM 38123 Solar Panel Requirements

Factors for Climate Zone 10	
A	0.627
B	1.41
CF	20%

	DU	Total SF	Garage SF	Conditioned Space	kW	kWhr/year
Total	177.0	337,494.8	70,800.0	266,694.8	416.8	730,211.9

Notes:

1. Calculations based on 2019 Title 24 Residential Compliance Manual for new residential buildings with 3 or fewer residential floors.
2. Factors are for Western Riverside County where A is the climate zone 10 adjustment factor, B is the climate zone 10 dwelling unit factor, and CF is the capacity factor which accounts for climate, daylight hours, roof pitch and orientation, and transmission loss.
3. Garage area based on typical 400 SF 2-car garage.
4. Solar power output requirement is calculated by 2019 Title 24 Residential Compliance Manual Equation 7-1:
   kW = (CFA X A) / 1000 + (DU X B).
5. Annual solar energy generated is calculated by:
   kWhr/year = Power Output (kW) x 24 hours/day x 365 days/year x CF.

Tentative Tract Map 38123

General Biological Resources Assessment

October 2021 | 00239.00028.001

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road
Suite 150
Irvine, CA 92618

This page intentionally left blank

Tentative Tract Map 38123

General Biological Resources Assessment

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road
Suite 150
Irvine, CA 92618

October 2021 | 00239.00028.001

This page intentionally left blank

TABLE OF CONTENTS

Section **Page**

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS (cont.)

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF FIGURES

No. **Title** **Follows Page**

LIST OF TABLES

No. **Title** **Page**

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

ACRONYMS AND ABBREVIATIONS

AMSL	Above Mean Sea Level
BUOW	Burrowing Owl
CESA	California Endangered Species Act
CASSA	Criteria Area Species Survey Area
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFG	California Fish and Game
City	City of Moreno Valley
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	County of Riverside
CRPR	California Rare Plant Rank
CWA	Clean Water Act
DBESP	Determination of Biological Equivalent or Superior Preservation
Dudek	Dudek & Associates
FESA	Federal Endangered Species Act
HANS	Habitat Acquisition and Negotiation Strategy
HCP	Habitat Conservation Plan
HELIX	HELIX Environmental Planning, Inc.
LDMF	Local Development Mitigation Fee
MBTA	Migratory Bird Treaty Act
MCV	Manual of California Vegetation
MSHCP	Western Riverside County Multiple Species Habitat Conservation Plan
NEPSSA	Narrow Endemic Plant Species Survey Area
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
OHWM	Ordinary High Water Mark
Project	Tentative Tract Map 38123 Project
RCA	Western Riverside County Regional Conservation Authority
RCHCA	Riverside County Habitat Conservation Authority
ROW	Right-of-Way
RWQCB	Regional Water Quality Control Board

ACRONYMS AND ABBREVIATIONS (cont.)

S	State
SKR	Stephens' kangaroo rat
SSC	Species of Special Concern
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Survey

This page intentionally left blank

SUMMARY

The Tentative Tract Map 38123 Project (project) is located in the City of Moreno Valley in western Riverside County, California. The proposed project consists of a residential tract with 173 single-family homes. Site development would include the grading and construction of single-family residential lots, a water quality basin, an open space park, underground utilities, and off-site street and sewer improvements within the paved right-of-way. The 40.4-acre study area (33.4 acres on-site, 7.0 acres off-site) is located within the Reche Canyon/Badlands Area Plan of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The study area is not located within or adjacent to an MSHCP Criteria Area or an MSHCP Conservation Area. The study area is located within the MSHCP Burrowing Owl (*Athene cunicularia*; BUOW) Survey Area. HELIX Environmental Planning, Inc. conducted a general biological survey, including vegetation mapping and a general habitat assessment; dry season focused survey for fairy shrimp; focused BUOW surveys; a jurisdictional assessment; and an MSHCP Riparian/Riverine Areas and Vernal Pool resource assessment.

The study area contains five vegetation communities, including non-native grassland, developed areas, disturbed areas, non-native vegetation, and rock outcrops. No BUOW or BUOW sign were observed during focused surveys. The study area also supports suitable habitat for nesting migratory bird species. The study area does not support sensitive plant communities, jurisdictional resources, or MSHCP Riparian/Riverine Areas or Vernal Pool habitat. Dry season fairy shrimp surveys identified *Branchinecta* sp. eggs in 23 of the 32 sampled depressional areas on the project site. Wet season sampling will further inform which Branchinecta species are present within the sampled depressional area. Wet season fairy shrimp surveys are currently in progress and will be completed in 2021/2022. These depressional areas are not considered Riparian/Riverine Areas or Vernal Pools since vegetation was not present, and wetland indicators were not observed.

The entire 33.4-acre project site would be developed. Of the 7.0-acre off-site area, 6.3 acres would be permanently impacted (mostly consisting of existing paved right-of-way) and 0.7 acre would be temporarily impacted to accommodate over-excavation during project construction. Potential significant impacts were identified for BUOW (if present during the 30-day pre-construction survey), nesting bird species, and federally listed fairy shrimp species (if observed during wet season surveys). The project is required to comply with regulations of the MSHCP and Habitat Conservation Plan for Stephens' kangaroo rat (*Dipodomys stephensi*; SKR).

Measures related to the following topics are proposed herein to fully mitigate potential impacts of the project: BUOW, migratory nesting bird species, federally listed fairy shrimp species, compliance with MSHCP landscaping restrictions, and payment of MSHCP and SKR fees. Successful implementation of these measures would mitigate potential impacts to MSHCP resources to below a level of significance.

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

This page intentionally left blank

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report provides the City of Moreno Valley (City; California Environmental Quality Act [CEQA] lead agency), resource agencies, and the public with current biological data to satisfy review of the proposed Tentative Tract Map 38123 Project (project) located in the City of Moreno Valley (City), Riverside County, California. The purpose of this report is to document the existing biological conditions on and in the immediate vicinity of the study area and provide an analysis of potential impacts to sensitive biological resources with respect to local, state, and federal policy. This report provides the biological resources technical documentation necessary for project review under CEQA by the City and demonstrates project consistency with the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP; Dudek and Associates [Dudek] 2003).

1.2 STUDY AREA LOCATION

The approximately 33.4-acre project site is located in the City of Moreno Valley in western Riverside County, California, and is generally located south of State Route 60 and east of Interstate 215 (Figure 1, *Regional Location*). The project site is located within Township 3 South, Range 3 West, Section 9 on the U.S. Geological Survey (USGS) 7.5-minute Sunnymead quadrangle map (Figure 2, *USGS Topography*). Specifically, the project site is located at the northeast intersection of Alessandro Boulevard and Lasselle Street (Figure 3, *Aerial Photograph*). The project site comprises four parcels with Assessor's Parcel Numbers 487-470-0025 and -0028 and 487-574-001 and -002.

The project also comprises 7.0 acres of off-site areas within the existing paved right-of-way (ROW) along Alessandro Boulevard, Darwin Drive, Bay Avenue, and Lasselle Street (Figure 3). "Study area" is used throughout this report to collectively refer to the project site and off-site areas.

1.3 PROJECT DESCRIPTION

The proposed project consists of a residential tract with 173 single-family homes (Figure 4, *Site Plan*). Site development would include the grading and construction of single-family residential lots, a water quality basin, an open space park, underground utilities, and off-site street and sewer improvements. The vacant lot in the southeast corner of Alessandro Boulevard and Lasselle Street is not a part of the project and will be used as a future commercial site. Vehicular access to the project would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. A series of internal driveways would provide access throughout the development and to the residences.

2.0 METHODS

Project evaluation included a review of project plans; a literature review of biological resources occurring on the study area and surrounding vicinity; a general biological survey, including vegetation mapping and a general habitat assessment; focused surveys for burrowing owl (*Athene cunicularia*; BUOW); dry season fairy shrimp surveys; a jurisdictional assessment; and an MSHCP Riparian/Riverine Areas and Vernal Pool resource assessment. The methods used to evaluate the biological resources present on the study area are discussed in this section.

2.1 NOMENCLATURE

Nomenclature for this report follows Baldwin et al. (2012) for plants and the MSHCP (Dudek 2003) for vegetation community classifications, with additional vegetation community information taken from Manual of California Vegetation, Second Edition (MCV; Sawyer et al. 2009). Animal nomenclature follows Emmel and Emmel (1973) for butterflies, California Herps (2021) for reptiles and amphibians, American Ornithologists' Union (2020 for birds, and Baker et al. (2003) for mammals. Rare plant and sensitive animal statuses are from the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (2021) and the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2021a). Rare plant species' habitats and flowering periods are from the Jepson Manual (Baldwin et al. 2012), MSHCP (Dudek 2003), CNPS (2021), and CNDDB (CDFW 2021a). Soil classifications were obtained from the Natural Resources Conservation Service's (NRCS) Web Soil Survey (2021).

2.2 LITERATURE REVIEW

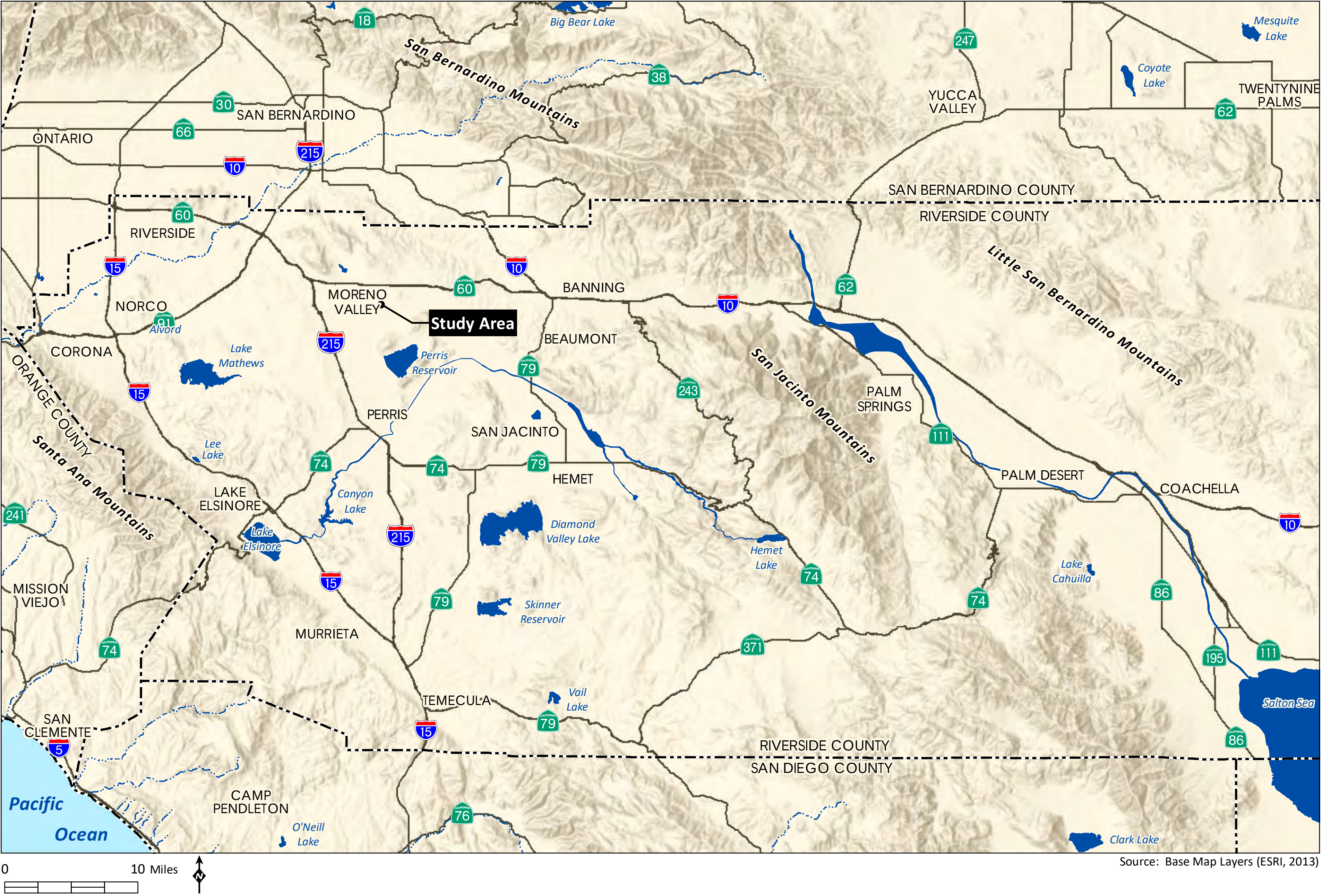
Prior to conducting the site visit, HELIX Environmental Planning, Inc. (HELIX) reviewed regional planning documents, Google Earth aerials (2021), Web Soil Survey (Natural Resources Conservation Service [NRCS] 2021), and sensitive species database records, including the Inventory of Rare and Endangered Plants of California (California Native Plant Society [CNPS] 2021), CNDDB (CDFW 2021a), U.S. Fish and Wildlife Service's (USFWS) critical habitat maps (2021a). A one-quadrangle database search was conducted on CNDDB and CNPS, which included the Sunnymead quadrangle. In addition, the MSHCP (Dudek 2003) and the Regional Conservation Authority's MSHCP Information Tool (Western Riverside County Regional Conservation Authority 2021) were consulted to determine project compliance with the MSHCP.

2.3 FIELD SURVEYS

Field surveys were conducted to document the existing condition of the study area and surrounding lands. A general biological survey and vegetation mapping was completed in December 2020, during which dominant plant species were noted. Focused BUOW surveys were conducted between April and August 2021. A dry season survey was conducted for federally listed fairy shrimp species in July 2021. A jurisdictional assessment was conducted in December 2020 to determine if resources are present under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and/or CDFW. A habitat assessment was conducted on the study area in December 2020 to determine habitat suitability for rare plant and animal species in addition to MSHCP Riparian/Riverine Area Species.

A list of plant and animal species observed and/or detected during the field surveys are provided as Appendix A, *Plant Species Observed*, and Appendix B, *Animal Species Observed and/or Detected*. Noted animal species were identified by direct observation, vocalizations, or the observance of scat, tracks, or other signs. However, the list of animal species identified is not necessarily a comprehensive account of all species that use the study area, as species that are nocturnal, secretive, or seasonally restricted may not have been observed.

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Source: Base Map Layers (ESRI, 2013)

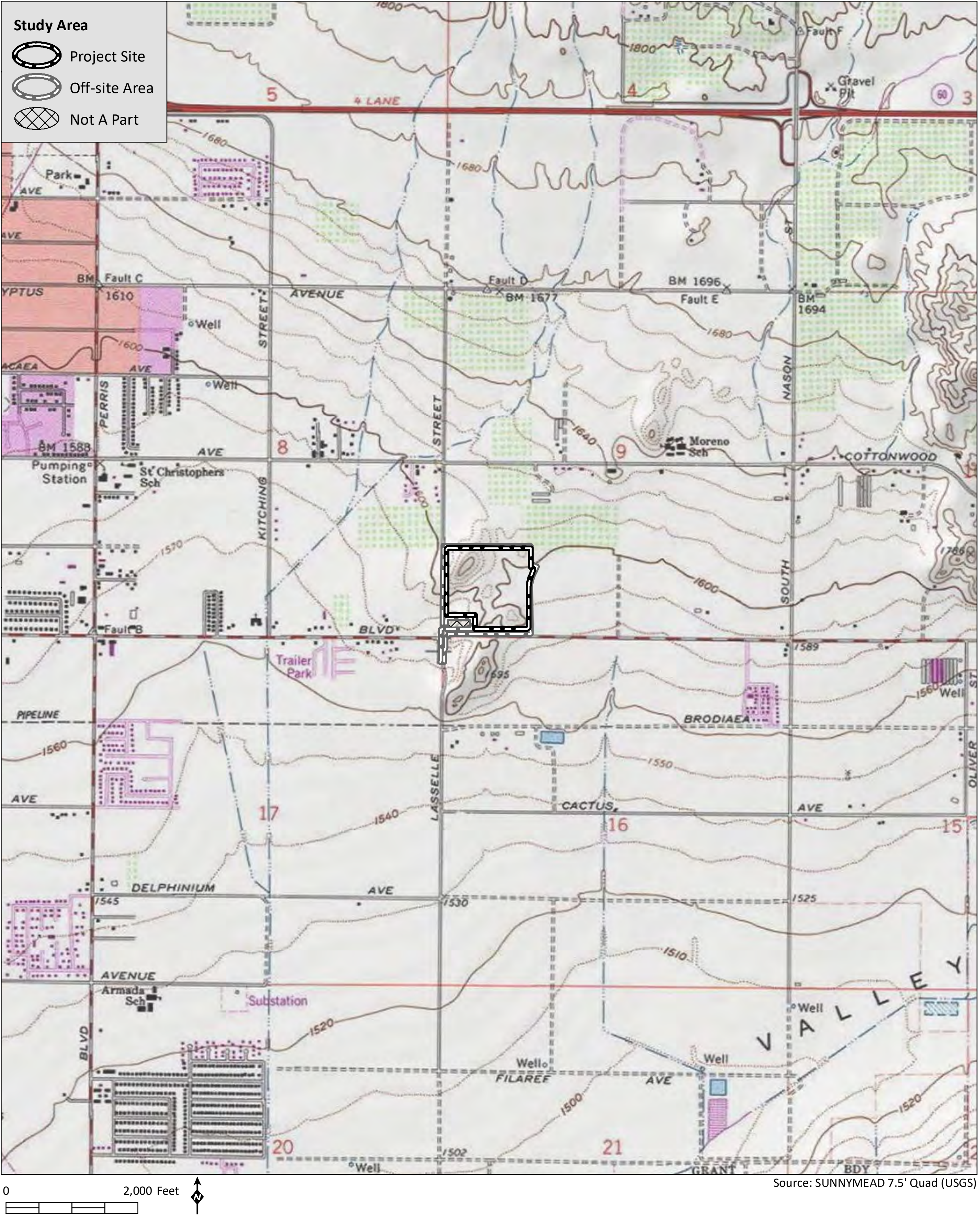
I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig1_Regional.mxd 00239.28.1 10/11/2021 - SAB

HELIX
Environmental Planning

Regional Location

Figure 1

Tentative Tract Map 38123



Source: SUNNYMEAD 7.5' Quad (USGS)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig2_USGS.mxd 00239.28.1 10/19/2021 - SAB

HELIX
Environmental Planning

USGS Topography

Figure 2

Tentative Tract Map 38123

Source: Aerial (Maxar, 2019)

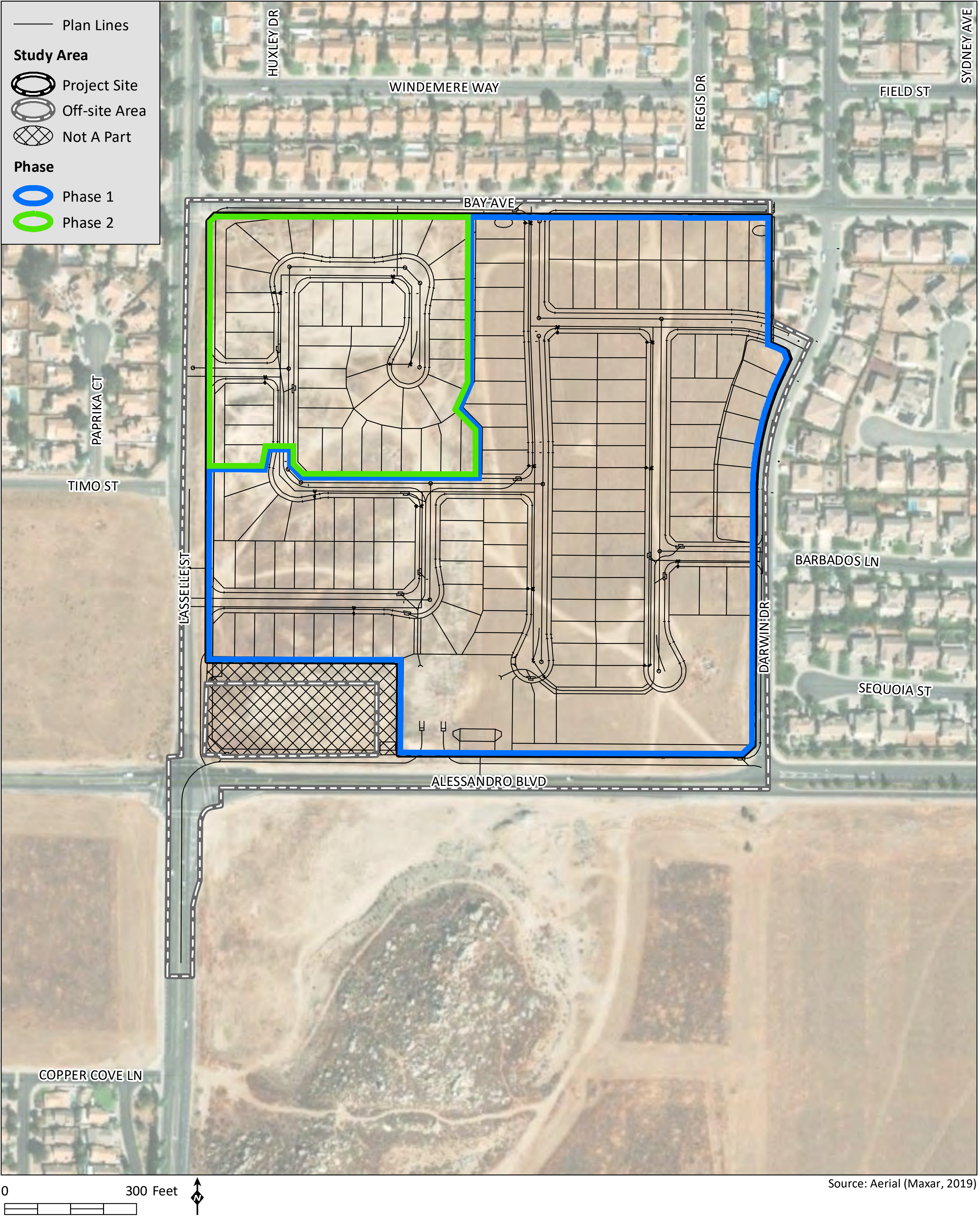
I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig3_Aerial.mxd 00239.28.1 10/19/2021 - SAB

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

HELIX
Environmental Planning

Aerial Photograph

Figure 3



Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig4_SitePlan.mxd 00239.28.1 10/19/2021 - SAB

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

HELIX
Environmental Planning

Site Plan

Figure 4

2.3.1 General Biological Survey

A general biological survey of the study area was conducted by HELIX Biologist Lauren Singleton on December 15, 2020, in accordance with vegetation community classification described in Section 2.1.3 of the MSHCP (Dudek 2003), and with additional information from MCV (Sawyer et al. 2009) and Oberbauer (2008). Vegetation was mapped on a 175-foot scale (1 inch = 175 feet) aerial photograph of the study area. Vegetation communities and land uses were mapped by HELIX to one-tenth of an acre (0.1 acre). The entire site was surveyed on foot with the aid of binoculars. Representative photographs of the site were taken, with select photographs included in this report as Appendix C, *Site Photographs*. Plant and animal species observed or otherwise detected were recorded in field notebooks. Animal identifications were made in the field by direct, visual observation or indirectly by detection of calls, burrows, tracks, or scat. Plant identifications were made in the field or in the lab through comparison with voucher specimens or photographs.

2.3.2 Focused Species Surveys

2.3.2.1 Fairy Shrimp

The project site supports 32 depressional features, which are mostly concentrated in the northwest portion of the project site. These depressional areas may provide suitable habitat for federally listed fairy shrimp species. No depressional features were noted within off-site areas. HELIX permitted biologist Amy Mattson (Permit TE778195-14) conducted the dry season sampling in accordance with USFWS protocol (USFWS 2017) on July 22, 2021. Ms. Mattson was assisted by HELIX biologist Mandy Mathews (supervised individual). Dry season sampling methods are detailed in Appendix D, *Dry Season Fairy Shrimp Focused Survey Report*. HELIX is currently conducting wet season surveys for listed fairy shrimp species in accordance with USFWS survey protocol for large brachiopods (USFWS 2017). The wet season survey results will be summarized in a separate focused survey report once the surveys are completed.

2.3.2.2 Burrowing Owl

The study area is located within an MSHCP BUOW Survey Area. In accordance with the County's survey protocol, a Step I Habitat Assessment was conducted on the study area and within a 150-meter (approximately 500-foot) buffer zone around the periphery of the study area (survey area; County of Riverside [County] 2006). Ms. Singleton completed the habitat assessment on December 15, 2020, during which potential suitable habitat for BUOW was observed.

After completing the habitat assessment, Step II surveys were conducted within the survey area. Step II surveys, which consist of a focused burrow survey (Part A) and four focused BUOW surveys (Part B), were conducted to determine whether the survey area supports suitable burrows and/or BUOWs. The focused burrow survey was conducted concurrently with the first focused BUOW survey. Since suitable burrows were observed within the survey area, three additional focused BUOW surveys were conducted. The biologist walked transects spaced no greater than 30 meters apart (approximately 100 feet) to allow for 100 percent visual coverage of all suitable habitat within the survey area. The biologist walked slowly and methodically, closely checking habitat for suitable burrows, BUOW diagnostic sign (e.g., molted feathers, pellets/castings, or whitewash at or near a burrow entrance), and individual BUOWs. Inaccessible areas of the survey area were visually assessed using binoculars. The focused burrow survey and four BUOW surveys were conducted by HELIX Biologists Matthew Dimson, Ryan

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Fitch, Jessica Lee, and Daniel Torres between April 2 and August 6, 2021. The BUOW focused survey methods are detailed in Appendix E, *BUOW Focused Survey Report*.

2.3.3 Jurisdictional Assessment

Prior to beginning fieldwork, 175-foot scale (1 inch = 175 feet) aerial photographs, 175-foot scale (1 inch = 175 feet) topographic maps, USGS quadrangle maps, and National Wetlands Inventory maps (USFWS 2021b) were reviewed to assist in determining the location of potential jurisdictional waters within the study area. Ms. Singleton conducted the jurisdictional assessment on December 15, 2020. The assessment was conducted to identify jurisdictional waters potentially subject to USACE jurisdiction pursuant to Section 404 of the Clean Water Act (CWA); jurisdictional waters potentially subject to RWQCB jurisdiction pursuant to Section 401 of the CWA and/or State Porter-Cologne Water Quality Control Act; and streambed habitats potentially subject to CDFW jurisdiction pursuant to Sections 1600 *et seq.* of the California Fish and Game (CFG) Code. Data collection was targeted in areas that were deemed to have the potential to support jurisdictional resources, such as the presence of an ordinary high water mark (OHWM), the presence of a bed/bank and streambed associated vegetation, and/or other surface indications of streambed hydrology.

2.3.4 Riparian/Riverine Areas and Vernal Pool Habitat Assessment

In accordance with the MSHCP, a Riparian/Riverine Areas and Vernal Pool habitat assessment was conducted by Ms. Singleton on December 15, 2020. This habitat assessment was conducted concurrently with the jurisdictional assessment. The identification of Riparian/Riverine Areas is based on the potential for the habitat to support, or be tributary to habitat that support, Riparian/Riverine Covered Species identified in MSHCP Section 6.1.2.

3.0 RESULTS

3.1 ENVIRONMENTAL SETTING

The study area consists of undeveloped land dominated by non-native herbaceous species with some rock outcrops in the southeastern and northwestern portions. There is a network of dirt roads that run throughout the study area, and the western portion is heavily disturbed due to frequent off-road vehicle use. The study area also includes the existing paved roads associated with Alessandro Boulevard, Darwin Drive, Bay Avenue, and Lasselle Street. The study area does not support any jurisdictional features or MSHCP Riparian/Riverine Areas or Vernal Pool resources. The study area is located in an urbanized area of the City and is bounded by residential development to the north, northwest, and east and by existing roads on all sides. Undeveloped land is located to the southwest and south of the study area.

3.2 TOPOGRAPHY AND SOILS

The topography of the study area is mostly flat, with elevations ranging from approximately 1,567 feet (478 meters) above mean sea level (AMSL) within the western portion of the off-site area along Alessandro Boulevard to a high of approximately 1,621 feet (540 meters) AMSL along the northern boundary.

The MSHCP lists nine sensitive soil types that occur within the Plan Area (Dudek 2003). None of these soil types are mapped within the study area. Three soil types were mapped within the project site, with the majority of the study area dominated by Vista coarse sandy loam (8 to 15 percent slopes, eroded; NRCS 2021). The other two soil types include Cieneba sandy loam (8 to 15 percent slopes, eroded; 15 to 50 percent slopes, eroded) and Ramona sandy loam (2 to 5 percent slopes, eroded; and 5 to 8 percent slopes, eroded;). The Vista soil component in the central portion of the study area consists of well-drained soils and are associated with hills and backslopes. The Cieneba soil component within the southeastern and northwestern portions of the study area is somewhat excessively drained and is associated with hills and backslopes. The Ramona soil component within the northeastern and southwestern portions of the study area is well-drained and is associated with alluvial fans and terraces. The off-site areas consist of an existing paved road and do not support native soils.

3.3 VEGETATION COMMUNITIES

Five vegetation communities and land uses were mapped on the study area, including non-native grassland, developed, disturbed, non-native vegetation, and rock outcrop (Table 1, *Vegetation and Land Uses*; Figure 5, *Vegetation*). The CDFW CaCodes and Oberbauer Element Codes are provided in parentheses next to each community name in Table 1. A brief description of each vegetation community and land use mapped on the study area is provided below.

Table 1
VEGETATION AND LAND USES

MSHCP Vegetation Community Classification[1]		MCV/Oberbauer	Project Site (acres)[2]	Off-site (acres)[2]	TOTAL (acres)[2]
Collapsed	**Uncollapsed**				
Grassland	Non-native Grassland	Wild Oats and Annual Brome Grasslands (CaCode[3] 42.026.23)	6.9	1.3	**8.2**
Developed/ Disturbed Land	Developed (Residential)	Urban/Developed (O[4] 11300l)	0.1	3.3	**3.4**
	Disturbed (Residential)	Disturbed (O 11300)	8.8	1.9	**10.7**
	Non-native Vegetation (Exotic)	Upland Mustards (CaCode 42.011.05)	16.5	0.5	**17.0**
N/A	Rock Outcrop[5]	Rock Outcrop (O 64000)[6]	1.1	0.0	**1.1**
		TOTAL	**33.4**	**7.0**	**40.4**

[1] Collapsed and uncollapsed community classifications are terms from MSHCP Table 2-1.
[2] Acreages are rounded to the nearest tenth.
[3] CDFW CaCodes
[4] Oberbauer Element Code
[5] The MSHCP does not have a classification for rock outcrop.
[6] This community is classified as "Unvegetated Habitat" by Oberbauer

3.3.1 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, often associated with numerous species of showy-flowered native annual forbs. Characteristic species include oats (*Avena* spp.), brome grasses (*Bromus* spp.), and mustards (*Brassica* spp., short-pod mustard [*Hirschfeldia incana*]). Most of the annual introduced species within the non-native grassland originated from the Mediterranean region, an area with a long history of agriculture and a climate similar to California. Intensive grazing and agricultural practices combined with severe droughts in California contributed to the successful invasion and establishment of these species and the replacement of native grasslands with annual-dominated non-native grasslands (Jackson 1985).

The western half of the study area is dominated by non-native grassland, covering approximately 8.2 acres (6.9 acres on-site, 1.3 acres off-site). This plant community was dominated by red brome (*Bromus rubens*) and slender oat (*Avena barbata*). Other non-native species observed included Mediterraneangrass (*Schismus barbatus*) and short-pod mustard. Scattered amounts of native species were also observed, including annual bursage (*Ambrosia acanthicarpa*), common sandaster (*Corethrogyne filaginifolia*), slender buckwheat (*Eriogonum gracile*), and vinegar weed (*Trichostema lanceolatum*).

3.3.2 Developed

Developed land included under the Urban/Residential/Exotic classification in the MSHCP. Developed land is where permanent structures and/or pavement have been placed, which prevents the growth of vegetation, or where landscaping is clearly tended and maintained.

Developed land was observed in the northeastern corner of the project site and ROW within the off-site areas, totaling 3.4 acres (0.1 acre on-site, 3.3 acres off-site). The developed land included a paved portion of Bay Avenue right-of-way.

3.3.3 Disturbed

Disturbed land is included under the Urban/Residential/Exotic classification in the MSHCP. This land use includes land cleared of vegetation (e.g., dirt roads), land containing a preponderance of non-native plant species, such as ornamentals or ruderal exotic species, that take advantage of disturbance (previously cleared or abandoned landscaping), or land showing signs of past or present animal usage that removes any capability of providing viable habitat.

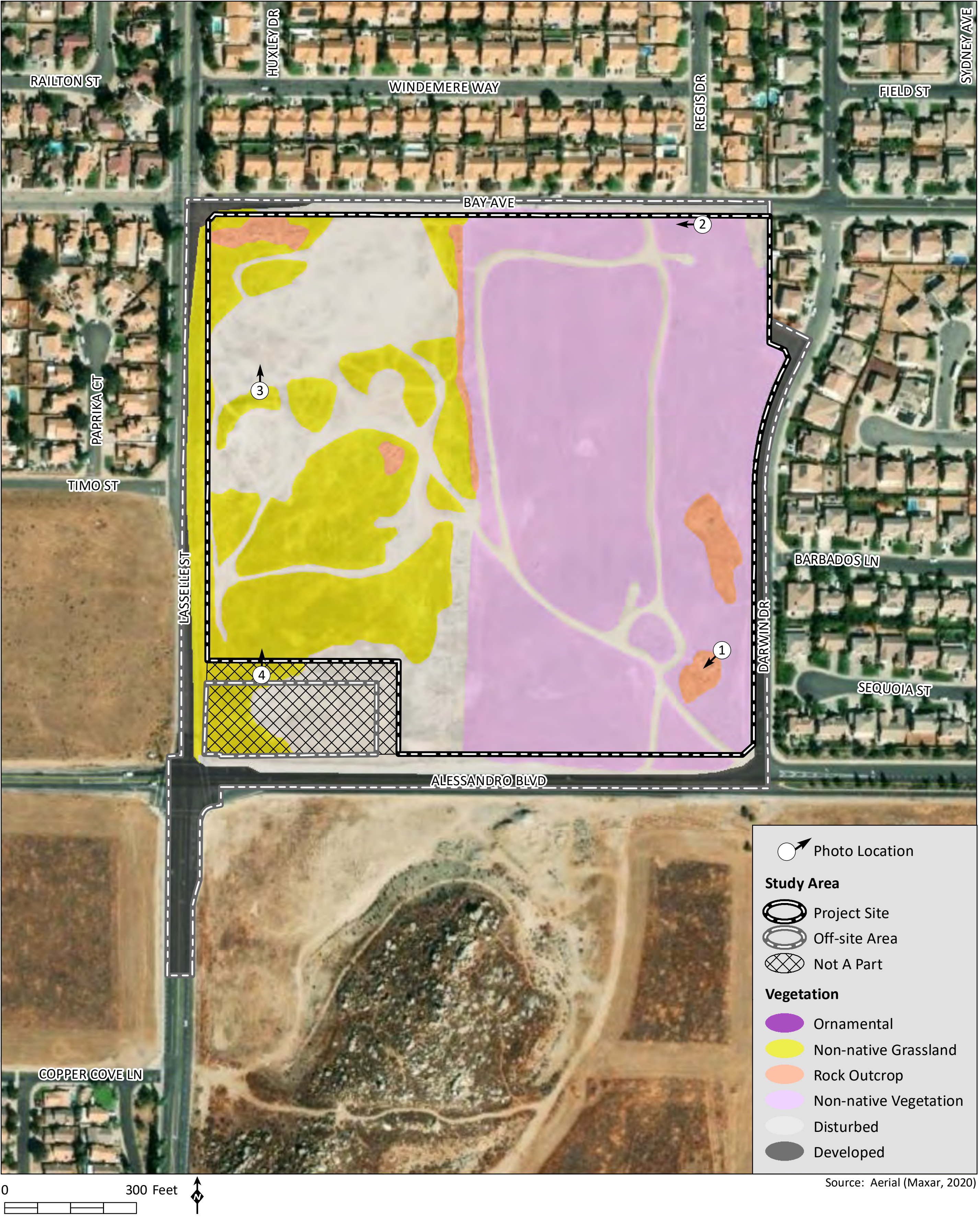
Disturbed land was observed throughout the study area, which totaled 10.7 acres (8.8 acres on-site, 1.9 acres off-site). These areas consisted of a network of dirt roads that were compact and mostly unvegetated due to frequent off-road vehicle use. Scattered non-native species were observed within the disturbed areas, including red brome, short-pod mustard, and slender oat.

3.3.4 Non-native Vegetation

Non-native vegetation is included under the Urban/Residential/Exotic classification in the MSHCP. This vegetation community is typically associated with land that has been heavily influenced by human activities, including areas adjacent to roads, manufactured slopes, and abandoned lots. Non-native vegetation areas are dominated by ornamental and exotic species that take advantage of previously cleared or abandoned landscaping or land showing signs of past or present animal usage that removes any capability of providing viable habitat.

Non-native vegetation is the predominant plant community observed on the study area, totaling 17.0 acres (16.5 acres on-site, 0.5 acre off-site) in the eastern half of the study area. This community mostly consisted of non-native short-pod mustard with Russian thistle (*Salsola tragus*) as the subdominant species. Other non-native species observed included Mediterraneangrass, red brome, and tocalote (*Centaurea melitensis*).

Tentative Tract Map 38123



Source: Aerial (Maxar, 2020)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig5_Veg.mxd ABC-01 10/19/2021 -XX

HELIX
Environmental Planning

Vegetation

Figure 5

3.3.5 Rock Outcrop

Rock outcrops are a distinctive feature composed of exposed bedrock or ancient surficial deposits, often found within shrublands, woodlands, and grasslands. The presence of this type of habitat within any given area will considerably enhance the local biodiversity by providing additional microhabitats. Furthermore, the physical properties of the rock itself help moderate microclimates and, thus, present cooler temperatures than the surrounding vegetated areas during the summer.

Rock outcrops totaled 1.1 acres (on-site only) and were observed in the northwestern and southeastern portions of the study area. This community comprised mostly outcrops with both non-native species (e.g., short-pod mustard) and native species (e.g., California sagebrush [*Artemisia californica*], phacelia [*Phacelia* sp.], slender buckwheat, and common sandaster) interspersed throughout the rock crevices.

3.4 PLANTS

HELIX identified 22 plant species on the study area during surveys to date, of which seven (32 percent) are non-native species (Appendix A). Although more native species were observed than non-native species, native species cover on the study area was very low and only consisted of a few scattered individuals. Non-native species cover was high, and the predominance of non-native species cover is indicative of the high degree of disturbance as a result of historical and current use of the study area.

3.5 ANIMALS

A total of 24 animal species were detected on the study area during surveys to date, including 2 invertebrate species, 20 bird species, and two mammal species (Appendix B).

3.6 SENSITIVE BIOLOGICAL RESOURCES

3.6.1 Rare Plant Species

Rare plant species are uncommon or limited in that they: (1) are only found in the western Riverside County region; (2) are a local representative of a species or association of species not otherwise found in the region; or (3) are severely depleted within their ranges or within the region. Rare plant species include those species listed by CNPS with a California Rare Plant Rank (CRPR) of 1, 2, or 3 (2021), federally and state listed endangered and threatened species, or those species that require additional surveys by the MSHCP (Dudek 2003). The MSHCP survey requirements for rare plant species are discussed below in Section 3.7. Since the study area does not occur within any MSHCP rare plant survey overlays, no focused surveys were warranted.

Five rare plant species were recorded within the Sunnymead quadrangle based on a database search conducted on CNDDB (CDFW 2021a) and CNPS (2021). These species are included in Appendix F, *Rare Plant Species Potential to Occur.* Of the five rare plant species recorded within the vicinity of the study area, three species were considered to have no potential to occur based on geographic range, elevation range, and/or lack of suitable habitat on the study area. Two species, Parry's spineflower (*Chorizanthe parryi* var. *parryi*) and San Bernardino aster (*Symphyotrichum defoliatum*), were determined to have a low potential to occur on the study area. Parry’s spineflower is a CRPR 1B.1 species and is conditionally covered under the MSHCP. San Bernardino aster is a CRPR 1B.2 species.

3.6.2 Sensitive Animal Species

Sensitive animal species include federally and state listed endangered and threatened, candidate species for listing by CDFW, and/or are species of special concern (SSC) pursuant to CDFW.

Twenty-one sensitive animal species were recorded within the Sunnymead quadrangle based on a database search conducted on CNDDB (CDFW 2021). These species are included in Appendix G, *Sensitive Animal Species Potential to Occur.* Of the 21 sensitive animal species recorded within the vicinity of the study area, 15 species were considered to have no potential to occur on the study area due to a lack of suitable habitat. The remaining six species are discussed in detail below. In addition, the on-site portion of the study area supports depressional areas that may be potentially suitable habitat for federally listed fairy shrimp species, which is also discussed below.

Three species were determined to have a low potential to occur on the study area based on the presence of low-quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity of the study area. These species include red-diamond rattlesnake (*Crotalus ruber*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), and western mastiff bat (*Eumops perotis californicus;* foraging only). These three species are State SSC. Red-diamond rattlesnake and San Diego black-tailed jackrabbit are covered species under the MSHCP.

Three species were determined to have a moderate potential to occur on the study area based on the presence of some habitat (although disturbed) and/or small extent of habitat. These species include BUOW, northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), and Stephens' kangaroo rat (*Dipodomys stephensi*; SKR). BUOW and northwestern San Diego pocket mouse are State SSC, while SKR is a federally endangered and State threatened species. Northwestern San Diego pocket mouse and SKR are covered species under the MSHCP and BUOW is a conditionally covered species. An evaluation of each sensitive animal species' potential to occur on the study area is provided in Appendix G.

The current statuses of fairy shrimp and BUOW on the study area are discussed in further detail below.

Fairy Shrimp

There are three species of fairy shrimp with potential to occur on the project site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*; Erikson and Belk 1999; CDFW 2021). Vernal pool fairy shrimp are federally listed as threatened, and Riverside fairy shrimp are federally listed as endangered, whereas the versatile fairy shrimp is relatively common and is not listed or considered sensitive. Species of the *Branchinecta* genus cannot be identified past genus level based on egg characteristics. For these species, a wet season fairy shrimp survey or authorized hatching is required to identify individuals to species level.

Dry season fairy shrimp surveys were completed in accordance with USFWS protocol (USFWS 2017), as previously described in Section 2.3.2.1 above. *Branchinecta* sp. eggs were observed in 23 of the 32 sampled depressional areas. Wet season sampling will further inform which Branchinecta species are present within the sampled features. No *Streptocephalus* sp. eggs were observed in the sampled features. The survey results are discussed in detail in a separate letter report, which is provided as Appendix D.

Burrowing Owl

Focused surveys for BUOW were conducted in accordance with the County's survey protocol (2006), as previously described in Section 2.3.2.2 above. No BUOWs or BUOW sign were observed within the survey area. Therefore, the study area does not currently support BUOWs. The survey results are discussed in detail in a separate letter report, which is provided as Appendix E.

3.6.3 Sensitive Vegetation Communities/Habitats

Sensitive vegetation communities/habitats are considered either rare within the region or sensitive by CDFW (CDFW 2021b). Communities are given a Global and State (S) ranking on a scale of 1 to 5. Communities afforded a rank of 5 are most common, while communities with a rank of 1 are considered highly periled. CDFW considers sensitive communities as those with a rank between S1 and S3.

The study area does not support any sensitive vegetation communities or habitats.

3.6.4 Habitat and Wildlife Corridor Evaluation

Wildlife corridors connect otherwise isolated pieces of habitat and allow movement or dispersal of plants and animals. Corridors can be local or regional in scale; their functions may vary temporally and spatially based on conditions and species presence. Local wildlife corridors allow access to resources such as food, water, and shelter within the framework of their daily routine. Animals use these corridors, which are often hillsides or tributary drainages, to move between different habitats. Regional corridors provide these functions over a larger scale and link two or more large habitat areas, allowing the dispersal of organisms and the consequent mixing of genes between populations.

The study area is not located within any MSHCP Linkages, which are areas within the Plan Area that are identified as having the potential to facilitate wildlife movement. The nearest linkage to the study area is Proposed Linkage 4, which is approximately four miles to the north of the study area and consists of upland habitat in Reche Canyon (Dudek 2003). The study area is not located within any linkages recognized by the South Coast Missing Linkages report (South Coast Wildlands 2008). The nearest linkage described by the South Coast Missing Linkages report is the San Bernardino–San Jacinto Connection, located approximately six miles to the east of the study area.

The study area does not directly connect to large blocks of habitat. The study area is bounded by residential development to the north, northwest, and east. The study area does not support any native communities and is dominated by non-native species, including red brome, slender oat, and short-pod mustard. Since the study area does not connect two or more large habitat areas, the study area is not considered a wildlife corridor.

The study area is disturbed from historical and surrounding human activities and supports minimal vegetative cover dominated by non-native species. Although the study area does not function as a wildlife corridor, it does support some shrubs and herbaceous ground cover that may provide limited opportunities for local wildlife movement or wildlife movement. Smaller mammals and reptiles that are adapted to human disturbance (e.g., California ground squirrel [*Otospermophilus beecheyi*], cottontail rabbits [*Sylvilagus* sp.], western fence lizard [*Sceloporus occidentalis*]) may use the study area for foraging and/or cover, while bird species may fly over existing development to access the study area for foraging and/or nesting. Some wildlife may use the study area for cover and/or foraging. Therefore, the study area may support some low-quality habitat for wildlife, but the study area does not function as a wildlife corridor since it does not connect two or more large blocks of habitat.

3.6.5 Jurisdictional Waters

Based on the results of the jurisdictional assessment, no jurisdictional features were observed on the study area. Streambed field indicators, such as an OHWM or the presence of a defined bed and bank, were not observed within the study area. Therefore, the study area does not support any waters of the U.S. under USACE jurisdiction or waters of the State under RWQCB and CDFW jurisdiction.

3.7 WESTERN RIVERSIDE COUNTY MSHCP CONSISTENCY ANALYSIS

3.7.1 Project Location within the MSHCP

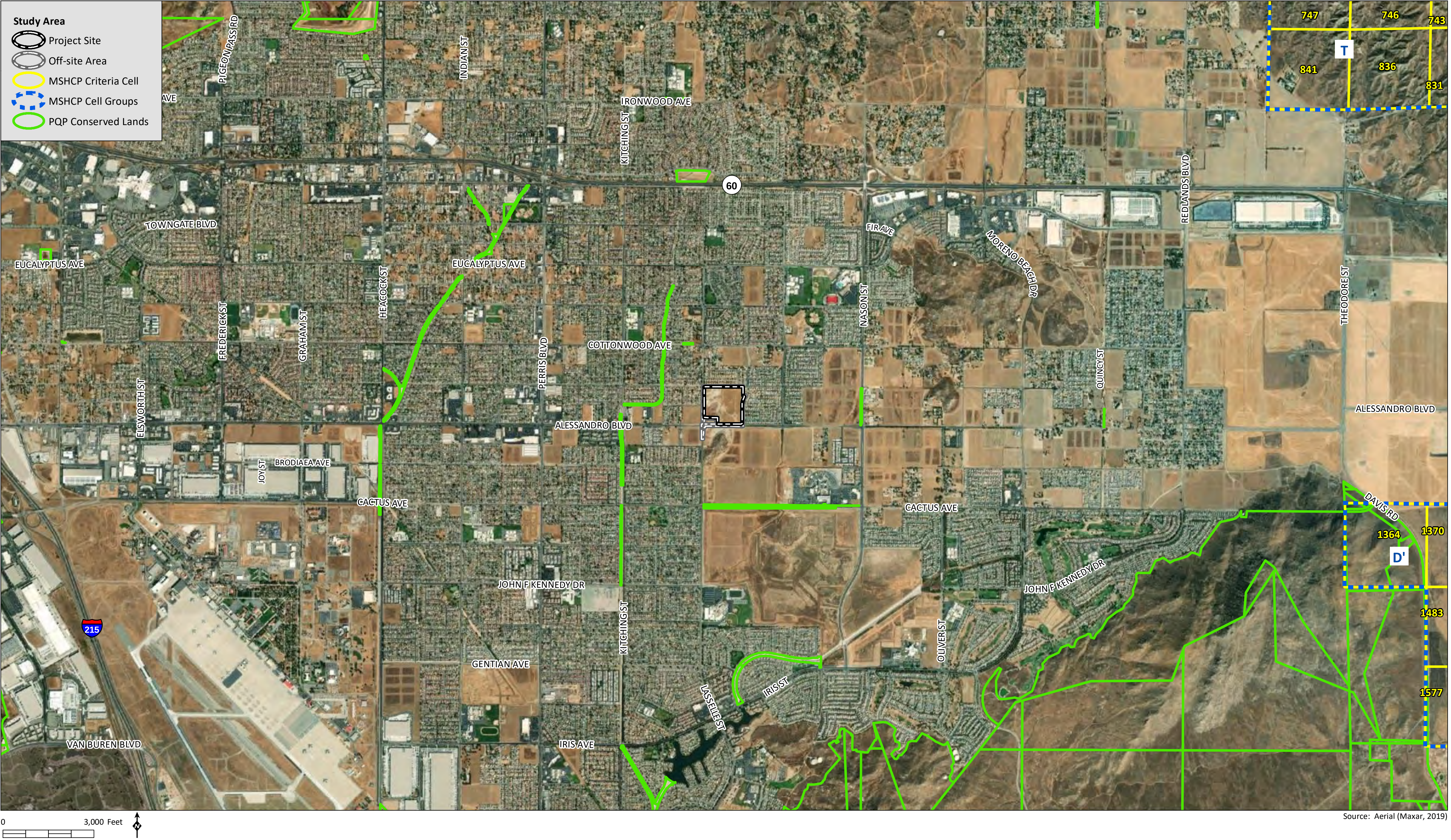
The MSHCP Plan Area is divided into 16 Area Plans, within which 153,000 acres were identified as potential areas for conservation that would contribute to the overall existing MSHCP Conservation Area. The areas identified for conservation within the MSHCP Plan Area are called Criteria Areas and include Core Areas that support habitat for covered species and Linkages that provide a connection between Core Areas. The Criteria Areas are divided into 160-acre cells, which each have their own conservation goal. All projects within a cell or cell group are required to be accessed through the Habitat Acquisition and Negotiation Strategy (HANS) process to determine the amount of MSHCP conservation required. The HANS process aids in the acquisition of lands that will contribute to the assembly of the MSHCP Reserve.

As described in Section 2.1.2 of the MSHCP, the study area is located in the Riverside Lowlands bioregion, an area lying generally below 2,000 AMSL and characterized by Riversidean sage scrub and annual grasslands. The relatively arid climate is partly the result of the rain shadow cast by the Santa Ana Mountains. A high level of disturbance and urbanization are noted within this bioregion (Dudek 2003).

The study area is located within the Reche Canyon/Badlands Area Plan and is not located within or adjacent to an MSHCP Criteria Area; therefore, the study area is not subject to special conservation requirements that apply to cells and is not required to undergo the HANS process. The nearest criteria cells to the study area are Cell 841, which is located approximately four miles to the northeast, and Cell 1364, which is located approximately four miles to the southeast (Figure 6, *MSHCP Context*). The study area is not located within or directly adjacent to any MSHCP Conservation Areas. The study area is located approximately two miles to the southeast of Core H and 4.5 miles to the southwest of Core 3. Existing development separates the study area from MSHCP Conservation Areas.

3.7.2 Riparian/Riverine Areas and Vernal Pool Habitat Assessment (MSHCP Section 6.1.2)

The identification of MSHCP Riparian/Riverine Areas is based on the potential for the habitat to support, or be a tributary to habitat that supports, Riparian/Riverine Covered Species. Riparian/Riverine Covered Species are identified in MSHCP Section 6.1.2. The MSHCP defines Riparian/Riverine Areas as “lands which contain Habitat dominated by trees, shrubs, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year” (Dudek 2003). The MSHCP defines Vernal Pools as “seasonal wetlands



Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig6_MSHCP.mxd DRH-28 10/19/2021 - SAB

HELIX
Environmental Planning

MSHCP Context

Figure 6

that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season" (Dudek 2003). Artificially created features, except for those created intentionally to provide wetland habitat or resulting from the creation of open waters or alteration of natural stream courses, are not considered MSHCP Riparian/Riverine Areas or Vernal Pools.

In accordance with the MSHCP, a Riparian/Riverine Areas assessment was conducted by Lauren Singleton on December 15, 2020. The Riparian/Riverine Areas and Vernal Pool habitat assessment was conducted concurrently with the jurisdictional assessment. No MSHCP Riparian/Riverine Areas or Vernal Pools were identified within the study area. Although depressional areas were observed throughout the study area, these areas are not considered MSHCP Vernal Pools since wetland soil and vegetation indicators were not observed during the wetter portion of the growing season.

3.7.2.1 Riparian/Riverine Areas and Vernal Pool Species

Through the protection of Riparian/Riverine Areas and Vernal Pool habitats, the MSHCP aims to conserve several plant and animal species within the Plan Area. During the Riparian/Riverine Areas assessment discussed above, each plant and animal species listed in Section 6.1.2 of the MSHCP was evaluated to determine the potential to occur on the study area. Riparian/Riverine Areas and Vernal Pool species are discussed in detail below.

Plant Species

The MSHCP lists 23 rare plant species that have a potential to occur in Riparian/Riverine Areas and/or Vernal Pool habitats within the MSHCP Plan Area, which are listed below in Table 2, *MSHCP Riparian/Riverine Areas and Vernal Pool Plant Species*.

No MSHCP Riparian/Riverine Areas or Vernal Pool plant species are expected to occur on the study area based on the absence of drainage features and vernal pools.

Table 2
MSHCP RIPARIAN/RIVERINE AREAS AND VERNAL POOL PLANT SPECIES

Common Name	Scientific Name	Habitat
Brand's phacelia	*Phacelia stellaris*	Sandy washes and/or benches in alluvial flood plains.
California black walnut	*Juglans californica* var. *californica*	Open savannahs, creek beds, alluvial terraces, and north-facing slopes.
California Orcutt grass	*Orcuttia californica*	Vernal pools.
Coulter's matilija poppy	*Romneya coulteri*	Dry washes and canyons in chaparral and coastal sage scrub communities and disturbed areas.
Engelmann oak	*Quercus engelmannii*	Woodlands, mixed chaparral, and savannah grasslands.
Fish's milkwort	*Polygala cornuta* var. *fishiae*	Shaded, rocky places in canyons associated with woodlands and chaparral.

Common Name	Scientific Name	Habitat
graceful tarplant	*Holocarpha virgata* ssp. *elongata*	Coastal mesas and foothills with grassland habitats.
lemon lily	*Lilium parryi*	Moist montane meadows.
Mojave tarplant	*Deinandra mohavensis*	Drainages within arid montane chaparral.
mud nama	*Nama stenocarpum*	Marshes, swamps, lake margins, and riverbanks along muddy embankments.
ocellated Humboldt lily	*Lilium humboldtii* ssp. *ocellatum*	Shaded montane canyons.
Orcutt's brodiaea	*Brodiaea orcuttii*	Vernally moist grasslands and vernal pools; occasionally occurs along stream embankments within clay soils.
Parish's meadowfoam	*Limnanthes gracilis* var. *parishii*	Montane meadows with abundant annual and herbaceous perennials and lack of shrubs.
prostrate navarretia	*Navarretia prostrata*	Coastal sage scrub, valley and foothill grassland, and vernal pools.
San Diego button-celery	*Eryngium aristulatum* var. *parishii*	Vernal pools.
San Jacinto Valley crownscale	*Atriplex coronata* var. *notatior*	Highly alkaline and silty-clay soils associated with alkali sink scrub, alkali playa, vernal pool, and annual alkali grassland habitats.
San Miguel savory	*Clinopodium chandleri*	Coastal sage scrub, chaparral, cismontane woodland, riparian woodland, and valley and foothill grasslands.
Santa Ana River woolly-star	*Eriastrum densifolium* spp. *sanctorum*	Sandy soils on flood plains and terraces within coastal scrub and chaparral communities.
slender-horned spineflower	*Dodecahema leptoceras*	Sandy soil associated with alluvial scrub; is often found on stream terraces and banks.
smooth tarplant	*Centromadia pungens* ssp. *laevis*	Alkali scrubs, playas, and grasslands; riparian woodland and streams.
spreading navarretia	*Navarretia fossalis*	Vernal pools, depressions, and ditches.
thread-leaved brodiaea	*Brodiaea filifolia*	Clay soils in vernally moist grasslands and vernal pool periphery are typical locales.
vernal barley	*Hordeum intercedens*	Saline flats and depressions in grasslands or vernal pools.

Source: Dudek (2003).

Animal Species

The MSHCP lists 12 sensitive animal species that have a potential to occur in Riparian/Riverine Areas and/or Vernal Pools within the MSHCP Plan Area, which are provided in Table 3, *MSHCP Riparian/Riverine Areas and Vernal Pool Animal Species*. The MSHCP requires focused surveys to be conducted for projects that propose impacts to three invertebrate and three bird species, as described in detail below. The study area supports does not suitable habitat for any of the sensitive bird species listed below in Table 3.

Table 3
MSHCP RIPARIAN/RIVERINE AREAS AND VERNAL POOL ANIMAL SPECIES

Common Name	Scientific Name	Habitat
Riverside fairy shrimp	*Streptocephalus woottoni*	Deep vernal pools and other ephemeral basins that hold water for typically 30 or more days.
Santa Rosa Plateau fairy shrimp	*Linderiella santarosae*	Limited to vernal pools within the Santa Rosa Plateau.
vernal pool fairy shrimp	*Branchinecta lynchi*	Vernal pools and other ephemeral basins within patches of grassland and agriculture interspersed in coastal sage scrub and chaparral.
arroyo toad	*Anaxyrus californicus*	Washes and intermittent streams with open-canopy riparian forest.
California red-legged frog	*Rana aurora draytonii*	Perennial streams with dense, shrubby riparian vegetation.
mountain yellow-legged frog	*Rana muscosa*	Perennial waterways, often within open riparian vegetation.
Santa Ana sucker	*Catostomus santaanae*	Clear, cool perennial streams with loose sand, gravel, cobble, and boulders with algae, aquatic emergent vegetation, macroinvertebrates, and riparian vegetation.
bald eagle	*Haliaeetus leucocephalus*	Within close proximity to lakes or other water bodies.
least Bell's vireo	*Vireo bellii pusillus*	Well-developed riparian scrub, woodland, or forest.
peregrine falcon	*Falco peregrinus*	Generally, areas with cliffs or tall buildings near water where prey (shorebirds and ducks) is concentrated.
southwestern willow flycatcher	*Empidonax traillii extimus*	Breeds within thickets of willows or other riparian understory usually along streams, ponds, lakes, or canyons.
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	Extensive stands of mature riparian woodland.

Source: Dudek (2003).

Invertebrates

There are three sensitive fairy shrimp species that occur in the MSHCP Plan Area, including Riverside fairy shrimp, Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*), and vernal pool fairy shrimp. Vernal pool fairy shrimp occurs throughout the Central Valley and in several disjunct populations in Riverside County. This species exists in vernal pools and other ephemeral basins, often located in patches of grassland and agriculture interspersed in coastal sage scrub and chaparral. Riverside fairy shrimp occurs in Riverside, Orange, and San Diego Counties, as well as in northern Baja California, Mexico. This species is typically found in deeper vernal pools and other ephemeral basins that hold water for long periods of time (30 or more days). Santa Rosa Plateau fairy shrimp is limited to the Santa Rosa Plateau in Riverside County.

The project site supports 32 unvegetated depressional features, which are mostly concentrated in the northwest portion of the project site. These depressional areas may provide suitable habitat for federally listed fairy shrimp species. Dry season fairy shrimp surveys were completed in accordance with USFWS protocol (USFWS 2017), as previously described in Section 2.3.2.1 above. *Branchinecta* sp. eggs were observed in 23 of the 32 sampled depressional areas. Wet season sampling will further inform which Branchinecta species are present within the sampled features. No *Streptocephalus* sp. eggs were observed in the sampled features. The survey results are discussed in detail in a separate letter report, which is provided as Appendix D.

Birds

Riparian/Riverine Areas within the MSHCP Plan Area provide suitable habitat for sensitive bird species, such as least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), bald eagle (*Haliaeetus leucocephalus*), and peregrine falcon (*Falco peregrinus*). Typical habitat for least Bell's vireo consists of well-developed riparian scrub, woodland, or forest dominated by willows, mule fat, and Fremont cottonwood. Least Bell's vireo will also use small patches of trees adjacent to dense, riparian habitat. Southwestern willow flycatcher and western yellow-billed cuckoo require mature riparian forest with a stratified canopy and nearby water. Both the bald eagle and peregrine falcon occur primarily in and adjacent to open water habitats, with peregrine falcon occurring in riparian areas.

The MSHCP requires focused surveys to be conducted for projects that propose impacts to suitable habitat for least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo. The study area does not support suitable habitat for any sensitive bird species.

3.7.3 Narrow Endemic Plant Species Survey Area (MSHCP Section 6.1.3)

The MSHCP requires focused plant surveys to be conducted for projects located within a Narrow Endemic Plant Species Survey Area (NEPSSA). There are 14 narrow endemic plant species that are associated with 10 different NEPSSAs located throughout the MSHCP Plan Area (see Table 6-1 in the MSHCP). Prior to conducting focused surveys, a habitat assessment should be conducted to determine whether the study area supports suitable habitat for plant species listed for the NEPSSA species. Focused surveys for species listed for the NEPSSA should be conducted if suitable habitat is present. If focused surveys are positive, 90 percent of the property that supports habitat suitable for long-term conservation of the species must be avoided until conservation goals for the species are satisfied.

The study area is not within a NEPSSA. Therefore, focused NEPSSA surveys were not required.

3.7.4 Additional Survey Needs and Procedures (MSHCP Section 6.3.2)

The MSHCP requires additional surveys for projects that support suitable habitat for certain conditionally-covered species. The survey results provide species-specific information in order for the MSHCP to satisfy the Federal Endangered Species Act (FESA) issuance criteria. If focused surveys are positive for conditionally-covered species, 90 percent of the property that supports habitat suitable for long-term conservation of the species must be avoided until conservation goals for the species are satisfied. Additional survey requirements are discussed in detail below.

3.7.4.1 Criteria Area Species

Focused surveys for rare plant species must be conducted for projects located within a Criteria Area Species Survey Area (CASSA). There is a total of 13 criteria area species, which are associated with eight CASSAs located throughout the MSHCP Plan Area (see Table 6-1 in the MSHCP). Prior to conducting focused surveys, a habitat assessment should be conducted to determine whether the study area supports suitable habitat for plant species listed for the CASSA. If suitable habitat is present, focused surveys for species listed for the CASSA should be conducted.

The study area is not within a CASSA; therefore, focused CASSA surveys were not required.

3.7.4.2 Amphibian Species

Focused surveys for arroyo toad (*Bufo californicus*), California red-legged frog (*Rana draytonii*), and mountain yellow-legged frog (*Rana muscosa*) must be conducted for projects located within an Amphibian Species Survey Area.

The study area is not within the Amphibian Species Survey Area; therefore, focused surveys were not required.

3.7.4.3 Bird Species

The study area is located within the BUOW Survey Area. Therefore, BUOW focused surveys were required in accordance with the County's survey protocol (County 2006). As discussed in Section 3.6.2, BUOW or BUOW sign were not observed during the focused surveys.

3.7.4.4 Mammal Species

Focused surveys for Aguanga kangaroo rat (*Dipodomys merriami collinus*), San Bernardino kangaroo rat (*Dipodomys merriami parvus*), and Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) must be conducted for projects located within a Mammal Species Survey Area.

The study area is not within the Mammal Species Survey Area; therefore, focused surveys were not required.

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

4.0 REGIONAL AND REGULATORY CONTEXT

Biological resources located within the study area are subject to regulatory review by federal, state, and local agencies. Biological resources-related laws and regulations that apply to the project include the FESA, Migratory Bird Treaty Act (MBTA), CWA, California Endangered Species Act (CESA), and CFG Code.

4.1 FEDERAL REGULATIONS

4.1.1 Federal Endangered Species Act

Administered by the USFWS, the FESA provides the legal framework for the listing and protection of species (and their habitats) identified as being endangered or threatened with extinction. Actions that jeopardize endangered or threatened species and the habitats upon which they rely are considered a "take" under the ESA. Section 9(a) of the ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" and "harass" are further defined in federal regulations and case law to include actions that adversely impair or disrupt a listed species' behavioral patterns.

Sections 4(d), 7, and 10(a) of the FESA regulate actions that could jeopardize endangered or threatened species. Section 7 describes a process of federal interagency consultation for use when federal actions may adversely affect listed species. A biological assessment is required for any major construction activity if it may affect listed species. In this case, take can be authorized via a letter of biological opinion issued by the USFWS for non-marine related listed species issues. A Section 7 consultation is required when there is a nexus between federally listed species' use of the site and impacts to USACE jurisdictional areas. Section 10(a) allows issuance of permits for "incidental" take of endangered or threatened species. The term "incidental" applies if the taking of a listed species is incidental to and not the purpose of an otherwise lawful activity. The MSHCP is the Section 10(a) permit for western Riverside County, including the study area.

4.1.2 Federal Clean Water Act, Section 404

Federal wetland regulation (non-marine issues) is guided by the Rivers and Harbors Act of 1899 and the CWA. The Rivers and Harbors Act deals primarily with discharges into navigable waters, while the purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of all waters of the U.S. Permitting for projects filling waters of the U.S., including wetlands and vernal pools, is overseen by USACE under Section 404 of the CWA. Projects may be permitted on an individual basis or may be covered under one of several approved Nationwide Permits. Individual Permits are assessed individually based on the type of action, amount of fill, etc. Individual Permits typically require substantial time (often longer than six months) to review and approve, while Nationwide Permits are pre-approved if a project meets the appropriate conditions. A CWA Section 401 Water Quality Certification, which is administered by the State Water Resources Control Board, must be issued prior to any 404 Permit.

4.1.3 Migratory Bird Treaty Act

All migratory bird species that are native to the United States or its territories are protected under the Federal MBTA, as amended under the Migratory Bird Treaty Reform Act of 2004 (FR Doc. 05-5127). The

MBTA is generally protective of migratory birds but does not actually stipulate the type of protection required. In common practice, the MBTA is used to place restrictions on disturbance of active bird nests during the nesting season, which is generally defined as March 15 through August 31 for songbirds. In addition, the USFWS commonly places restrictions on disturbances allowed near active raptor nests. The raptor nesting season is generally defined as January 15 through August 31.

4.1.4 Critical Habitat

As described by the FESA, critical habitat is the geographic area occupied by a threatened or endangered species essential to species conservation that may require special management considerations or protection. Critical habitat also may include specific areas not occupied by the species, but that have been determined to be essential for species conservation.

Critical habitat does not occur on the study area. The nearest critical habitats to the study area include Spreading navarretia (*Navarretia fossalis*) critical habitat, which is approximately 5.5 miles to the southeast of the study area (USFWS 2021a).

4.2 STATE REGULATIONS

4.2.1 California Environmental Quality Act

Primary environmental legislation in California is found in CEQA and its implementing guidelines (State CEQA Guidelines), which require that projects with potential adverse effects (i.e., impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

4.2.2 California Endangered Species Act

The CESA is similar to the FESA in that it contains a process for the listing of species and regulating potential impacts to listed species. Section 2081 of the CESA authorizes the CDFW to enter into a memorandum of agreement for take of listed species for scientific, educational, or management purposes. The MSHCP is the regional 2081 for this portion of the County, which includes the study area. The golden eagle (*Aquila chrysaetos*) and white-tailed kite (*Elanus leucurus*) are considered state fully protected species. Fully protected species may not be taken or possessed at any time, and no state licenses or permits may be issued for their take except for collecting the species necessary for scientific research, and relocation of the bird species for the protection of livestock (Fish and Game Code Sections 3511, 4700, 5050, and 5515).

The Native Plant Protection Act (NPPA) enacted a process by which plants are listed as rare or endangered. The NPPA regulates the collection, transport, and commerce of plants that are listed. The CESA followed the NPPA and covers both plants and animals that are determined to be endangered or threatened with extinction. Plants listed as rare under NPPA were designated threatened under the CESA.

4.2.3 Protection of Raptor Species

Raptors (birds of prey) and owls and their active nests are protected by California Fish and Game Code Section 3503.5, which states that it is unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird unless authorized by the CDFW.

4.2.4 California Fish and Game Code, Section 1602

The California Fish and Game Code (Section 1600 et seq.) requires an agreement with the CDFW for projects affecting riparian and wetland habitats through the issuance of a Streambed Alteration Agreement.

4.3 LOCAL REGULATIONS

4.3.1 Multiple Species Habitat Conservation Plan Consistency

The MSHCP is a comprehensive multi-jurisdictional effort that includes Riverside County and multiple cities in western Riverside County. Rather than addressing sensitive species on an individual basis, the MSHCP focuses on the conservation of 146 species, proposing a reserve system of approximately 500,000 acres and a mechanism to fund and implement the reserve system (Dudek 2003). Most importantly, the MSHCP allows participating entities to issue take permits for listed species so that individual applicants need not seek their own permits from the USFWS and/or CDFW. The MSHCP was adopted on June 17, 2003, by the Riverside County Board of Supervisors. The Incidental Take Permit was issued by both the USFWS and CDFW on June 22, 2004. Section 3.7 above and Section 5.5 below demonstrate the project's consistency with the MSHCP.

4.3.2 Stephens' Kangaroo Rat Habitat Conservation Plan

The Habitat Conservation Plan (HCP) for SKR describes the conservation, mitigation, and monitoring measures that are implemented within core reserves (Riverside County Habitat Conservation Authority [RCHCA 1996]). Within the HCP, there are seven core reserves totaling 41,221 acres for conservation of SKR and associated habitat. The HCP provides a 30-year incidental take authorization for SKR on lands within its boundaries, which includes 533,954 acres within the County of Riverside and Cities of Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Perris, Riverside, and Temecula.

The study area is within the SKR HCP, but is not located within any of the core reserves. Therefore, the project is required to pay an SKR mitigation fee for incidental take authorization under the SKR HCP.

4.3.3 City Tree Replacement and Protection Guidelines

Section 9.17.030 (see E, F, and G) of the City's Municipal Code (tree measures) requires the following measures to be implemented for existing trees:

- Existing mature trees that cannot be preserved in-place shall be transplanted elsewhere on the site unless transplantation is infeasible due to the type or condition of the trees (see E7).
- Projects necessitating the removal of existing trees with four-inch or greater trunk diameters (calipers), shall be replaced at a three to one ratio, with minimum 24-inch box

size trees of the same species, or a minimum 36-inch box for a one to one replacement, where approved (see E8).

- No person shall remove, destroy, top, or disfigure a heritage tree within the City limits (see G2). A heritage tree is defined as:
    - any tree that defines the historical and cultural character of the city including older Palm and Olive trees, and/or any tree designated as such by official action;
    - trees with a 15-inch diameter measured 24 inches above ground level; or
    - trees that have reached a height of fifteen feet or greater.
- Removal of a heritage tree is permitted for the following reasons:
    - if the tree poses a dangerous or hazardous condition to people, structures, property, or another heritage tree (see G3);
    - if a tree is diseased, dying, or dead, and if a reasonable undertaking has occurred (see G4); or
    - if a tree is in the public or future right-of-way is permitted with the approval of the community development director and if a reasonable undertaking to preserve the tree had occurred (see G5).

5.0 PROJECT EFFECTS

This section describes potential direct and indirect impacts associated with the proposed project. Direct impacts immediately alter the affected biological resources such that those resources are eliminated temporarily or permanently. Indirect impacts consist of secondary effects of a project, including noise, decreased water quality (e.g., through sedimentation, urban contaminants, or fuel release), fugitive dust, colonization of non-native plant species, animal behavioral changes, and night lighting. The magnitude of an indirect impact can be the same as a direct impact; however, the effect usually takes a longer time to become apparent.

The significance of impacts to biological resources present or those with potential to occur was determined based upon the sensitivity of the resource and the extent of the anticipated impacts. For certain highly sensitive resources (e.g., a federally listed species), any impact would be significant. Conversely, other resources that are of low sensitivity (e.g., species with a large, locally stable population in the County but declining elsewhere) could sustain some impact with a less than significant effect.

According to Appendix G of the CEQA Guidelines, project impacts to biological resources would be considered significant if they would:

(a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFW or USFWS.

(b) Have a substantial adverse effect on any riparian habitat or sensitive natural community identified by local or regional plans, policies, regulations, or by CDFW or USFWS.

(c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling hydrological interruption, or other means.

(d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or within an established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

(e) Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

(f) Conflict with provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.1 SENSITIVE SPECIES

5.1.1 Rare Plant Species

No Impacts

Three of the five rare plant species recorded within the Sunnymead quadrangle were not considered to have a potential to occur based on geographic range, elevation range, and/or lack of suitable habitat (see Appendix F). Rare plant surveys were not required since the study area is not located within a CASSA (see Section 5.5.4 below) or NEPSSA (see Section 5.5.2 below).

Two species (Parry's spineflower and San Bernardino aster) were determined to have a low potential to occur on the study area based on some areas of low-quality habitat (see Appendix F). Parry's spineflower is conditionally covered under the MSHCP and is a CRPR 1B.1 species. San Bernardino aster is a CRPR 1B.2 species. Although potentially suitable habitat is present, these two species are not expected to occur since records within the vicinity of the study area are historical records. The nearest record of Parry's spineflower was recorded in 1936, approximately five miles to the northwest of the study area. The nearest record of San Bernardino aster was recorded in 1951, approximately 10 miles to the northeast of the study area. Therefore, the project is not anticipated to impact any rare plant species.

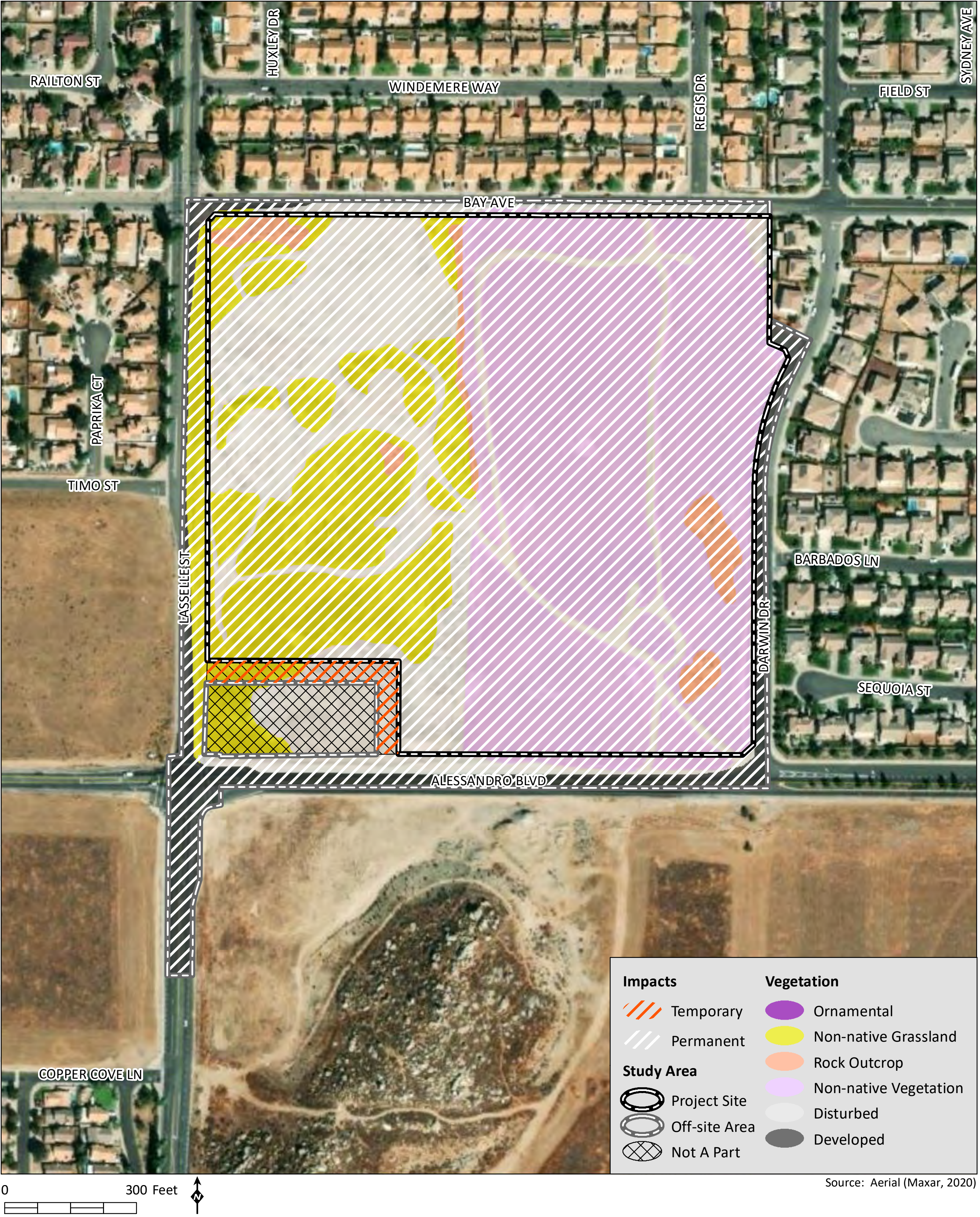
5.1.2 Sensitive Animal Species

Less than Significant Impacts with Mitigation Incorporated

Of the 21 sensitive animal species recorded within the vicinity of the study area, 15 species were considered to have no potential to occur on the study area due to lack of suitable (see Appendix G). Therefore, no significant impacts to these sensitive wildlife species are anticipated by the project. The remaining six species are discussed in detail below. In addition, the northwest portion of the study area supports depressional areas that may be potentially suitable habitat for federally listed fairy shrimp species. Fairy shrimp are discussed further in Section 5.5.1.

Three of the remaining six species were determined to have a low potential to occur on the study area based on the presence of low quality habitat, limited acreage of habitat, and lack of recent observations

Tentative Tract Map 38123



Source: Aerial (Maxar, 2020)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\GBRA\Fig7_VegImps.mxd ABC-01 10/19/2021 -XX

HELIX
Environmental Planning

Vegetation Impacts

Figure 7

within the immediate vicinity of the study area. These species include red-diamond rattlesnake, San Diego black-tailed jackrabbit, and western mastiff bat (foraging only). Red-diamond rattlesnake and San Diego black-tailed jackrabbit are fully covered species under the MSHCP. With payment of the MSHCP Local Development Mitigation Fee (LDMF), no additional mitigation is required for potential impacts to these species (see Section 5.5.6 below). Western mastiff bat is a State SSC and is not a covered species under the MSHCP. The study area does not support suitable roosting habitat for western mastiff bat. There is some potential for foraging habitat on the study area, although the habitat is considered low quality based on the high-level of existing disturbance on the study area and surrounding area. This species was only recorded once within the Sunnymead quadrangle on CNDDB, which was in 1990 approximately 0.3 mile to the south of the study area (CDFW 2021a). Based on the presence of low quality habitat, lack of recent observations, and absence of suitable roosting habitat, no significant impacts to western mastiff batt are anticipated by the project.

The remaining three species were determined to have a moderate potential to occur on the study area based on the presence of potentially suitable habitat, including BUOW, northwestern San Diego pocket mouse, and SKR. Northwestern San Diego pocket mouse and SKR are fully covered species under the MSHCP. With payment of the MSHCP LDMF, no additional mitigation is required for potential impacts to these species (see Section 5.5.6 below). BUOW is a State SSC and MSHCP conditionally covered species. Based on the results of the focused BUOW surveys, the study area does not support BUOW. Prior to commencement of ground-disturbing activities, a pre-construction survey must be conducted within 30 days of ground-disturbing activities (County 2006; see Measure BIO-1 in Section 6.0 below). If BUOW is detected during the pre-construction survey, avoidance of active nests and/or relocation of BUOW would be required as outlined in Measure BIO-1 in Section 6.0 below.

5.1.3 Sensitive Vegetation Communities

5.1.3.1 California Department of Fish and Wildlife Sensitive Vegetation Communities/Habitats

No Impacts

The entire 33.4-acre project site would be developed, which is dominated by non-native vegetation (16.5 acres; Figure 7, *Vegetation Impacts*).

Of the 7.0-acre off-site area, 6.3 acres (1.1 acres of non-native grassland, 3.3 acres of developed land, 1.4 acres of disturbed habitat, 0.5 acre of non-native vegetation) would be permanently impacted and 0.7 acre (0.2 acre of non-native grassland, 0.5 acre of disturbed habitat) would be temporarily impacted to accommodate over-excavation during project construction. None of the vegetation communities mapped on the study area are dominated by native plant species or are considered sensitive pursuant to CDFW (2021). Therefore, no impacts to sensitive vegetation communities would occur and mitigation is not warranted.

5.1.3.2 California Department of Fish and Wildlife Riparian Habitat and Streambed

No Impacts

The study area does not support any drainage features, wetlands, or other special aquatic sites under the jurisdiction of CDFW. Therefore, no impacts to CDFW jurisdiction would occur and mitigation is not warranted.

5.2 U.S. ARMY CORPS OF ENGINEERS/REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

No Impacts

The study area does not support any drainage features, wetlands, or other special aquatic sites under the jurisdiction of USACE/RWQCB. Therefore, no impacts to waters of the U.S. or waters of the State are anticipated by the project.

5.3 WILDLIFE MOVEMENT AND MIGRATORY SPECIES

5.3.1 Wildlife Movement

Less than Significant

The study area is not part of a regional corridor and does not serve as a nursery site. The study area is not identified by the MSHCP (Dudek 2003) or South Coast Missing Linkages (South Coast Wildlands 2008) as being part of a local or regional corridor or linkage. The study area currently does not directly connect two or more large blocks of habitat. The study area is bounded by residential development to the north, northwest, and east. The study area supports limited vegetation that may be used by birds and smaller mammals and reptiles that have adapted to human disturbance. Some wildlife moving may use the study area for foraging and/or nesting, but use of the study area would be restricted due to limited vegetative cover and adjacent disturbance from existing human development.

5.3.2 Migratory Species

Less than Significant Impacts with Mitigation Incorporated

Development of the proposed project could disturb or destroy active migratory bird nests, including eggs and young. Disturbance to or destruction of migratory bird eggs, young, or adults is in violation of the MBTA and is considered a potentially significant impact. Although suitable habitat for nesting birds on the study area is limited, herbaceous ground cover and shrubs located throughout the study area could provide habitat for protected nesting bird species. A mitigation measure is provided as BIO-2 in Section 6.0 below, which would help ensure the project is in compliance with MBTA regulations.

5.4 LOCAL POLICIES AND ORDINANCES

No Impacts

The study area does not support any trees. Therefore, the project would not conflict with Section 9.17.030 of the City's Municipal Code.

5.5 ADOPTED HABITAT CONSERVATION PLANS

Less than Significant Impacts with Mitigation Incorporated

As discussed in Section 3.6.1 above, the study area is within the Southwest Area Plan of the MSHCP. The study area is not located within or adjacent to an MSHCP Criteria Area; therefore, the study area is not subject to special conservation requirements that apply to cells and is not required to undergo the HANS process. The following sections demonstrate the project's compliance with MSHCP requirements.

5.5.1 Riparian/Riverine Areas and Vernal Pools (MSHCP Section 6.1.2)

The identification of MSHCP Riparian/Riverine Areas is based on the potential for the habitat to support, or be a tributary to, habitat that supports Riparian/Riverine Covered Species. Riparian/Riverine Covered Species are identified in MSHCP Section 6.1.2. The MSHCP defines Riparian/Riverine Areas as "lands which contain Habitat dominated by trees, shrubs, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year" (Dudek 2003). The MSHCP defines Vernal Pools as "seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season" (Dudek 2003). Artificially created wetlands, except for those created intentionally to provide habitat or resulting from the creation of open waters or alteration of natural stream courses, are not considered MSHCP Vernal Pools.

Riparian/Riverine Areas

The study area does not support Riparian/Riverine Area Species or Vernal Pools as defined by MSHCP.

Riparian/Riverine Area Species

The study area does not support suitable habitat for Riparian/Riverine Areas or Vernal Pool plant species and, therefore, no impacts are anticipated by the project. The study area does not support suitable habitat for 11 of the 12 Riparian/Riverine Areas or Vernal Pool animal species. The project site supports 32 depressional features, which are mostly concentrated in the northwest portion of the project site. These depressional areas may provide suitable habitat for federally listed fairy shrimp species. Dry season fairy shrimp surveys were completed in accordance with USFWS protocol (USFWS 2017), as previously described in Section 2.3.2.1 above. *Branchinecta* sp. eggs were observed in 23 of the 32 sampled depressional areas. Wet season sampling will further inform which Branchinecta species are present within the sampled features. Wet season focused surveys are currently in progress and will be completed in 2021/2022. Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing) within the study area, wet season surveys will be completed by a permitted biologist following the current USFWS survey protocol for large brachiopods (USFWS 2017). If listed fairy

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

shrimp are detected during the wet season surveys, a DBESP must be prepared to ensure that the proposed alternative provides for the replacement of any lost functions and values of habitat. Compensatory mitigation for impacts to occupied habitat would be required, as outlined in Measure BIO-3 in Section 6.0 below.

As discussed above, the proposed project is consistent with MSHCP Section 6.1.2.

5.5.2 Narrow Endemic Plant Species (MSHCP Section 6.1.3)

The study area is not located within a NEPSSA; therefore, no focused surveys were required and the proposed project is consistent with Section 6.1.3 of the MSHCP.

5.5.3 Urban/Wildland Interface Guidelines (MSHCP Section 6.1.4)

Proposed developments adjacent to MSHCP Conservation Areas may create edge effects that can impact conserved biological resources. The MSHCP provides several guidelines that address potential indirect effects from proposed developments that are in proximity to MSHCP Conservation Areas. These guidelines include measures addressing quantity and quality of runoff generated by the development (i.e., drainage and toxics), night lighting, noise, non-native invasive plant species, barriers to humans and animal predators, and grading/land development encroachment.

The study area does not occur adjacent to land targeted for conservation or existing MSHCP Conservation Areas. The nearest MSHCP Conservation Area is Existing Core H, which is approximately two miles to the southeast of the study area. Since the study area is not within or adjacent to MSHCP Conservation areas, many of the MSHCP Urban/Wildland Interface Guidelines are not required. As discussed below, the project will comply with applicable guidelines to ensure consistency with MSHCP Section 6.1.4.

Drainage

The study area does not support any drainages. However, the project will incorporate measures to avoid discharge of untreated surface runoff into downstream waters. Measures will include those required for construction pursuant to the State Water Resources Control Board General Construction Stormwater Permit and those required post-construction pursuant to the National Pollutant Discharge Elimination System and Municipal Storm Drain requirements. The project shall be designed to prevent the release of toxins, chemicals, petroleum products, exotic plant materials, or other elements that might degrade or harm biological resources or ecosystem processes downstream from the study area.

Toxics

Land uses that use chemicals or generate bio-products that are potentially toxic or may adversely affect wildlife species, habitat, or water quality shall incorporate measures to ensure that application of such chemicals does not result in discharge into downstream waters. Measures such as those employed to address drainage issues would be implemented by the proposed project to avoid the potential impacts of toxics.

Lighting

The study area does not occur directly adjacent to MSHCP Conservation Areas, which are separated by existing development. Therefore, lighting standards are not applicable.

Noise

The study area does not occur directly adjacent to MSHCP Conservation Areas, which are separated by existing development. Therefore, noise standards are not applicable.

Invasives

The project shall not use invasive plants for erosion control, landscaping, wind rows, or other purposes. A mitigation measure (BIO-4) is provided in Section 6.0 below, which requires the project to comply with the MSHCP and avoid the use of invasive, non-native plants in accordance with MSHCP Table 6.2.

Barriers

Since the study area is not directly adjacent to the MSHCP Conservation Area, barriers or signage are not necessary.

Grading/Land Development

The project is not adjacent to an existing or proposed MSHCP Conservation Areas. Therefore, manufactured slopes associated with proposed site development will not extend into an MSHCP Conservation Area.

5.5.4 Additional Surveys (MSHCP Section 6.3.2)

The study area is not within a CASSA or an amphibian or mammal survey area. No impacts to CASSA species or sensitive amphibian or mammal species are proposed.

Based on the results of the focused BUOW surveys, the study area does not support BUOW. Prior to commencement of ground-disturbing activities, a pre-construction survey must be conducted within 30 days of ground-disturbing activities (County 2006; see Measure BIO-1 in Section 6.0 below). If BUOW is detected during the pre-construction survey, avoidance of active nests and/or relocation of BUOW would be required as outlined in Measure BIO-1 in Section 6.0 below.

As discussed above, the proposed project is consistent with MSHCP Section 6.3.2.

5.5.5 Fuels Management (MSHCP Section 6.4)

The property is not adjacent to an MSHCP Conservation Area. Therefore, fuel modification impacts would not extend into a conservation area. The project is consistent with MSHCP Section 6.4.

5.5.6 Multiple Species Habitat Conservation Plan and Stephens' Kangaroo Rat Fees

In order for the project to participate in the MSHCP, the project proponent is required to pay an MSHCP LDMF in order to finance the acquisitions of conservation areas to provide habitat for MSHCP covered species (City 2007). The LDMF must be paid prior to issuance of a building permit. The applicant shall pay the LDMF as determined by the City. Final fee credits shall be determined through coordination with the City.

The study area is also within the SKR HCP but is not located within any of the core reserves (RCHCA 1996). Therefore, the project is required to pay an SKR mitigation fee for incidental take authorization under the SKR HCP (City 1996).

A mitigation measure (BIO-5) is provided in Section 6.0, which requires the project proponent to pay the MSHCP LDMF and SKR HCP fees.

6.0 MITIGATION MEASURES

The following provides recommended measures intended to minimize or avoid impacts to biological resources:

BIO-1 **Burrowing Owl:** In compliance with the MSHCP, a pre-construction survey shall be conducted on the study area within 30 days prior to ground disturbance to determine presence of BUOW. If the pre-construction survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW is observed during the pre-construction survey, active burrows shall be avoided by the project in accordance with the California Department of Fish and Wildlife's (CDFW) Staff Report on Burrowing Owl Mitigation (2012) or CDFW's most recent guidelines. The project proponent shall immediately inform the Western Riverside County Regional Conservation Authority (RCA) of BUOW observations. A BUOW Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by RCA prior to initiating ground disturbance. The RCA will coordinate directly with CDFW as needed to ensure that the plan is consistent with the MSHCP and CDFW guidelines. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31). The RCA may require translocation sites to be created within the MSHCP Conservation Area for the establishment of new colonies. If required, the translocation sites must take into consideration unoccupied habitat areas, presence of burrowing mammals, existing colonies, and effects to other MSHCP Covered Species in order to successfully create suitable habitat for BUOW. The translocation sites must be developed in consultation with RCA. If required, translocation sites would also be described in the agency-approved plan.

BIO-2 **Nesting Birds**: To the extent feasible, construction activities (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds. The general nesting season is March 15 through August 31 for songbirds and January 15 through August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory songbirds (March 15 through August 31) and raptors (January 15 through August 31), a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. If construction is inactive for more than seven days, an additional survey shall be conducted. The results of the pre-construction survey shall be documented by the qualified biologist.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.

BIO-3 **Fairy Shrimp**: Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing), wet season focused surveys for federally listed fairy shrimp species shall be completed. The wet season surveys shall be conducted by a permitted biologist and follow the current USFWS survey protocol for large brachiopods (USFWS 2017). Survey results shall be submitted to USFWS following completion of the surveys. If listed fairy shrimp species are not detected during the wet season surveys, then ground-disturbing activities shall be allowed to commence on the study area and no further mitigation is required.

If federally listed fairy shrimp are identified during the wet season surveys and the project cannot avoid occupied habitat, a DBESP assessment shall be completed to ensure that the proposed alternative provides for replacement of any lost functions and values of habitat. Project impacts to occupied listed fairy shrimp habitat shall be accomplished through purchase of off-site mitigation credits at an agency-approved mitigation bank or in-lieu fee program, or through purchase of off-site land that supports occupied habitat at a ratio of no less than 2:1. If off-site land is purchased, the mitigation site shall be preserved in perpetuity through a conservation easement, deed restriction, or similar legal protection mechanism.

BIO-4 **MSHCP Landscaping Restrictions**: In accordance with MSHCP Section 6.1.4, no species listed in Table 6-2, *Plants that Should Be Avoided Adjacent to the MSHCP Conservation Area*, shall be used in the project landscape plans (including hydroseed mix used for interim erosion control).

BIO-5 **Habitat Conservation Plan Fees**: The project applicant is subject to the MSHCP Local Development Mitigation Fee and the Stephens' Kangaroo Rat Habitat Conservation Plan Fee, which shall be paid prior to issuance of any grading permit.

7.0 CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report:

Sean Bohac	Graduate Certificate in GIS, Mesa College, San Diego, 2003 B.S., Biology, The Evergreen State College, 1998
Ezekiel Cooley	B.S., Natural Resources with an emphasis in Wildlife, Central Michigan University, 2004
Linda Garcia	M.A., English, National University, San Diego, 2012 B.A., Literatures in English, University of California, San Diego
Jessica Lee	M.S., Biology with an emphasis in Wetland Ecology, California State University Long Beach, 2018 B.S., Marine Biology, Auburn University, 2013
Amir Morales	B.S., Hydrological Sciences, Minor Geographic Information Systems, University of California Santa Barbara, 2001
Lauren Singleton	M.S., Biology with an emphasis in Ecology and Entomology, California State University Long Beach, 2014 B.S., Biology with an emphasis in Ecology, California State University Long Beach, 2010
Daniel Torres	B.S., Ecology and Natural Resources, Rutgers University, 2013

8.0 REFERENCES

American Ornithologists' Union. 2020. AOU checklist of North and Middle America birds. Available from: http://checklist.aou.org/taxa/. Accessed May 3, 2021.

Baker, R.J., L.C. Bradley, R.D. Bradley, J.W. Dragoo, M.D. Engstrom, R.S. Hoffmann, C.A. Jones, F. Reid, D.W. Rice, and C. Jones. 2003. Revised checklist of North American mammals north of Mexico. Occasional Papers of the Museum, Texas Tech University 223.

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken, editors. 2012. The Jepson manual: Vascular plants of California. 2nd ed. University of California Press, Berkeley.

California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. State of California Natural Resource Agency. March 7.

California Department of Fish and Wildlife. 2021. California Natural Diversity Database and Rarefind. California Department of Fish and Wildlife: Sacramento, California. Retrieved from: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed March 31, 2021.

2020. California natural community list. The Vegetation Classification and Mapping Program. Wildlife & Habitat Data Analysis Branch. September 2020. Retrieved from: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities/Background. Accessed March 31, 2021.

California Herps. 2021. A Guide to the Amphibians and Reptiles of California. Available from: http://www.californiaherps.com. Accessed March 31, 2021.

California Native Plant Society. 2021. Inventory of rare and endangered plants of California. California Native Plant Society. Retrieved from: http://www.rareplants.cnps.org/. Accessed March 31, 2021.

Dudek and Associates (Dudek). 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) Final MSHCP Volume I. Prepared for County of Riverside, Transportation and Land Management Agency. Available from: http://www.rctlma.org/Portals/0/mshcp/index.html.

Emmel, T.C. and J.F. Emmel. 1973. The butterflies of Southern California. Natural History Museum of Los Angeles County, Science Series 26: 1-148.

Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Technical report Y-87-1. Vicksburg (MS): U.S. Army Engineer Waterways Experiment Station. 100 p. with Appendices.

Erikson, C.H. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press. Eureka, California. 196 pp.

Google Earth. 2021. Aerial imagery of the Tentative Tract Map 38123 Project, 33.918741°, -117.206776°. Aerial Imagery from April 15, 2020. Retrieved from: https://earth.google.com/web/. Accessed March 31, 2021.

Jackson, L. 1985. Ecological origins of California's Mediterranean grasses. Journal of Biogeography (1985) 12, 349-361.

Moreno Valley, City of. 2007. Ordinance 742 § 1.1. Western Riverside Multi-Species Habitat Conservation Plan Fee Program Ordinance. Retrieved from: http://qcode.us/codes/morenovalley/?view=desktop&topic=3-3_48-3_48_030. Accessed March 31, 2021.

1996. Ord. 502 § 2.1. Chapter 8.60 of the Municipal Code: Threatened and Endangered Species. Retrieved from: http://qcode.us/codes/morenovalley/?view=desktop&topic=8-8_60-8_60_010. Accessed March 31, 2021.

Natural Resources Conservation Service. 2021. Web Soil Survey. United States Department of Agriculture (USDA). Retrieved from: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.Aspx. Accessed March 31, 2021.

Oberbauer, T. 1996. Terrestrial vegetation communities in San Diego County based on Holland’s descriptions, San Diego Association of Governments, San Diego, CA.

Riverside, County of. 2006. Burrowing owl survey instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area. Environmental Programs Department. Retrieved from: https://www.wrc-rca.org/species/survey_protocols/burrowing_owl_survey_instructions.pdf. Accessed March 31, 2021.

Riverside County Habitat Conservation Authority. 1996. Habitat Conservation Plan for the Stephens’ Kangaroo Rat in Western Riverside County California. March 1996. Retrieved from: https://rchca.us/DocumentCenter/View/549/SKR-Habitat-Conservation-Plan. Accessed March 31, 2021.

Sawyer, J.O., T. Keeler-Wolf, and J. Evens. 2009. A manual of California vegetation. 2nd Ed. Sacramento: California Native Plant Society.

South Coast Wildlands. 2008. South Coast missing linkages: A wildland network for the South Coast ecoregion. Retrieved from: http://www.scwildlands.org/reports/SCMLRegionalReport.pdf. March 2008.

U.S. Army Corps of Engineers. 2008a. Regional supplement to the Corps of Engineers wetland delineation manual: Arid west region (Version 2.0). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERCD/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Fish and Wildlife Service. 2021a. Critical habitat mapping. GIS files provided by USFWS. Retrieved from: https://ecos.fws.gov/ecp/report/table/critical-habitat.html. Accessed March 31, 2021.

2021b. National Wetlands Inventory. Retrieved from: https://www.fws.gov/wetlands/data/google-earth.html. Accessed March 31, 2021.

2017. Survey Guidelines for the Listed Large Branchiopods. Revised November 13. Retrieved from: https://www.fws.gov/ventura/docs/species/protocols/vpshrimp/shrimp2017.pdf. Accessed October 7, 2021.

Western Riverside County Regional Conservation Authority. 2021. MSHCP information tool. Powered by ESRI. Retried from: https://wrcrca.maps.arcgis.com/apps/webappviewer/index.html?id=a73e69d2a64d41c29ebd3acd67467abd. Accessed March 31, 2021.

This page intentionally left blank

Appendix A

Plant Species Observed

Appendix A
PLANT SPECIES OBSERVED

Family	Scientific Name	Common Name
ANGIOSPERMS	**– EUDICOTS**	
Asteraceae	*Ambrosia acanthicarpa*	annual bur-sage
	Artemisia californica	California sagebrush
	*Centaurea melitensis**	tocalote
	Corethrogyne filaginifolia	common sandaster
	Encelia farinosa	brittlebush
	Erigeron canadensis	horseweed
	Helianthus annuus	western sunflower
	Heterotheca grandiflora	telegraph weed
	*Oncosiphon piluliferum**	stinknet
	Ambrosia acanthicarpa	annual bur-sage
Boraginaceae	*Phacelia* sp.	phacelia
Brassicaceae	*Hirschfeldia incana**	short-pod mustard
Euphorbiaceae	*Euphorbia albomarginata*	rattlesnake weed
	Croton setigerus	dove weed
Fabaceae	*Parkinsonia aculeata**	Mexican palo verde
Lamiaceae	*Trichostema lanceolatum*	vinegar weed
Polygonaceae	*Eriogonum fasciculatum*	buckwheat
	Eriogonum gracile	slender buckwheat
Solanaceae	*Datura wrightii*	jimson weed
ANGIOSPERMS	**– MONOCOTS**	
Poaceae	*Avena barbata**	slender oat
	*Bromus rubens**	red brome
	*Schismus barbatus**	Mediterraneangrass

* Non-native species

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Appendix B

Animal Species Observed or Detected

Appendix B
ANIMAL SPECIES OBSERVED OR DETECTED

Order	Family	Scientific Name	Common Name
INVERTEBRATES			
Anostraca	Branchinectidae	*Branchinecta* sp.	fairy shrimp
Hymenoptera	Formicidae	*Pogonomyrmex* sp.	harvester ant
Birds			
Accipitriformes	Accipitridae	*Buteo jamaicensis*	red-tailed hawk
Apodiformes	Trochilidae	*Calypte anna*	Anna's hummingbird
Charadriiformes	Charadriidae	*Charadrius vociferus*	killdeer
Columbiformes	Columbidae	*Columba livia*	rock pigeon
		Streptopelia decaocto	Eurasian collared-dove
		Zenaida macroura	mourning dove
Falconiformes	Falconidae	*Falco sparverius*	American kestrel
Passeriformes	Alaudidae	*Eremophila alpestris*	horned lark
	Corvidae	*Corvus brachyrhynchos*	American crow
		Corvus corax	common raven
	Fringillidae	*Haemorhous mexicanus*	house finch
		Spinus psaltria	lesser goldfinch
	Hirundinidae	*Petrochelidon pyrrhonota*	cliff swallow
	Passerellidae	*Melospiza melodia*	song sparrow
		Zonotrichia leucophrys	white-crowned sparrow
	Passeridae	*Passer domesticus*	house sparrow
	Troglodytidae	*Salpinctes obsoletus*	rock wren
	Tyrannidae	*Sayornis saya*	Say's phoebe
		Tyrannus verticalis	western kingbird
Pelecaniformes	Ardeidae	*Ardea alba*	great egret
Mammals			
Lagomorpha	Leporidae	*Sylvilagus audubonii*	desert cottontail
Rodentia	Sciuridae	*Otospermophilus beecheyi*	California ground squirrel

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Appendix C

Site Photographs

Photo 1: View of the non-native vegetation in the foreground and rock outcrops in the background. This photo was taken in the southeastern portion of the study area, facing southwest.

Photo 2: View of the non-native vegetation in the northeastern portion of the study area, facing west. The dirt roads that traverse the study area can be seen in the distance.

G:\IrvineDC\Vol3\PROJECTS\D\DRHorton_00239\DRH-28_Reports\GBRA\Appendices\Appendix C_Site Photos

Note: Please see Figure 6 for photograph locations.

HELIX
Environmental Planning

Site Photographs

Photo 3: View of the non-native grassland and disturbed land in the northwestern portion of the study area, facing north.

Photo 4: View of the non-native grassland in in the southwestern portion of the study area, facing north.

G:\IrvineDC\Vol3\PROJECTS\D\DRHorton_00239\DRH-28_Reports\GBRA\Appendices\Appendix C_Site Photos

Note: Please see Figure 6 for photograph locations.

HELIX
Environmental Planning

Site Photographs

Appendix D

Dry Season Fairy Shrimp Focused Survey Report

Darco Residential Project

2021 Dry Season Survey Report

September 2021 | 00239.00028.001

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

This page intentionally left blank

Darco Residential Project

2021 Dry Season Survey Report

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

September 2021 | 00239.00028.001

This page intentionally left blank

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

This page intentionally left blank

1.0 INTRODUCTION

This report presents the findings of the 2021 dry season fairy shrimp sampling conducted by HELIX Environmental Planning, Inc. (HELIX) for the Darco Residential Project (project), which will be provided to the U.S. Fish and Wildlife Service (USFWS). The site is located in the City of Moreno Valley, Riverside County, California (Figure 1, *Regional Location*). It is depicted in Section 9 of Township 3 South, Range 3 West, as shown on the U.S. Geological Survey (USGS) 7.5 minute Sunnymead quadrangle map (Figure 2, *USGS Topography*). More specifically, the site is located at the northeast intersection of Alessandro Boulevard and Lasselle Street (Figure 3, *Aerial Photograph).* Thirty-two previously identified features were sampled for this survey. Findings will be provided to the USFWS.

1.1 SPECIES INFORMATION

There are three species of fairy shrimp with potential to occur on-site: vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and versatile fairy shrimp (*Branchinecta lindahli*) (Erikson and Belk 1999; California Natural Diversity Database 2021). Vernal pool fairy shrimp are federally listed as threatened and Riverside fairy shrimp are federally listed as endangered, whereas the versatile fairy shrimp is relatively common and is not listed or considered sensitive. Vernal pool fairy shrimp have the widest geographic range of the federally listed vernal pool crustaceans occurring from southern Oregon to northern and central California, generally west of the Sierra Nevada, to southern California. The species' range extends south to Orange and Los Angeles counties and east to western Riverside County, but is generally absent from San Diego County. Vernal pool fairy shrimp are found in vernal pools and other vernal pool-like habitats such as ephemeral ponds or features that can be formed from anthropogenic events such as tire ruts. Riverside fairy shrimp can be found in Riverside, Orange, and San Diego counties and occur in vernal pools and other ephemeral features with long inundation times. The versatile fairy shrimp is common in pools throughout California and can co-occur with both vernal pool and Riverside fairy shrimp.

Fairy shrimp are adapted for variable and uncertain rainfall patterns. When fertilized by males of their species, female fairy shrimp produce "resting eggs," which are dormant embryos surrounded by hard-shelled membranes capable of remaining viable in the soil for long periods of time. Dry season fairy shrimp surveys are designed to detect, collect, and identify eggs present in the soil. The surface characteristics of these eggs can be used to differentiate the genus and potentially the species of fairy shrimp. Certain fairy shrimp, such as *B. lindahli* and *B. lynchi*, cannot be identifiable to the species level by examination of the eggs alone. For these species, a wet season fairy shrimp survey or authorized hatching would be required to identify individuals to species level.

2.0 METHODS

HELIX permitted biologist Amy Mattson (Permit TE778195-14) conducted the dry season sampling in accordance with USFWS protocol (USFWS 2017) on July 22, 2021. Ms. Mattson was assisted by HELIX biologist Mandy Mathews (supervised individual). The USFWS Data Sheets for Dry Season Sample Analysis for Listed Large Branchiopods are included as Appendix A.

Soil was collected from thirty-two (32) features identified and mapped during a hydrological monitoring visit in February 2021 (Figure 4, *2021 Dry Season Survey Results*). Following soil collection, the samples were transferred to the HELIX laboratory for processing by HELIX permitted biologist Amy Mattson

(Permit TE778195-14) and Ms. Mathews. Samples were prepared by dissolving the soil samples in water and sequentially sieving the material through 710- and 75 µm pore size screens. The small size of these screens ensures that eggs from the target fairy shrimp species are retained. The portion of each sample retained in the screen was dispersed in a brine solution to separate the organic from the inorganic material. The organic fraction was decanted, dried, and examined under a microscope by Ms. Mattson. Eggs were identified to genus level based on surface characteristics. Multiple species of the *Branchinecta* genus can occur in Riverside County, but cannot be identified past genus level based on egg characteristics.

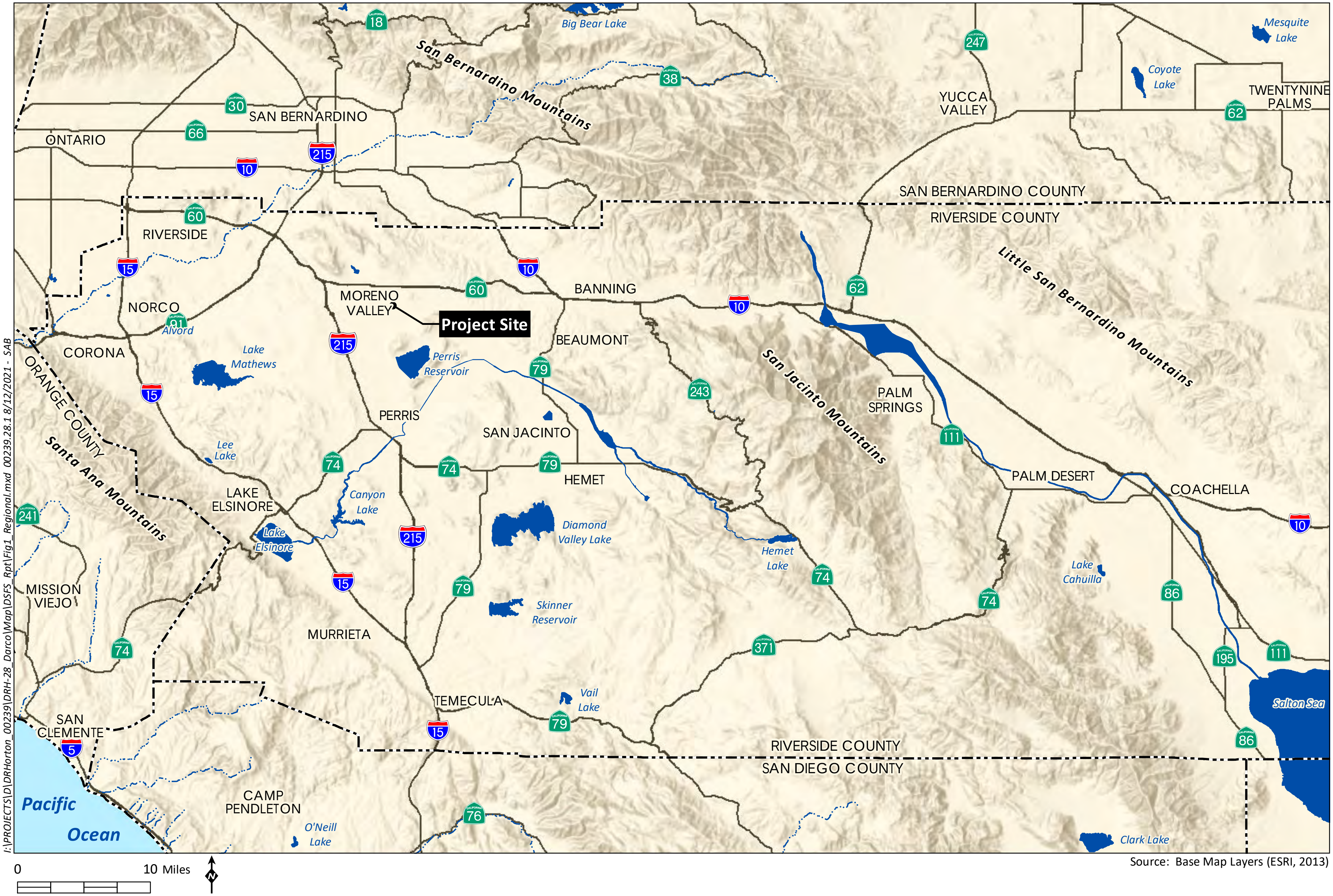
Eggs of each genus were counted within each soil sample, and egg abundance was estimated for each feature and is provided in the Results Section, according to the guidelines provided in the USFWS Survey Guidelines: none (no eggs found in sample); low abundance (estimate of 1-10 eggs/100 milliliters [mL] soil); medium abundance (estimate of 11-50 eggs/100 mL soil); and high abundance (estimate of more than 50 eggs/100 mL of soil).

3.0 RESULTS

Branchinecta sp. eggs were observed in twenty-three (23) of the 32 the sampled features (Table 1, *Dry Season Results*). Wet season sampling will further inform which *Branchinecta* species are present within the sampled features. No *Streptocephalus* sp. eggs were observed in the sampled features. The USFWS Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods is included as Appendix A.

Table 1
DRY SEASON RESULTS

Feature	*Branchinecta* sp. Present	Abundance*	*Streptocephalus* sp. Present	Abundance*
1	No	None	No	None
2	No	None	No	None
3	No	None	No	None
4	Yes	Medium	No	None
5	Yes	Low	No	None
6	Yes	Medium	No	None
7	No	None	No	None
8	Yes	Low	No	None
9	Yes	Low	No	None
10	No	None	No	None
11	Yes	Low	No	None
12	Yes	Low	No	None
13	Yes	High	No	None
14	Yes	High	No	None
15	Yes	Low	No	None
16	Yes	Low	No	None
17	Yes	Low	No	None
18	Yes	Low	No	None
19	Yes	High	No	None
20	Yes	High	No	None
21	Yes	Medium	No	None
22	No	None	No	None



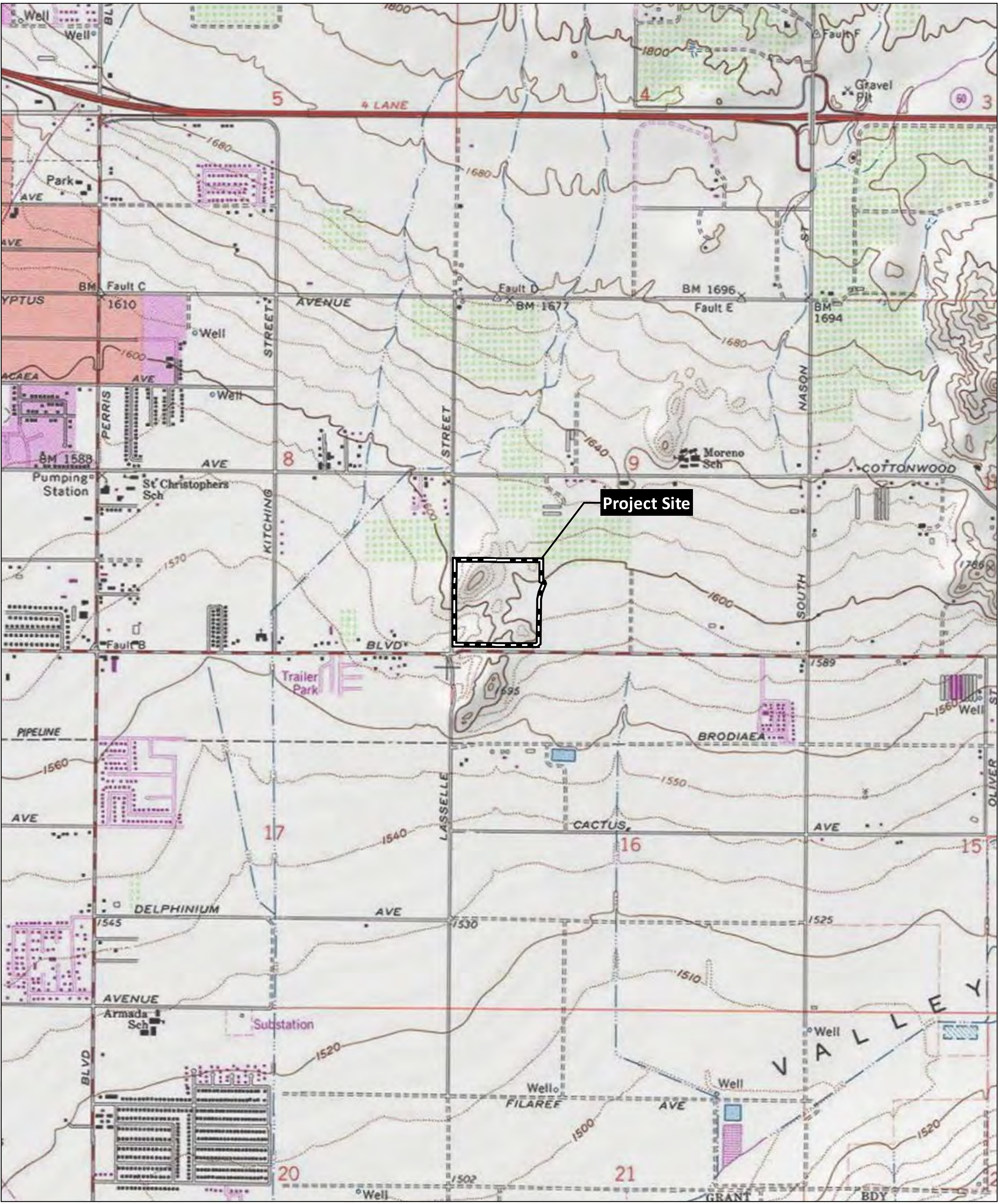
Source: Base Map Layers (ESRI, 2013)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\DSFS_Rpt\Fig1_Regional.mxd 00239.28.1 8/12/2021 - SAB

HELIX
Environmental Planning

Regional Location

Figure 1



Source: SUNNYMEAD 7.5' Quad (USGS)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\DSFS_Rpt\Fig2_USGS.mxd 00239.28.1 8/12/2021 - SAB

HELIX
Environmental Planning

USGS Topography

Figure 2

Source: Aerial (RCIT, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\DSFS_Rpt\Fig3_Aerial.mxd 00239.28.1 8/12/2021 - SAB

HELIX
Environmental Planning

Aerial Photograph

Figure 3

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\DSFS\DSFS_RptFig4_DSFS.mxd 00239.28.1 9/7/2021 - SAB

Source: Aerial (RCIT, 2019)

HELIX
Environmental Planning

2021 Dry Season Survey Results

Figure 4

Feature	*Branchinecta* sp. Present	Abundance*	*Streptocephalus* sp. Present	Abundance*
23	Yes	High	No	None
24	Yes	Low	No	None
25	Yes	Low	No	None
26	Yes	Medium	No	None
27	No	None	No	None
28	No	None	No	None
29	No	None	No	None
30	Yes	Low	No	None
31	Yes	Low	No	None
32	Yes	Medium	No	None

* Based on abundance categories found within the 2017 U.S. Fish and Wildlife Service Survey Guidelines for the Listed Large Branchiopods.

4.0 CERTIFICATION

I certify that the information in this survey report and attached exhibits fully and accurately represents my work.

Amy Mattson

Amy Mattson
Senior Scientist
TE778195-14

AM Mathews

Mandy Mathews
Biologist
Supervised Individual

5.0 REFERENCES

California Department of Fish and Wildlife (CDFW), 2021. California Natural Diversity Database (CNDDB). RareFind Database Program.

Erikson, C.H. and D. Belk. 1999. Fairy Shrimps of California’s Puddles, Pools, and Playas. Mad River Press. Eureka, California. 196 pp.

U.S. Fish and Wildlife Service (USFWS). 2017. Survey Guidelines for the Listed Large Branchiopods. Revised November 13.

Appendix A

USFWS Data Sheets for Dry Season Sampling for Large Branchiopods

This page intentionally left blank

Appendix 2. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information

Project Name: DARCO
USFWS Project Number:
County: Riverside
Lat: 33°55'04.80"N
Long: 117°12'23.37"W
Quad: Sunnymead
Township: 3South
Range: 3West
Section: 9

Biologist Information

Name of Person(2) Who Conducted the Following Tasks and Permit Number(s):
Soil Collection: Amanda Mathews (TE 778195-14)
Soil Processing: Amanda Mathews + Amy Mattson (TE 778195)
Soil Analysis/Cysts ID: Amy Mattson
Soil Collection Date: 7/22/21

Pool/ Habitat/ Basin No.	Invertbrates Present (X)															Comme
	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	Number of Large Branchiopod Cysts						Hydracarina Live	Nematoda	Collembola	Other Species	
						Branchinecta sp.	*Lepidurus packardi*	*Streptocephalus wootoni*	*Linderiella occidentalis*	*Lynceus brachyurus*	*Cyzicus californicus*					
1						0										
2						0										
3	✓					0										
4	✓					180										
5	✓					47										
6	✓					74										
7						0										
8						2										
9	✓					1										
10						0										
11	✓					1										
12						4										
13	✓					2468										
14	✓					1937										

Appendix 2. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information

Project Name: DARCO
USFWS Project Number:
County: Riverside
Lat: 33°55'04.80"N
Long: 117.12'23.37"W

Quad: SunnyMead
Township: 3 South
Range: 3 West
Section: 9

Biologist Information

Name of Person(2) Who Conducted the Following Tasks and Permit Number(s):
Soil Collection: Amanda Mathews (TE 778195-14)
Soil Processing: Amanda Mathews + Amy Mattson (TE 778195-1
Soil Analysis/Cysts ID: Amy Mattson
Soil Collection Date: 7/22/21

Pool/ Habitat/ Basin No.	Invertbrates Present (X)															Comme
						Number of Large Branchiopod Cysts										
	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	*Branchinecta* sp.	*Lepidurus packardi*	*Streptocephalus wootoni*	*Linderiella occidentalis*	*Lynceus brachyurus*	*Cyzicus californicus*	Hydracarina Live	Nematoda	Collembola	Other Species	
15	✓					15										
16	✓					22										
17						20										
18						1										
19	✓					707										
20						1135										
21	✓					242										
22						0										
23	✓					1445										
24						5										
25						9										
26	✓					124										
27	✓					0										
28	✓					0										

Appendix 2. U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information

Project Name: DARCO

USFWS Project Number:

County: Riverside

Lat: 33°55'04.80"N

Long: 117°12'23.37"W

Quad: Sunnymead

Township: 3 South

Range: 3 West

Section: 9

Biologist Information

Name of Person(2) Who Conducted the Following Tasks and Permit Number(s):

Soil Collection: Amanda Mathews (TE778195-14)

Soil Processing: Amanda Mathews + Amy Mattson (TE778195-

Soil Analysis/Cysts ID: Amy Mattson

Soil Collection Date: 7/22/21

Pool/ Habitat/ Basin No.	Invertbrates Present (X)														Comme
						Number of Large Branchiopod Cysts									Other Species	
	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	*Branchinecta* sp.	*Lepidurus packardi*	*Streptocephalus wootoni*	*Linderiella occidentalis*	*Lynceus brachyurus*	*Cyzicus califomicus*	Hydracarina Live	Nematoda	Collembola		
29	✓					0										
30						14										
31	✓					17										
32	✓					35										

Appendix E

Burrowing Owl Focused Survey Report

HELIX Environmental Planning, Inc.
16485 Laguna Canyon Road, Suite 150
Irvine, CA 92618
949.234.8792 **tel.**
619.462.0552 **fax**
www.**helixepi**.com

September 6, 2021 00239.00028.001

Ms. Megan Whieldon
D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Subject: 2021 Burrowing Owl (*Athene cunicularia*) Survey Report for the Tentative Tract Map 38123 Project

Dear Ms. Whieldon:

This letter report presents the results of the 2021 focused burrowing owl (*Athene cunicularia;* BUOW) survey conducted by HELIX Environmental Planning, Inc. (HELIX) for the Tentative Tract Map 38123 (project) located in the City of Moreno Valley, Riverside County (County), California. The survey was conducted in accordance with the County's Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan (MSHCP).[1] This survey was conducted to meet applicable conditions under the MSHCP, which was approved in 2003.[2] The MSHCP is a comprehensive planning effort that includes multiple cities throughout Riverside County, including the City of Moreno Valley. As part of the MSHCP implementation, enrolled jurisdictions are required to impose terms of the MSHCP, including appropriate surveys in accordance with Volume 1, Section 6. The study area is located within the MSHCP BUOW Survey Area; therefore, surveys are required if suitable habitat is present. This letter report describes the methods used to perform the survey and the survey results.

STUDY AREA LOCATION

The approximately 33.4-acre project site is located in the City of Moreno Valley in western Riverside County, California, and is generally located south of State Route 60 and east of Interstate 215 (Figure 1, *Regional Location*). The project site is located within Township 3 South, Range 3 West, Section 9 on the U.S. Geological Survey (USGS) 7.5-minute Sunnymead quadrangle map (Figure 2, *USGS Topography*).

---

[1] Riverside, County of. 2006. Burrowing owl survey instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area. Environmental Programs Department. Retrieved from: https://www.wrc-rca.org/species/survey_protocols/burrowing_owl_survey_instructions.pdf. Accessed April 1, 2021.

[2] Dudek and Associates (Dudek). 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) Final MSHCP Volume I. Prepared for County of Riverside, Transportation and Land Management Agency. Available from: http://www.rctlma.org/Portals/0/mshcp/index.html.

Specifically, the project site is located at the northeast intersection of Alessandro Boulevard and Lasselle Street (Figure 3, *Aerial Photograph*). The project site comprises four parcels with Assessor's Parcel Numbers 487-470-0025 and -0028 and 487-574-001 and -002.

The project also comprises 7.0 acres of off-site areas within the existing paved right-of-way along Alessandro Boulevard, Darwin Drive, Bay Avenue, and Lasselle Street (Figure 3). "Study area" is used throughout this report to collectively refer to the project site and off-site areas.

PROJECT DESCRIPTION

The proposed project consists of a residential tract with 173 single-family homes. Site development would include the grading and construction of single-family residential lots, a water quality basin, an open space park, underground utilities, and off-site street and sewer improvements. The vacant lot in the southeast corner of Alessandro Boulevard and Lasselle Street is not a part of the project and will be used as a future commercial site.

STUDY AREA DESCRIPTION

The study area consists of undeveloped land dominated by non-native herbaceous species with some rock outcrops in the southeastern and northwestern portions. There is a network of dirt roads that run throughout the study area, and the western portion is heavily disturbed due to frequent off-road vehicle use. The study area also includes existing paved roads associated with Alessandro Boulevard, Darwin Drive, Bay Avenue, and Lasselle Street. The study area is located in an urbanized area of the City and is bounded by residential development to the north, northwest, and east and by existing roads on all sides. Undeveloped land is located to the southwest and south of the study area.

The topography of the study area is mostly flat, with elevations ranging from approximately 1,567 feet (478 meters) above mean sea level (AMSL) within the western portion of the off-site area along Alessandro Boulevard to a high of approximately 1,621 feet (540 meters) AMSL along the northern boundary. Three soil types were mapped within the project site, with the majority of the study area dominated by Vista coarse sandy loam (8 to 15 percent slopes, eroded).[3] The other two soil types include Cieneba sandy loam (8 to 15 percent slopes, eroded; 15 to 50 percent slopes, eroded) and Ramona sandy loam (2 to 5 percent slopes, eroded; and 5 to 8 percent slopes, eroded).

Representative photographs of the study area are depicted in Attachment A, *Representative Site Photographs*.

METHODS

A Step I Habitat Assessment was conducted by HELIX biologist Lauren Singleton on December 15, 2020. Step II Locating Burrows and Burrowing Owls, including Part A: Focused Burrow Surveys and Part B: Focused Burrowing Owl Surveys were conducted on the study area by HELIX biologists Matthew Dimson, Ryan Fitch, Jessica Lee, and Daniel Torres between April 2 and August 8, 2021, in accordance with the County's survey protocol. The specific survey information is provided in Table 1, *Survey Information.* The

---

[3] Natural Resources Conservation Service. 2021. Web Soil Survey. United States Department of Agriculture (USDA). Retrieved from: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.Aspx. Accessed April 1, 2021.

habitat assessment and Part A: Focused Burrow Surveys and Part B: Focused Burrowing Owl Surveys are described in detail below.

Table 1
SURVEY INFORMATION

Site Visit	Survey Date	Biologists	Start/Stop Time	Start/Stop Weather Conditions	Survey Results
HA[1]	12/15/20	Lauren Singleton	0930-1500	59°F, wind 0-1 mph, 10% clouds 63°F, wind 2-3 mph, 0% clouds	Suitable habitat detected; no BUOW detected.
1	04/02/21	Matthew Dimson Jessica Lee	0630-0830	49°F, wind 1-2 mph, 0% clouds 56°F, wind 0-1 mph, 0% clouds	Potential burrows/ burrow surrogates were observed; no BUOW detected.
2	06/04/21	Jessica Lee Daniel Torres	0630-0830	60°F, wind 0-1 mph, 0% clouds 68°F, wind 0-1 mph, 0% clouds	No BUOW detected.
3	07/08/21	Ryan Fitch Jessica Lee	0550-0725	66°F, wind 0-1 mph, 5% clouds 72°F, wind 0-1 mph, 0% clouds	No BUOW detected.
4	08/06/21	Matthew Dimson Jessica Lee	0600-0800	70°F, wind 0-1 mph, 0% clouds 75°F, wind 0-1 mph, 0% clouds	No BUOW detected.

[1] Step I Habitat Assessment

Step I – Habitat Assessment

The study area is located within an MSHCP BUOW survey area; therefore, a Step I Habitat Assessment was conducted to determine whether the study area supports suitable BUOW habitat. The assessment was conducted on the study area and within a 150-meter (approximately 500-foot) buffer zone around the periphery study area (collectively, the survey area). The survey area was slowly walked and assessed for suitable BUOW habitat, including:

- disturbed low-growing vegetation within grassland and shrublands (less than 30 percent canopy cover);
- gently rolling or level terrain;
- areas with abundant small mammal burrows, especially California ground squirrel burrows (*Otospermophilus beecheyi*);
- fence posts, rocks, or other low perching locations; and
- man-made structures, such as earthen berms, debris piles, and cement culverts.

Inaccessible areas of the buffer zone were visually assessed using binoculars.

Step II – Locating Burrows and Burrowing Owls

Since suitable habitat was observed during the habitat assessment, Step II surveys were conducted within the survey area. Step II surveys, which consist of a focused burrow survey (Part A) and four focused BUOW surveys (Part B), were conducted to determine whether the survey area supports suitable burrows and/or BUOW. The focused burrow survey was conducted concurrently with the first BUOW survey.

All potential burrows were checked for signs of recent owl occupation. Signs of occupation include:

- pellets/casting (regurgitated fur, bones, and/or insect parts);
- white wash (excrement); and/or
- feathers.

Since suitable burrows were observed within the survey area, three additional BUOW surveys were conducted. The biologists walked transects spaced no greater than 30 meters apart (approximately 100 feet) to allow for 100 percent visual coverage of all suitable habitat within the survey area. The biologists walked slowly and methodically, closely checking suitable habitat within the survey area for suitable burrows, BUOW diagnostic sign (e.g., molted feathers, pellets/castings, or whitewash at or near a burrow entrance), and individual BUOW. Inaccessible areas of the survey area were visually assessed using binoculars. All suitable burrows, burrow surrogates, BUOW sign, and/or BUOW observations were recorded using a handheld Global Positioning System unit (Figure 4, *Suitable Burrow and Transect Locations*).

RESULTS

Suitable BUOW habitat was observed within the survey area, including non-native grassland, non-native vegetation, disturbed habitat, and rock outcrops (Attachment A). Suitable burrows and burrow surrogates (e.g., rock piles) that could potentially be used by BUOW were observed within the survey area. No BUOW or sign of BUOW occupation were observed during the four focused surveys. Therefore, BUOW does not currently occupy the study area. Observed burrow locations and transects walked are shown on Figure 4.

CONCLUSION

No BUOWs were observed or detected within the survey area during the focused surveys. Burrows with potential to support BUOW were noted in the survey area, but no sign of BUOW occupation was observed. A pre-construction survey is required 30 days prior to ground disturbance pursuant to the County's survey protocol. If ground-disturbing activities are delayed more than 30 days after the pre-construction survey has been completed, the study area must be resurveyed.

If you have any questions regarding the information presented in this letter report, please contact us at (949) 234-8770.

Sincerely,

Lauren Singleton
Lauren Singleton
Biology Project Manager

Matthew Dimson
Matthew Dimson
Biologist

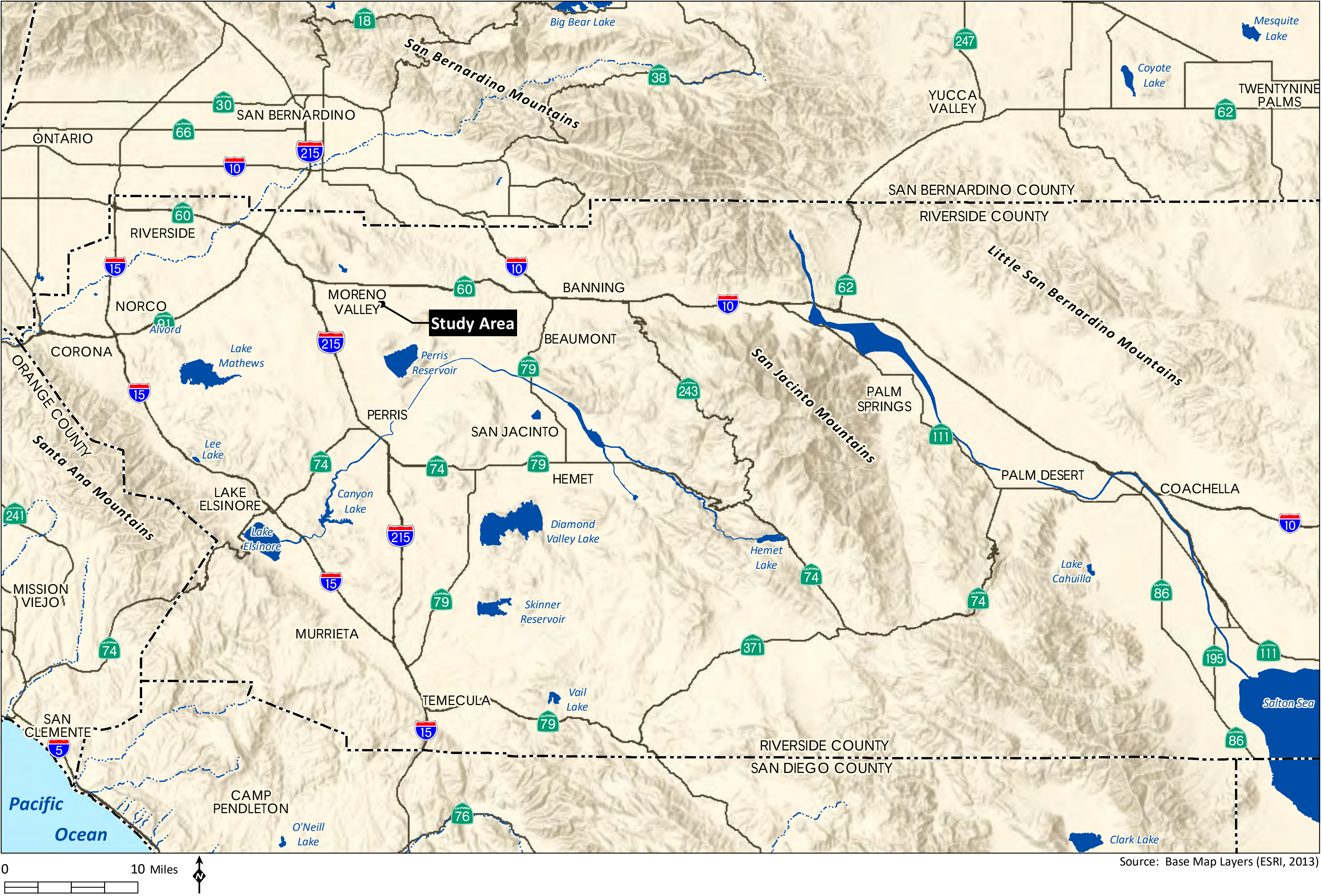
Jessica Lee
Jessica Lee
Biologist

Daniel E.
Daniel Torres
Biologist

Ryan Fitch
Biologist

Attachments:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Photograph
Figure 4: Suitable Burrow and Transect Locations
Attachment A: Representative Site Photographs



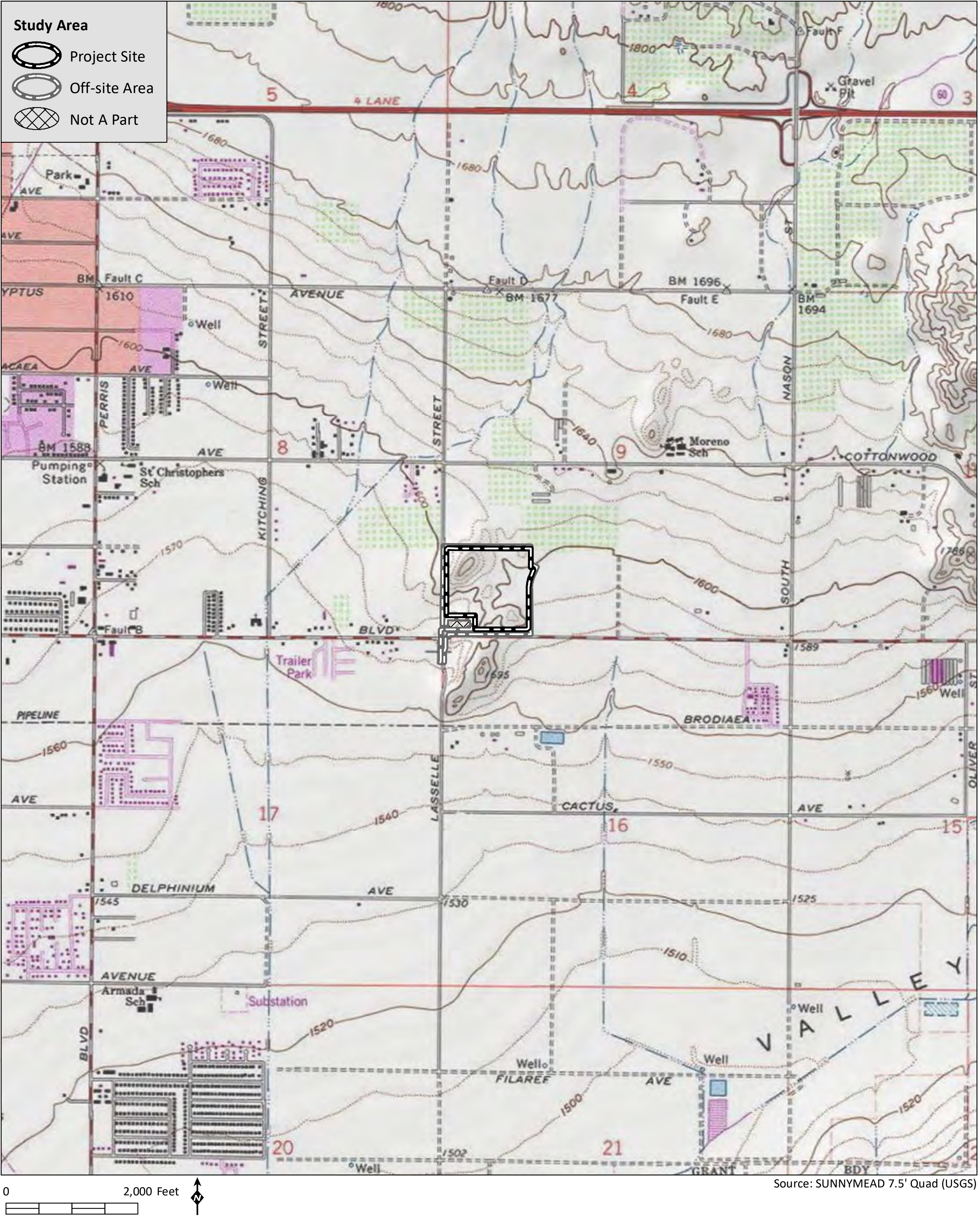
Source: Base Map Layers (ESRI, 2013)

HELIX
Environmental Planning

Regional Location

Figure 1

Tentative Tract Map 38123



Source: SUNNYMEAD 7.5' Quad (USGS)

HELIX
Environmental Planning

USGS Topography

Figure 2

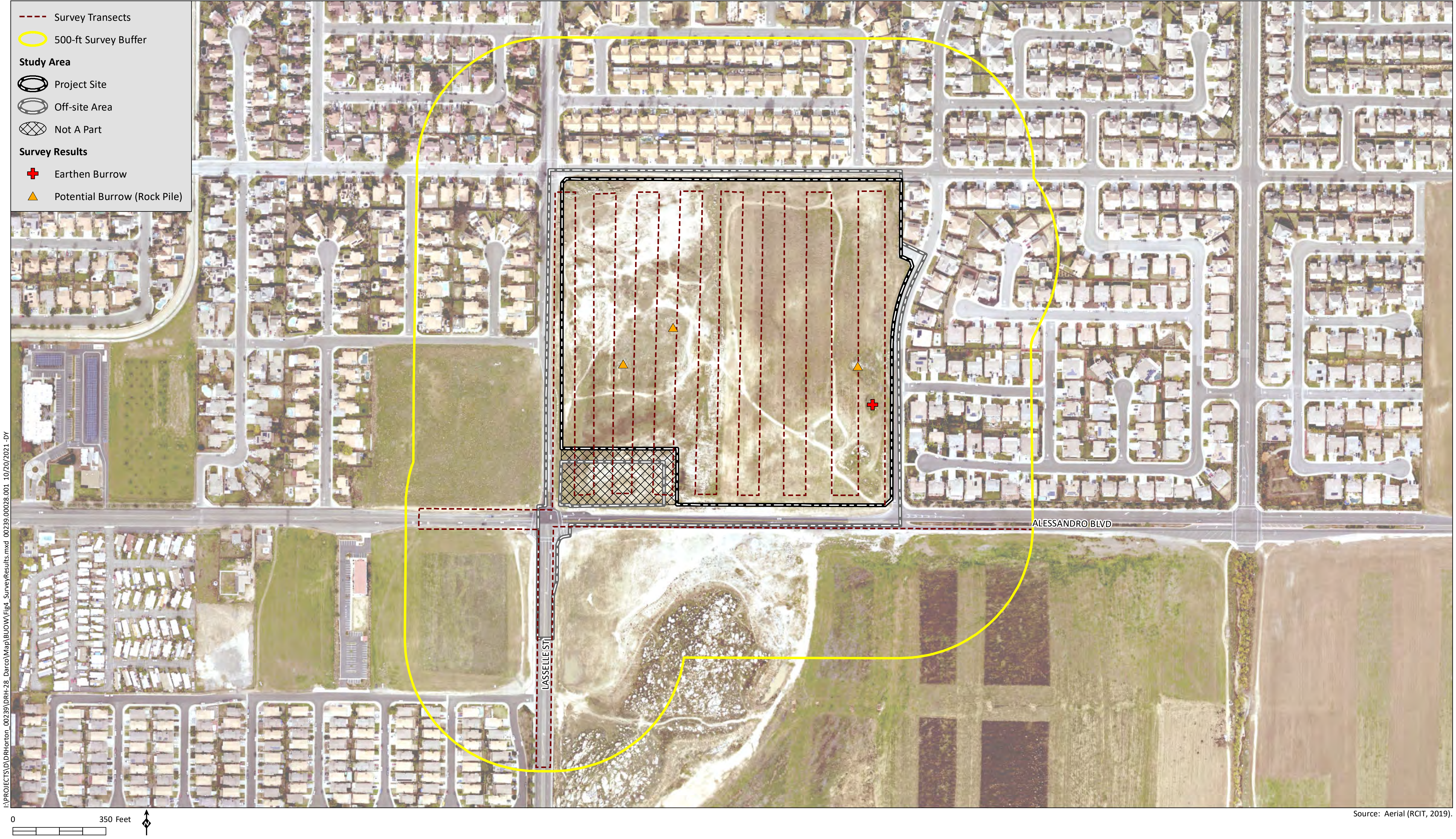
Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\BUOW\Fig3_Aerial.mxd 00239.28.1 10/20/2021 - SAB

HELIX
Environmental Planning

Aerial Photograph

Figure 3



Source: Aerial (RCIT, 2019).

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\BUOW\Fig4_SurveyResults.mxd 00239.00028.001 10/20/2021 -DY

HELIX
Environmental Planning

Survey Results

Figure 4

Photo 1: View of the non-native vegetation in the foreground and rock outcrops in the background. This photo was taken in the southeastern portion of the study area, facing southwest.

Photo 2: View of the non-native vegetation in the northeastern portion of the study area, facing west. The dirt roads that traverse the study area can be seen in the distance.

HELIX
Environmental Planning

Representative Site Photographs

Photo 3: View of the non-native grassland and disturbed land in the northwestern portion of the study area, facing north.

Photo 4: View of the non-native grassland in in the southwestern portion of the study area, facing north.

HELIX
Environmental Planning

Representative Site Photographs

Appendix F

Rare Plant Species Potential to Occur

Appendix F
RARE PLANT SPECIES POTENTIAL TO OCCUR[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Berberis nevinii	Nevin’s barberry	SE/FE CRPR 1B.1 MSHCP Covered Species (d)	Shrub. Occurs on steep, north-facing slopes or washes within chaparral, cismontane woodland, coastal scrub, and riparian scrub. Elevation range 70-825 m. Flowering period Mar-May.	**None.** The study area does not support chaparral, cismontane woodland, coastal scrub, or riparian scrub habitat.
Centromadia pungens ssp. *laevis*	smooth tarplant	CRPR 1B.1 MSHCP Covered Species (d)	Annual herb. Occurs within valley and foothill grasslands near alkaline locales. Elevation range 90-500 m. Flowering period Apr-Sep.	**None.** The study area does not support alkaline soils.
Chorizanthe parryi var. *parryi*	Parry's spineflower	CRPR 1B.1 MSHCP Covered Species (e)	Annual herb. Occurs in sandy soil on flats and foothills in mixed grassland, coastal sage scrub, and chaparral communities. Elevation range 90-800 m. Flowering period May-Jun.	**Low**. The study area supports highly disturbed sandy soils. However, this species has not been recorded within five miles of the study area. The nearest record of this species was recorded in 1936, approximately five miles to the northwest of the study area.
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	CRPR 1B.1 MSHCP Covered Species (d)	Annual herb. Occurs in clay and alkaline silty-clay soils within marshes/swamps, grasslands, playas, and vernal pools. Elevation range 0-1000 m. Flowering period Apr-May.	**None.** The study area does support clay or alkaline silty-clay soils.

Attachment: Appendix B - Biological Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

Appendix F (cont.)
Rare Plant Species Potential to Occur

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Symphyotrichum defoliatum	San Bernardino aster	CRPR 1B.2	Perennial herb. Occurs in vernally mesic soils within cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and grasslands, disturbed areas. Elevation range 0-2050 m. Flowering period Jul-Nov.	**Low.** The study area supports some depressional areas. However, this species has not been recorded within 10 miles of the study area. The nearest record of this species was recorded in 1951, approximately 10 miles to the northeast of the study area.

Source: HELIX (2021)

[1] Sensitive species reported within the Sunnymead quadrangle based on a database search conducted on CNDDB and CNPS.

[2] Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened.
CRPR = California Rare Plant Rank: 1A – presumed extinct; 1B – rare, threatened, or endangered in California and elsewhere; 2A – rare, threatened, or endangered in California and elsewhere; 2B – rare, threatened, or endangered in California but more common elsewhere. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered. MSHCP Conditionally Covered Species (a) through (f): (a) surveys may be required for species as part of wetland mapping (MSHCP Section 6.1.2); (b) surveys may be required for species within Narrow Endemic Plant Species Survey Area (MSHCP Section 6.1.3); (c) surveys may be required for species within locations shown on survey maps (MSHCP Section 6.3.2); (d) surveys may be required for species within Criteria Area Species Survey Area (MSHCP Section 6.3.2); (e) covered species will be considered to be covered species adequately conserved when conservation requirements identified in species-specific conservation objectives have been met (MSHCP Table 9-3); and (f) covered species will be conserved covered species adequately conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land (MSHCP Table 9-3).

[3] Potential to Occur is assessed as follows: **None**: Habitat suitable for species survival does not occur on the study area, the study area is not within geographic range of the species, and/or the study area is not within the elevation range of the species; **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during focused surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused surveys for the species were negative.

Appendix G

Sensitive Animal Species Potential to Occur

Appendix G
SENSITIVE ANIMAL SPECIES POTENTIAL TO OCCUR[1]

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Amphibians				
Spea hammondii	western spadefoot	SSC MSHCP Covered Species	Occurs in open coastal sage scrub, chaparral, and grassland, along sandy or gravelly washes, floodplains, alluvial fans, or playas; require temporary pools for breeding and friable soils for burrowing; generally excluded from areas with bullfrogs (*Rana catesbiana*) or crayfish (*Procambarus* spp.)	**None.** The study area does not occur along a wash, floodplain, alluvial fan, or playa. Although depressional areas were observed in the northwestern portion of the study area, these areas were small and were not deep enough to support this species.
Reptiles				
Anniella stebbinsi	Southern California legless lizard	SSC	Occurs in moist, warm, loose soil with plant cover. May be found in coastal sand dunes, chaparral, pine-oak woodlands, desert scrub, sandy washes, and stream terraces with sycamores, cottonwoods, or oaks.	**None.** The study area does not support coastal sand dunes, sandy washes, or suitable vegetation communities.
Aspidoscelis tigris stejnegeri	coastal whiptail	SSC MSHCP Covered Species	Open coastal sage scrub, chaparral, and woodlands. Frequently found along the edges of dirt roads traversing its habitats. Important habitat components include open, sunny areas, shrub cover with accumulated leaf litter, and an abundance of insects, spiders, or scorpions.	**None.** The study area does not support coastal sage scrub, chaparral, or woodlands.
Crotalus ruber	red-diamond rattlesnake	SSC MSHCP Covered Species	Occurs in chaparral, coastal sage scrub, along creek banks, particularly among rock outcrops or piles of debris with a supply of burrowing rodents for prey.	**Low.** Although the study area does not support chaparral, or coastal sage scrub, the rock outcrops may provide potentially suitable habitat for this species.

Appendix G (cont.)

SENSITIVE ANIMAL SPECIES POTENTIAL TO OCCUR

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Actinemys pallida	southwestern pond turtle	SSC MSHCP Covered Species	Almost entirely aquatic; occurs in freshwater marshes, creeks, ponds, rivers and streams, particularly where basking sites, deep water retreats, and egg laying areas are readily available.	**None.** The study area does not support suitable aquatic habitat for this species.
Phrynosoma blainvillii	coast horned lizard	SSC MSHCP Covered Species	Coastal sage scrub and open areas in chaparral, oak woodlands, and coniferous forests with sufficient basking sites, adequate scrub cover, and areas of loose soil; require native ants, especially harvester ants (*Pogonomyrmex* spp.), and are generally excluded from areas invaded by Argentine ants (*Linepithema humile*).	**None.** The study area does not support chaparral, oak woodlands, or coniferous forest habitats.
Salvadora hexalepis virgultea	coast patch-nosed snake	SSC	Primarily found in chaparral but also inhabits coastal sage scrub and areas of grassland mixed with scrub. Uses small mammal burrows for refuge and overwintering.	**None.** The study area does not support chaparral, coastal sage scrub, or areas of grassland mixed with scrub.
Birds				
Agelaius tricolor	tricolored blackbird	ST/SSC MSHCP Covered Species	Breeds in dense stands of cattails (*Typha* sp.) or bulrushes (*Schoenoplectus* sp./*Scirpus* sp.) located within large freshwater marshes. Forages in adjacent open habitats, such as agricultural fields, pastures, or grasslands.	**None.** The study area does not support dense stands of cattails or bulrushes.

Appendix G (cont.)
SENSITIVE ANIMAL SPECIES POTENTIAL TO OCCUR

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Athene cunicularia	burrowing owl	SSC MSHCP Covered Species (c)	Typical habitat is grasslands, open scrublands, agricultural fields, and other areas where there are ground squirrel burrows or other areas in which to burrow.	**Moderate.** The study area supports some limited areas of suitable habitat. Focused surveys are being performed during the 2021 breeding season. The most recent occurrence of this species was recorded on CNDDB in 2007, approximately 2.3 miles to the southwest of the study area.
Coccyzus americanus	western yellow-billed cuckoo	FT/SE MSHCP Covered Species (a)	Generally occurs along larger river systems, where it nests in riparian forest dominated by willows (*Salix* sp.) and cottonwoods (*Populus* sp.).	**None.** The study area does not support riparian forest.
Icteria virens	yellow-breasted chat	SSC MSHCP Covered Species	Summer resident of mature riparian woodlands. Nests are placed in low, dense vegetation, such as willows (*Salix* sp.), blackberry (*Rubus* sp.), and wild grape (*Vitis californica*).	**None.** The study area does not support mature riparian woodlands.
Polioptila californica californica	coastal California gnatcatcher	FT/SSC MSHCP Covered Species	Occurs in coastal sage scrub and very open chaparral.	**None.** The study area does not support coastal sage scrub or chaparral.
Vireo bellii pusillus	least Bell's vireo	FE/SE MSHCP Covered Species (a)	Inhabits riparian woodland and is most frequent in areas that combine an understory of dense, young willows or mule fat with a canopy of tall willows.	**None.** The study area does not support suitable southern willow scrub habitat.
Mammals				
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	SSC MSHCP Covered Species	Herbaceous openings within coastal sage scrub, chaparral, grasslands, and desert scrub. Often associated with sandy, rocky, or gravelly substrates.	**Moderate.** The study area does not support coastal sage scrub, chaparral, or desert scrub. The study area supports some areas of non-native grassland habitat. This species was recorded 0.75 miles northwest of the study area in 1990.

Appendix G (cont.)
SENSITIVE ANIMAL SPECIES POTENTIAL TO OCCUR

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Dipodomys merriami parvus	San Bernardino kangaroo rat	FE/SCE MSHCP Covered Species (c)	Generally associated with alluvial fan sage scrub, but also occurs in sage scrub, chaparral, and grassland in proximity to alluvial fan sage scrub habitats.	**None.** The study area does not support alluvial fan sage scrub.
Dipodomys stephensi	Stephens' kangaroo rat	FE/ST MSHCP Covered Species	Primarily occurs in sparsely vegetated areas within grassland habitats, but also found in open coastal scrub habitat. Feeds on filaree (*Erodium* sp.) and brome (*Bromus* sp.) seeds. Dig burrows in firm soil or use abandoned pocket gopher burrows.	**Moderate.** The study area supports suitable sparsely vegetated areas for this species. The nearest observation of this species was recorded in CNDDB in 1989, approximately 1.6 miles to the northeast of the study area.
Eumops perotis californicus	western mastiff bat	SSC	Roosts under exfoliating rock slabs on cliff faces and occasionally in large boulder crevices with vertical faces and building cracks. Forages in a variety of open areas, including washes, floodplains, chaparral, coastal sage scrub, woodlands, ponderosa pine forests, grassland, and agricultural areas.	**Low.** Although the study area supports small areas of rock outcrops, the habitat is not suitable for roosting. This species requires vertical faces to drop off to take flight from a roost. The study area supports some potentially suitable foraging habitat. This species was recorded on CNDDB in 1990, approximately 0.3 mile to the southeast of the study area.
Lasiurus xanthinus	western yellow bat	SSC	Roosts in trees and are commonly found in palms and cottonwoods. Typically forages over water and among trees within riparian, desert riparian, desert wash, and palm oasis habitats.	**None.** The study area does not support trees or foraging habitat for this species.

Appendix G (cont.)
SENSITIVE ANIMAL SPECIES POTENTIAL TO OCCUR

Species Name	Common Name	Status[2]	Habitat, Ecology, and Life History	Potential to Occur[3]
Lepus californicus bennettii	San Diego black-tailed jackrabbit	SSC MSHCP Covered Species	Occurs primarily in open habitats including coastal sage scrub, chaparral, grasslands, croplands, and open, disturbed areas if there is at least some shrub cover present.	**Low.** The study area supports a small area of potentially suitable habitat cover habitat due to presence of scattered shrubs and rock outcrops. This species was recorded on CNDDB in 2007, approximately 4.5 miles to the north of the study area.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	SSC MSHCP Covered Species (c)	Sandy, gravelly, or stony soils within coastal scrub, alluvial sage scrub, and grassland habitats.	**None.** The study area does not support suitable coastal scrub, alluvial sage scrub, or grassland habitat.
Taxidea taxus	American badger	SSC	Generally found in dry, open shrublands, forest, and grasslands with friable soils.	**None.** The study area does not support suitable open space for this species. No large burrows were observed on the study area.

Source: HELIX (2021)

[1] Sensitive species reported within the Sunnymead quadrangle based on a database search conducted on CNDDB.

[2] Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; CT = Candidate Threated; FP = Fully Protected; SSC = State Species of Special Concern. MSHCP Conditionally Covered Species (a) through (f): (a) surveys may be required for species as part of wetland mapping (MSHCP Section 6.1.2); (b) surveys may be required for species within Narrow Endemic Plant Species Survey Area (MSHCP Section 6.1.3); (c) surveys may be required for species within locations shown on survey maps (MSHCP Section 6.3.2); (d) surveys may be required for species within Criteria Area Species Survey Area (MSHCP Section 6.3.2); (e) covered species will be considered to be covered species adequately conserved when conservation requirements identified in species-specific conservation objectives have been met (MSHCP Table 9-3); and (f) covered species will be conserved covered species adequately conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land (MSHCP Table 9-3).

[3] Potential to Occur is assessed as follows. **None**: Species is so limited to a particular habitat that it cannot disperse across unsuitable habitat (*e.g.* aquatic organisms), and habitat suitable for its survival does not occur on the study area; **Not Expected**: Species moves freely and might disperse through or across the study area, but suitable habitat for residence or breeding does not occur on the study area (includes species recorded during surveys but only as transients); **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent for residence or breeding is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during biological surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused/protocol surveys for the species were negative.

HELIX
Environmental Planning

Tentative Tract Map 38123 Residential Project

Cultural Resources Survey Report

October 2021 | 00239.00028.001 (DRH-28)

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Mary Robbins-Wade

Mary Robbins-Wade
Cultural Resources Group Manager

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

Tentative Tract Map 38123 Residential Project

Cultural Resources Survey Report

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

October 2021 | DRH-28

National Archaeological Database Information

Author(s):	Kassie Sugimoto and Theodore G. Cooley
Firm:	HELIX Environmental Planning, Inc
Client/Project:	D.R. Horton / Tentative Tract Map 38123 Residential Project
Report Date:	October 2021
Report Title:	Cultural Resources Survey Report for the Proposed Tentative Tract Map 38123 Residential Project, City of Moreno Valley, Riverside County, California
Type of Study:	Cultural Resources Survey
New Sites:	None
Updated Sites:	P-33-003249 (CA-RIV-3249H), P-33-016788
USGS Quad:	Sunnymead 7.5' Quadrangle
Acreage:	Approximately 36 acres
Key Words:	Riverside County; Moreno Valley; City of Moreno Valley; Alessandro Boulevard; prehistoric bedrock milling feature; water cistern.

This page intentionally left blank

TABLE OF CONTENTS

Section **Page**

LIST OF APPENDICES
(Confidential, Bound Separately)

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
AMSL	above mean sea level
APN	Assessor's Parcel Number
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CHRIS	California Historical Resources Information System
CRHR	California Register of Historical Resources
EGA	EGA Consultants, LLC
EIC	Eastern Information Center
F	Fahrenheit
GeoTek	GeoTek, Inc.
HELIX	HELIX Environmental Planning, Inc.
I	Interstate
km	kilometers
Leighton	Leighton and Associates
MLD	most likely descendant
NAHC	Native American Heritage Commission
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
PA	Project Architect
PI	principal investigator
PRC	Public Resources Code
Project	Tentative Tract Map 38123 Residential Project
Santa Fe	Atchison, Topeka and Santa Fe Railway
SHPO	State Historic Preservation Officer
SLR	San Luis Rey
TCR	Tribal Cultural Resources
USGS	U.S. Geological Survey

This page intentionally left blank

EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) was contracted by D.R. Horton to conduct a cultural resources study for the proposed "Tentative Tract Map 38123" Residential Project (Project). The Project is located within the City of Moreno Valley, in western Riverside County. The proposed Project intends to develop a residential tract within two adjacent parcels. The site development includes the grading and construction of 177 single-family residential lots, two water quality basins, open space areas, underground utilities, and street improvements. The Project site consists of two adjacent properties, including the approximately 17.6-acre "Skylar Place" property (Assessor's Parcel Number [APN] 487-470-025) on the west and the approximately 17.9-acre "Windsong" property (APN 487-470-028) on the east.

A cultural resources study including a records search, Sacred Lands File search, Native American outreach, a review of historic aerial photographs and maps, and a field survey was conducted by HELIX in 2021. This report details the methods and results of the cultural resources study and has been prepared to comply with the California Environmental Quality Act (CEQA).

The records search conducted at the Eastern Information Center indicated that 23 previous cultural resources studies have been conducted within a half-mile of the Project, two of which, RI-00182 (Weaver 1975) and RI-00742 (Wilke 1979), occurred within the Project site. Additionally, the records search identified 12 previously recorded cultural resources within a half-mile radius of the Project site. Of these, two resources (P-33-003249 and P-33-016788) are located within the Project site. The remaining 10 resources are located outside of the development footprint within a half-mile of the Project site. However, three resources (P-33-000857, P-33-003159, and P-33-003342) are located adjacent to the Project site, south of Alessandro Boulevard. The resources within the search area pertain to both the prehistoric and historic eras. The prehistoric resources include sites comprised of lithic scatters, bedrock milling features, cairns/rock features, and rock shelters. The historic resources consist of historic archaeological sites containing structural pads or foundations, privies or historic trash scatters, wells/cisterns, and historic (single-family) properties.

A pedestrian survey of the Project site was conducted on February 26, 2021, by HELIX archaeologists Julie Roy and Dominique Diaz de Leon and a Native American monitor from the Soboba Band of Luiseño Indians (Soboba), Victoria Banda. P-33-003249 could not be observed during the survey; it appears to have been destroyed sometime between 2004 and 2005. P-33-016788 is located along the northeastern boundary of the western (Skylar Place) parcel. However, the "mortars" do not appear to be prehistoric in nature. The "mortars" pictured on the original site record appear to be mechanically drilled holes in the rock, rather than bedrock milling features. Only mechanically drilled holes were observed during the survey, no actual mortars. The "feature" remains heavily disturbed and out of context, consistent with the observations made in 2007 when it was originally recorded.

Based upon the findings of the survey, the Project is expected to have no impacts to significant cultural resources; however, the general vicinity of the Project has been occupied/used by the Luiseño, Cahuilla, and other native people for thousands of years, and there are numerous previously recorded cultural resources within the Project vicinity. In addition, the Project site falls within the Traditional Use Area of several local tribes and may be sensitive for cultural resources. Based on these factors, an archaeological and Native American monitoring program is recommended, as described in the mitigation measures presented in this report.

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

This page intentionally left blank

1.0 INTRODUCTION

1.1 PROJECT LOCATION

HELIX Environmental Planning, Inc. (HELIX) was contracted by D.R. Horton to conduct a cultural resources study for the proposed “Tentative Tract Map 38123” Residential Project (Project). The Project is located within the City of Moreno Valley, in western Riverside County (Figure 1, *Regional Location*), within Section 9 of Township 3 South, Range 3 West, on the U.S. Geological Survey (USGS) 7.5' Sunnymead quadrangle (Figure 2, *USGS Topography*). The Project site consists of two adjacent properties, including the approximately 17.6-acre “Skylar Place” property (APN 487-470-025) on the west and the approximately 17.9-acre “Windsong” property (APN 487-470-028) on the east (Figure 3, *Project Location)*. Both properties are currently vacant but have been graded and/or previously disturbed by past activities. The cultural resources study area for the Project consisted of the two adjacent properties and a half-mile buffer.

In addition to the primary development area that is intended for a residential development, the project site includes off-site areas intended for half-width improvements, infrastructural improvements, and a 50-foot buffer to account for over excavations along Lasselle Street, Bay Avenue, Darwin Drive, and Alessandro Boulevard. The off-site area also includes a portion of Lasselle Street, located south of Alessandro Boulevard, for a new storm drain connection. All activities within the off-site locations will occur within the public right-of-way. The southwest corner of the development area, located at the intersection of Alessandro Boulevard and Lasselle Street, was included in the cultural resources study, but will be omitted from the residential development; this section is slated for future commercial development that will be assessed in the future and excluded from the current residential project (Figure 3).

1.2 PROJECT DESCRIPTION

The Project intends to develop a residential tract within the two adjacent parcels. The site development includes the grading and construction of 177 single-family residential lots, two water quality basins, open space areas, underground utilities, and street improvements. Within the Skylar Place (western) portion of the site, cuts and fills up to 18 and 15 feet, respectively, are anticipated to be required to reach design grades, while cut and fill slopes up to about seven feet in height and at 2:1 (horizontal to vertical [h:v]) maximum gradients, as well as retaining walls, are expected. Skylar Place will be developed into 75 residential lots. Similarly, cuts and fills up to 20 and nine feet, respectively, are anticipated to be required to reach design grades within the Windsong (eastern) portion of the site. The Windsong parcel will be developed into 102 residential lots. Cut and fill slopes up to about five to ten feet in height, respectively, at 2:1 (h:v) maximum gradients, as well as retaining walls, are also expected to be necessary within the Windsong property. Vehicular access to the Project site would be provided by seven driveways, including one from Alessandro Boulevard to the south, two from Lasselle Street to the west, one from Bay Avenue to the north, and three from Darwin Drive to the east.

1.3 REGULATORY FRAMEWORK

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, and/or scientific importance. The California Environmental Quality Act (CEQA), Public Resources Code (PRC) 21084.1, and CEQA Guidelines, California Code of Regulations (CCR) Title 14 Section 15064.5, discuss significant cultural resources as "historical resources," and define them as:

- resource(s) listed or determined eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources (CRHR) (14 CCR Section 15064.5[a][1])
- resource(s) either listed in the NRHP [National Register of Historic Places] or in a "local register of historical resources" or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless "the preponderance of evidence demonstrates that it is not historically or culturally significant" (14 CCR Section 15064.5[a][2])
- resources determined by the Lead Agency to meet the criteria for listing on the CRHR (14 CCR Section 15064.5[a][3])

For listing in the CRHR, a historical resource must be significant at the local, state, or national level under one or more of the following four criteria:

A. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;

B. It is associated with the lives of persons important to local, California, or national history;

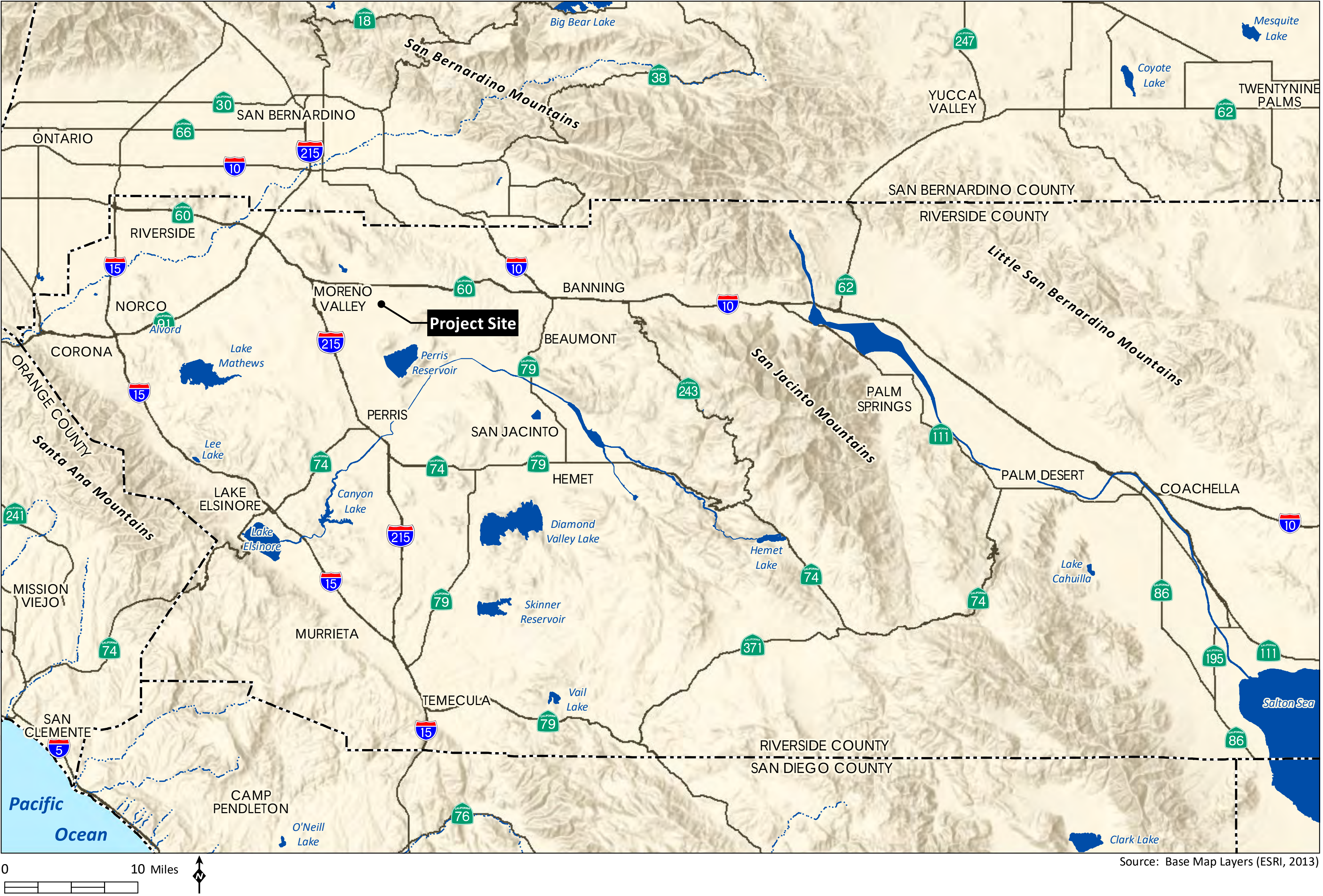
C. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; and/or

D. It has yielded or has the potential to yield information important to the prehistory or history of the local area, California, or the nation.

Under 14 CCR Section 15064.5(a)(4), a resource may also be considered a "historical resource" for the purposes of CEQA at the discretion of the lead agency.

All resources that are eligible for listing in the CRHR must have integrity, which is the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Resources, therefore, must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. In an archaeological deposit, integrity is assessed with reference to the preservation of material constituents and their culturally and historically meaningful spatial relationships. A resource must also be judged with reference to the particular criteria under which it is proposed for nomination.

California State Assembly Bill 52 (AB 52) revised PRC Section 21074 to include Tribal Cultural Resources (TCRs) as an area of CEQA environmental impact analysis. Further, per new PRC Section 21080.3, a CEQA lead agency must consult with any California Native American tribe that requests consultation and that is traditionally and culturally affiliated with the geographic area of a proposed project to identify resources of cultural or spiritual value to the tribe, even if such resources are already eligible as historical resources as a result of cultural resources studies.



Source: Base Map Layers (ESRI, 2013)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\CUL\Phase1\Fig1_Regional.mxd DRH-28 10/6/2021 - DY

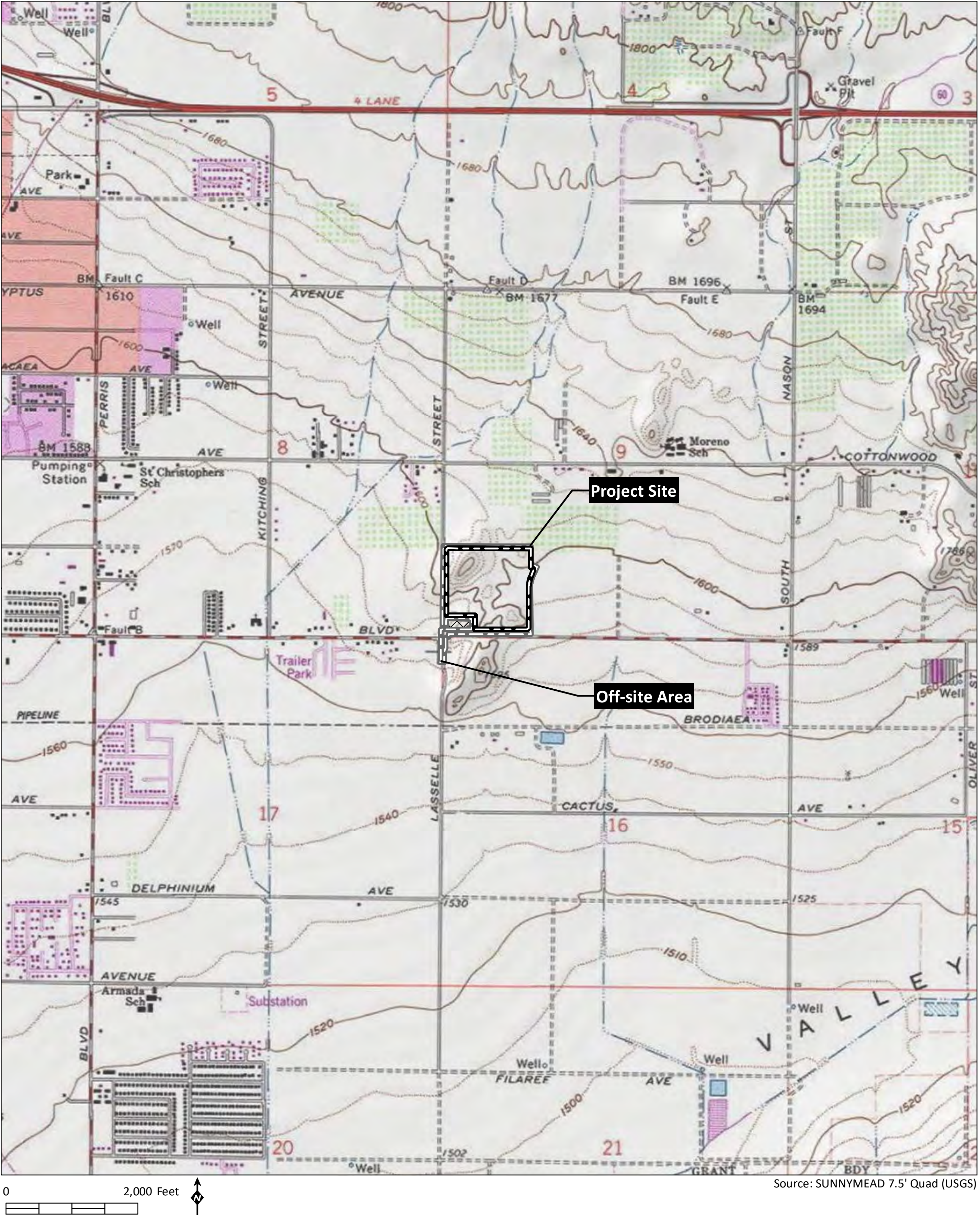
HELIX
Environmental Planning

Regional Location

Figure 1

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

Tentative Tract Map 38123



Source: SUNNYMEAD 7.5' Quad (USGS)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\CUL\Phase1\Fig2_USGS.mxd DRH-28 10/20/2021 -DY

HELIX Environmental Planning

USGS Topography

Figure 2

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Tentative Tract Map 38123

Study Area
- Project Site
- Off-site Impact
- ▨ Omitted from Residential Development Project
- Project Parcels

Source: Aerial (RCIT, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\CUL\Phase1\Fig3_Aerial.mxd DRH-28 10/20/2021 -DY

HELIX
Environmental Planning

Aerial Photograph

Figure 3

2.0 PROJECT SETTING

2.1 NATURAL SETTING

The Project area is in the Moreno Valley within the foothills of northwestern Riverside County. The Badlands mountains lie to the northeast, the Bernasconi Hills lie to the southeast, and the Box Spring Mountains are to the northwest. The climate of western Riverside County is characterized as a semi-arid environment with low humidity and rainfall. Almost all rainfall occurs in the winter, but the region can also experience rare, intense summer thunderstorms. Wind is also a strong feature of this climatic regime, with dry winds in excess of 25 miles per hour in the late winter and early spring (National Oceanic and Atmospheric Administration [NOAA] 2014). Average monthly temperatures range from a December low of 53.6 degrees Fahrenheit (°F) to an August high of 79.0°F, and the average yearly rainfall is 9.97 inches (Weather Currents 2017). The project area is flat with an elevation of approximately 1,540 to 1,600 feet above mean sea level (AMSL) across the Project site.

Geologically, the Project area is mostly underlain by granitic bedrock of quartz diorite to granodiorite (LaMont et al. 2020; Dibblee and Minch 2003). The regional geologic maps noted the general trend of foliations in the bedrock had a northwest-southeast orientation and a 50-degree inclination to the northeast. Locally, one trend of foliations in the bedrock had a northeast-southwest orientation with no defined inclination. Tonalite, undifferentiated, dating to the Cretaceous, is found east of Alessandro Boulevard and Lasselle Street and west of South Nason Street (Morton and Matti 2001). The Badlands to the north are of undivided Pliocene non-marine formations (Morton and Matti 2001).

The subsurface soil conditions were reported on by three geotechnical investigations carried out by EGA Consultants, LLC. (EGA), Leighton and Associates (Leighton), and GeoTek, Inc. (GeoTek). EGA mapped the subsurface soil conditions within the western (Skylar Place) parcel. The EGA study (Worthington 2006, 2007) included hollow-stem auger borings and a seismic refraction rippability assessment. EGA excavated twenty borings to a maximum depth of 36 feet below the existing ground surface, and their seismic refraction survey consisted of three 156-foot-long seismic traverses. EGA described the subsurface soil conditions at the proposed Project site as being fill and/or topsoil underlain by igneous bedrock. The fill/topsoil was encountered in the majority of the borings to average depths of 2 to 3 feet with the exception of the northeast portion of the site, where the fill extended to 13 feet below grade. The fill soils generally consisted of light brown and gray, dry, loose silty sands. Underlying the fill/topsoil materials was igneous bedrock in all test borings by EGA. The bedrock was described as Cretaceous-age bedrock consisting primarily of very coarse-grained crystalline tonalite, that is well-foliated and massive. The expansion index of the fill and the granitic bedrock was determined to be “very low” according to EGA.

Leighton (Hertzberg et al. 2005) conducted four hollow-stem auger borings, ten backhoe test pits, four D9R bulldozer test pits, and a seismic refraction rippability study within the eastern (Windsong) parcel of the Project site. Leighton excavated borings to a depth of 20 feet below grade and excavated backhoe test pits to a maximum depth of 10 feet. Their seismic refraction survey consisted of five seismic refraction lines about 250-foot long each. Leighton described the subsurface conditions within the Windsong parcel as granitic bedrock overlain by a thin veneer of alluvial and colluvial soils. The lower-lying areas, particularly in the central portions of the site, have thicker accumulations of alluvial soils. The alluvial soils encountered were generally two to three feet thick and consisted of loose to very dense gravelly sand to silty sand. Also encountered was medium stiff to very stiff sandy silt. Locally deeper alluvium encountered in the central portion of the site ranged from approximately four to 10 feet thick. Granitic bedrock of tonalite composition was encountered below the alluvium and at the ground surface at some areas throughout the site. The alluvial soils in the upper five to 10 feet were described as slightly compressible with a low collapse potential. Leighton recommended partial removal and recompaction of these soils.

GeoTek conducted a second geotechnical analysis on the western (Skylar Place) site consisting of exploratory trenches and borings excavated to log the subsurface materials and examine the rippability and/or hardness of localized areas throughout the site (LaMont et al. 2020). GeoTek excavated eleven trenches to depths ranging from two to 18 feet and drilled five exploratory borings to approximately 18 to 20 feet below grade. The GeoTek investigation described the subsurface soil profile in concurrence with the 2006 EGA study.

Although the soils are mostly disturbed due to the development within the Project site, these soil series would support vegetation consisting of annual grasses and forbs (National Cooperative Soil Survey 2017). Native grassland species would have been used by native populations for food, medicine, ceremonial, and other uses (Bean and Shipek 1978; Hedges and Beresford 1986). The granitic rocks found within the Project region would have provided native populations surfaces for milling and processing of plant resources. Many of the animal species living within this habitat (such as rabbits, deer, small mammals, and birds) would have been used by native inhabitants as well.

2.2 CULTURAL SETTING

2.2.1 Prehistoric Period

2.2.1.1 Introduction

The study area is located in the Moreno Valley area of northwestern Riverside County, California. Moratto (1984) has previously defined eight archaeological regions and 16 subregions for California. The location of the study area places it within the boundary of the San Diego subregion of the Southern Coast Region, but it is also located adjacent to the boundary with the Colorado River subregion of the Desert Region (Moratto 1984: 148, Figure 4.13). The following culture history outlines and briefly describes the known prehistoric cultural Traditions and chronology of archaeological sites in the vicinity of the study area. The approximately 10,000 years of documented prehistory of the region has often been divided into three periods: Early Prehistoric Period (San Dieguito Tradition [Warren 1968]), Fluted-Point Tradition [Moratto 1984], Archaic Period (Milling Stone Horizon [Wallace 1955], Encinitas Tradition [Warren 1968]), and Late Prehistoric Period.

Prior to 1984, when Moratto defined the San Diego subregion, little archaeological investigation had occurred in the western Riverside and San Bernardino counties portion of this subregion. This paucity of archaeological information limited the ability of early researchers to assess the cultural and temporal associations for the archaeological resources in this part of the subregion. One of the few early studies to occur in this area prior to 1984 was conducted near Temecula in the early 1950s at a site identified as the ethnohistoric village of Temeku (McCown 1955). The investigation produced a substantial, primarily Late Prehistoric Period, artifact assemblage, but with some possible Late Archaic materials as well. Another study, conducted in the 1970s, for the construction of the Perris Reservoir, located approximately four miles to the south of the project area (O’Connell et al. 1974, eds.), consisted of investigations at several sites and was, perhaps, the most extensive study conducted in the area prior to

1984. The results, which included several radiocarbon dates, indicated a predominance of occupation at the sites during the Late Prehistoric Period, after A.D. 1500, but with some limited evidence for occupation as early 380 B.C. (Bettinger 1974:159-162). During the last approximately 35 years since 1984, several archaeological studies have occurred in western Riverside County and have served to substantially augment the archaeological record for the area (e.g., Applied Earth Works, Inc. 2001; Grenda 1997; Horne and McDougall 2008; Keller and McCarthy 1989; McCarthy 1986, 1987). Based on the information provided by these and other subsequent studies in the area, Sutton and Gardner (2010) and others have recently begun to define the early prehistory of this area of the San Diego subregion and how it fits in with the previously better-known areas of the subregion. The three chronological periods defined for the prehistory of the San Diego subregion are described below.

2.2.1.2 Early Prehistoric Period

The Early Prehistoric Period represents the time of the entrance of the first known human inhabitants into California. In some areas of California, it is referred to as the Paleo-Indian period and it is associated with the Big-Game-Hunting activities of the peoples of the last Ice Age occurring during the Terminal Pleistocene (pre-10,000 years ago) and the Early Holocene (beginning circa 10,000 years ago) (Erlandson 1994, 1997; Erlandson et al. 2007). In the western United States, the most substantial evidence for the Paleo-Indian or Big-Game-Hunting peoples derives from finds of large, fluted spear and projectile points (Fluted-Point Tradition) at sites in places such as Clovis and Folsom in the Great Basin and the Desert southwest (Moratto 1984:79–88). In California, most of the evidence for the Fluted-Point Tradition derives principally from areas along the western margins of the Great Basin including the eastern Sierras and the Mojave Desert, and in the southern Central Valley (Dillon 2002; Rondeau et al. 2007). Elsewhere in California, with the exception of a site in the north coast ranges in northwestern California, CA-LAK-36, only isolated occurrences of fluted spear points have occurred, scattered around the state (Dillon 2002; Rondeau et al. 2007). These isolated occurrences have, however, included two fluted points or fluted point fragments recently discovered in the mountains of northern San Diego County approximately 54 miles to the south of the Project area (Kline and Kline 2007) and another along the coast approximately 43 miles to the west of the Project area in adjacent Orange County (Fitzgerald and Rondeau 2012). Two examples have also been discovered to the south in Baja California (Des Lauriers 2008; Hyland and Gutierrez 1995). Despite these isolated occurrences of fluted points elsewhere in the San Diego subregion and Baja California, none have been found, to date, in the western areas of Riverside or San Bernardino counties (Dillon 2002; Rondeau et al. 2007).

The earliest sites in the San Diego subregion, documented to be nearly 10,000 years old, belong to the San Dieguito Tradition (Warren et al 1998; Warren and Ore 2011). The San Dieguito Tradition, with an artifact assemblage distinct from that of the Fluted Point Tradition, has been documented mostly in the coastal and near coastal areas in San Diego County (Warren and True 1961; Rogers 1966; Warren 1966; True and Bouey 1990; Carrico et al. 1993) as well as in the southeastern California deserts (Rogers 1939, 1966; Warren 1967). The content of the earliest component of the C.W. Harris Site (CA-SDI-149), located along the San Dieguito River and approximately 68 miles to the south of the Project, formed the basis upon which Warren and others (Rogers 1966; Warren and True 1961; Warren 1966, 1967) identified the “San Dieguito complex,” which Warren later reclassified as the San Dieguito Tradition (1968). This Tradition is characterized by an artifact inventory consisting almost entirely of flaked stone biface and scraping tools, but lacking the fluted points associated with the Fluted-Point Tradition. Diagnostic artifact types and categories associated with the San Dieguito Tradition include elongated bifacial knives; scraping tools; crescentics; and Silver Lake, Lake Mojave, and leaf-shaped projectile points (Knell and Becker 2017; Rogers 1939, 1966; Vaughan 1982; Warren 1966, 1967; Warren and True 1961). Some researchers interpret the San Dieguito Tradition/complex as having a primarily, but not exclusively, hunting subsistence orientation, but sufficiently hunting oriented as to be distinct from the more gathering-oriented complexes of traits that were to follow in the Archaic Period (Warren 1968; Warren et al. 1998). Other researchers see the San Dieguito subsistence system as less focused on hunting, and more diversified, and, therefore, possibly ancestral to, or a developmental stage for, the subsequent, predominantly gathering oriented, Encinitas Tradition, denoted in the San Diego area as the “La Jolla/Pauma complex” (True 1958, 1980) during the Archaic Period (cf. Bull 1983; Ezell 1987; Gallegos 1985, 1987, 1991; Koerper et al. 1991. While little definite evidence for the San Dieguito Tradition has been discovered in other coastal and near-coastal areas of southern California outside of San Diego County, some evidence has recently been attributed to it in the eastern Mountains of San Diego County (Pigniolo 2005), and possibly in a coastal area approximately 70 miles to the west in Los Angeles County (Sutton and Grenda 2012).

2.2.1.3 Archaic Period

During the subsequent Archaic Period, artifact assemblages of the Milling Stone Horizon/Encinitas Tradition occur at a range of coastal and adjacent inland sites, and, in contrast to those of the previous Early Prehistoric Period, are relatively common in the study area region. These assemblages appear to indicate that a relatively stable, sedentary, predominantly gathering complex, possibly associated with one people, was present in the coastal and immediately inland areas of southern California for many millennia. Warren proposed that during the Archaic Period in the south coastal region, the Encinitas Tradition began circa 8,500 years ago and extended essentially unchanged until circa 1,500 years ago (Warren 1968; Warren et al. 1998). More recently, however, several sites in the western Riverside County area have produced Milling Stone Horizon/Encinitas Tradition assemblages with radiocarbon dating in excess of 9,000 years ago (Horne and McDougall 2008; McDougall 2001). Consequently, the earliest extent of the Archaic Period in the area is still in the process of being determined.

Subsequent to the Early Archaic, beginning circa 4,800 years ago and continuing to as late as 1,300 years ago, a cultural assemblage, variously described as the Intermediate Horizon (Wallace 1955) or Campbell Tradition (Warren 1968), has been delineated and distinguished, following the Milling Stone Horizon/Encinitas Tradition. This assemblage, initially occurring somewhere north of San Diego and extending to Santa Barbara, is distinguished from earlier Archaic assemblages by the presence of large projectile points and milling tools such as the mortar and pestle. While still a matter of some debate, Warren, and others (1998) have subsequently termed the time period encompassing the extent of the Intermediate/Campbell cultural assemblage in the southernmost coastal region as the Final Archaic Period.

In the western Riverside and San Bernardino counties area, Sutton and Gardner have identified early Archaic Period assemblages at sites near Yucaipa, Fontana, and in the Prado Basin area (2010:26). Site CA-SBR-5096 located along the Santa Ana River in the Prado Basin area has produced “manos and metates, a pinto point and an unknown number of cogged stones and discoidals” (Sutton and Gardner 2010:26). In the vicinity of the project area, site CA-SBR-1000 in the Yucaipa area contained an early Archaic component consisting of many manos and metates but no mortars or pestles, numerous projectile points (including Pinto points), a few discoidals and cogged stones, and a flexed inhumation (Kowta 1969; Sutton and Gardner 2010:26). Archaeological studies conducted at several sites in Perris Valley for the Perris Reservoir project, approximately four miles to the south of the study area, produced a single radiocarbon date within the Late Archaic Period of circa 2200 years before present (B.P.) as well as a few diagnostic artifacts as the only evidence for a late Archaic Period occupation at the sites

(Bettinger 1974:159-162). Investigations at another site, CA-RIV-1806, in the mountains northwest of Temecula, also produced a radiocarbon date for the Late Archaic Period of circa 2775 B.P. (McCarthy 1986:73). More recently, large-scale archaeological investigations that were conducted in western Riverside County for the Eastside Reservoir (since renamed Diamond Valley Lake) Project, located approximately 18 miles south of the study area, have elucidated the regional chronology. This project involved reservoir construction within the adjacent Domenigoni and Diamond valleys (Robinson 2001; Goldberg 2001). Based on the results from this project, the researchers developed a local chronology specific to the Domenigoni and Diamond valleys based on projectile point style changes and associated radiocarbon dates (Robinson 2001). The terminology in this chronology resembles that already presented above by Warren et al. (1998) with the period from 9,500 to 7,000 years ago designated as the Early Archaic period, the period from 7,000 to 4,000 years ago as the Middle Archaic, and the period from 4,000 to 1,500 years ago as the Late Archaic. Only two components could be firmly dated to the Early Archaic at the reservoir sites, but sparse evidence of Early Archaic activity was noted in six other localities. One site (CA-RIV-5086) did, however, produce two radiocarbon dates of 9190±50 and 9310±60 B.P. (McDougall 2001). For the Middle Archaic, firm evidence was documented in 14 locations, with other traces at four other sites. During the Late Archaic, a profusion of activity and occupation was evident, with 23 firmly dated site components and sparse evidence at eight other localities (Goldberg 2001:524).

Two other archaeological investigations conducted in the western Riverside County area have also produced evidence, based on radiocarbon dating, for prehistoric occupation during the earliest part of the Archaic Period. One of these investigations was conducted at archaeological site CA-RIV-2798, located approximately 19 miles to the southwest of the study area along the old shoreline of Lake Elsinore, a natural lake situated in a fault-created basin, whose principal source of water in prehistoric times was the San Jacinto River (Grenda 1997:3). The investigations produced results, including radiocarbon dating, that indicated occupation of the site as early as 8,500 years ago (Grenda 1997). Another investigation located inland, along the San Jacinto River, approximately 14 miles southeast of the study area, produced results, including radiocarbon dating, indicating an early Archaic Period occupation, dating to circa 9,400 years ago (Horne and McDougall 2008). The early assemblages at these sites appeared to be consistent with Milling Stone Horizon/Encinitas Tradition content with milling and primarily (but not exclusively) gathering tools present. Thus, prehistoric occupation during the Archaic Period, in areas of western Riverside County and in the study area vicinity, is now documented to have occurred, beginning, possibly as early as 9,400 years ago, and remained present to the end of the period, approximately 1,500 years ago.

This new evidence has prompted Sutton and Gardner (2010), to recently propose a reconceptualization of Warren’s Archaic Period Encinitas Tradition, including proposing a new pattern for the western Riverside and San Bernardino counties area, coexistent with the coastal Topanga complex/pattern in the Los Angeles Basin area and La Jolla complex/pattern in the San Diego area. The authors termed this pattern the Greven Knoll pattern, based on a site with that name, CA-SBR-1000, containing an Archaic Period assemblage (2010:26). This site was originally labeled as the Greven Knoll Site by Kowta (1969), and Kowta indicated that this term could also be used to represent the early inland Milling Stone Horizon in the area (Kowta 1969: Figure 5). The authors, therefore, chose to apply this designation for all of the inland Milling Stone Horizon/Encinitas Tradition patterns in the area, but divided it into three phases labelled Greven Knoll I (early), Greven Knoll II, and Greven Knoll III. While this chronologic terminology essentially corresponds to the Early, Middle, and Late Archaic Period chronology defined by Robinson (2001), Sutton and Gardner have incorporated additional site data from a broader range of inland sites in the western Riverside and San Bernardino counties area, and have integrated the results into Warren's original (1968), more coastal based, Encinitas Tradition concept of a relatively stable, sedentary, predominantly gathering complex, possibly associated with one people.

2.2.1.4 Late Prehistoric Period

The beginning of the Late Prehistoric Period, circa 1,500 years ago, is seen as time-marked by a number of rather abrupt changes. The magnitude of these changes and the short period of time within which they took place are reflected in significant alteration of previous subsistence practices and the adoption of significant new technologies. As discussed further below, some of this change may have been as a result of significant variations in the climatic conditions. Subsistence and technological changes that occurred include a shift from hunting using atlatl and dart to the bow and arrow; a de-emphasizing of shellfish gathering along some areas of the coast (possibly due to silting-in of the coastal lagoons); and an increase in the storage of crops, such as acorns and pinyon nuts, by both Takic and Yuman speaking peoples. Other new traits introduced during the Late Prehistoric Period include the production of pottery and cremation of the dead, and, locally, in the western Riverside County area, a shift in settlement pattern is apparent (cf. Wilke 1974).

This shift in settlement is first noted during the early part of the period from 1,500 to 750 years ago and is evidenced, locally, in the results from the Eastside Reservoir (Diamond Lake) Project by a rather sudden decline in occupation in the local area during the initial part of the period. This 750-year period was termed by the Eastside Reservoir researchers as the Saratoga Springs Period, following Warren's (1984) desert terminology. This period can also be seen to partially coincide with a warm and arid period known as the Medieval Warm Period, documented to have occurred between approximately 1,100 and 600 years ago (Jones et al. 1999; Kennett and Kennett 2000; Stine 1994). During this period, at least two episodes of severe drought have also been demonstrated, the first between 1060 and 840 cal B.P. and the second between 740 and 650 cal B.P. (Goldberg 2001; Stine 1994). While sites dating to this period are not absent in western Riverside County (e.g., McCarthy 1987:34; Keller and McCarthy 1989), Goldberg (2001) hypothesized that the Medieval Warm Period could account for the decline in sites occurring in the Eastside Reservoir Project area during the Saratoga Springs Period (1500 to 750 B.P.), claiming that desert and inland areas of western Riverside County, such as where the Eastside Reservoir Project and the current study area are located, would no longer be suitable to support residential bases. Goldberg (2001) further hypothesized that settlements would possibly be clustered at more suitable water sources during this time, such as at the coast, Lake Cahuilla, or Lake Elsinore (cf. Wilke 1974; 1978). While a decline was noted during the initial part of the Saratoga Springs Period, subsequently, during the latter Medieval Warm Period, a reoccupation began to occur (Goldberg 2001:578). According to Goldberg "When components dating to the Medieval Warm segment of the Saratoga Springs Period are segregated and combined with Medieval Warm components from the Late Prehistoric Period, it shows that the frequency of refuse deposits and artifact and toolstone caches during the Medieval Warm is slightly higher than during the Late Archaic and much higher than during the later portion of the Late Prehistoric Period..." (2001:578).

In the Eastside Reservoir Project, the Late Prehistoric Period was defined as extending from the end of the Saratoga Springs Period (750 B.P.) to 410 B.P. A subsequent Protohistoric Period was also defined as extending from 410 to 150 B.P. The Late Prehistoric (750 to 410 B.P.) was characterized by the presence of Cottonwood points, although research indicated that Cottonwood points had actually begun to appear in the Eastside Reservoir Project study area as early as 950 B.P. Ceramics and abundant obsidian begin to appear around the time of the Cabrillo exploration in A.D. 1542 and so this date (i.e., circa 410 B.P.), until the establishment of the mission system in the late 1700s, was defined as the Protohistoric

Period (Robinson 2001). It should also be noted that the end of the Saratoga Springs Period and the beginning of the Late Prehistoric Period, 750 B.P., also coincides with the onset of the Little Ice Age, generally dated from 750 to 150 B.P. (Goldberg 2001; Sutton et al. 2007). During this period, the climate was cooler and moister, and the sites identified within the Eastside Reservoir Project study area reflected a substantial increase in number and diversity, longer occupation periods, and more sedentary land use. Similar intensification of land use also occurred during this time in the neighboring San Gorgonio Pass (Bean et al. 1991) and Perris Valley (Wilke 1974).

Differing from the terminology used in the Eastside Reservoir study, the Late Prehistoric Period has been more commonly described, archaeologically, in the northern San Diego County and the western portion of Riverside County, as the San Luis Rey (SLR) complex. As originally defined by Meighan (1954), the SLR complex is associated with the ethnographic Luiseño who were present in the area at the time of first contact with Europeans. Meighan saw the complex as occurring in two phases: SLR I and SLR II, with the principal archaeological element distinguishing the two phases being the absence of pottery in SLR I sites and its presence in SLR II assemblages. The introduction of pottery was seen as having disseminated to the prehistoric Luiseño from their neighbors, the Kumeyaay, to the south (Rogers 1936; Meighan 1954:221). Elements of the SLR I phase include small, triangular, pressure-flaked projectile points (generally Cottonwood series with Desert Side-notched series points rarely occurring); milling implements, including mortars and pestles, manos and metates, and bedrock milling features; bone awls; Olivella shell beads; other stone and shell ornaments; and cremations (Meighan 1954; Moratto 1984; True et al. 1974; Pigniolo 2004). In addition to pottery, the later SLR II assemblages include several other elements not found in SLR I assemblages: "cremation urns, red and black pictographs, and such nonaboriginal items as metal knives and glass beads" (Meighan 1954:223). SLR I was originally thought by Meighan to date from A.D. 1400 to A.D. 1750, with SLR II dating between A.D. 1750 and A.D. 1850 (Meighan 1954:223). This chronology was subsequently revised, however, by True and others, who suggested that, while "some pottery probably filtered across from Diegueño [Kumeyaay] territory perhaps as early as A.D. 1200-1300 under some circumstances, ...the introduction of pottery as a regular and important element in the San Luis Rey lifeway probably did not take place until a century or two before the arrival of the Spanish (perhaps A.D. 1500-1600)" (True et al. 1974:97). It is of interest to note in regard to the origin of pottery with the Cahuilla, that rather than them having acquired it from either the Kumeyaay or their Takic neighbors the Luiseño, Bean and Lawton (1992:5) have stated that "Cahuilla pottery was probably borrowed from the Colorado River Indians to the east at a relatively late date". In regard to the Serrano, Johnston (1980:7) states that they were "prolific" pottery makers and indicates that some Serrano wares (e.g., black-on-buff ware) occurred in Serrano territory more commonly in proximity to Cahuilla territory, probably indicating "intermingling of technique and design because it is also found among Cahuilla ware" suggesting an exchange of the ceramic technology between the groups.

2.2.2 Ethnohistory

The study area location is marginal to the territories of three Native American tribal peoples, the Luiseño, Cahuilla, and Serrano, all of the Takic family of the Uto-Aztecan language stock (Shipley 1978; Miller 1984). These Takic-speaking groups are thought to represent migration into the area occurring approximately 1,500 B.P. (Schaefer 2006:21). At the time of European contact, the Luiseño territory extended from the southern Orange County area, south into northern San Diego County, and east into western Riverside and San Bernardino counties. Due to a lack of data, the boundaries of Serrano territory are not well-defined (Bean and Smith 1978), but based on what is known, they occupied the San Bernardino Mountains east of the Cajon Pass, north to Victorville, east to Twentynine Palms, and south to the Yucaipa Valley (Bean and Smith 1978:570). The Cahuilla territory included a portion of the eastern San Bernardino Valley, the southern San Bernardino Mountains as well as the San Jacinto and Santa Rosa Mountains, and extended into the desert and the Coachella Valley in the northern part of the Salton Basin. The name for the coastal Luiseño is based on their association, post-European contact, with the Mission San Luis Rey. The terms for the exclusively inland Cahuilla and Serrano, while not related to the missions, are also of likely Spanish origin. "Serrano" in Spanish equates to "mountaineer" or "highlander" (Kroeber 1925; Bean and Smith 1978:570). According to Strong (1929:36), "The derivation of the term Cahuilla is obscure, and it is regarded by the Indians to be of Spanish origin." It has been suggested that it possibly derives from their own word *Káwiya*, which translates as 'master or boss' (Bean 1978:575; Kroeber 1925:693).

Based on Kroeber (1925:Plate 57), the location of the study area lies within the northernmost extent of the territory of the Luiseño, while Bean (1978:576) using the Santa Ana River as a boundary, places it within the territory of the Cahuilla. Kroeber, and other researchers, also show the westernmost extent of the territory of the Serrano into the San Bernardino Valley to be in close proximity to the Project location (Bean 1978; Bean and Smith 1978; Bean and Shipek 1978; Kroeber 1925:Plate 57). Territorial boundaries between native groups, however, have long been difficult for early ethnographers to definitely delineate. It has been noted that the territorial boundaries between the Luiseño, Cahuilla, and their neighbor, the Kumeyaay to the south, were apparently somewhat fluid at the time of European contact (Schaefer 2006). Schaefer (2006), for example, observed in regard to the territorial boundary between the Cahuilla and their neighbor the Kumeyaay, that, as both groups "consider the cultural resources of the general area as part of their cultural and historical legacy," tribal boundaries likely shifted through time (2006:21). Similarly, Bean and Smith noted for the Serrano that "It is nearly impossible to assign definitive boundaries for the Serrano territory due, both to Serrano sociopolitical organizational features, and to a lack of reliable data" (Bean and Smith 1978:570). As the Project area represents a likely transitional region between the ethnographic territories of the Cahuilla, Luiseño, and Serrano, all of these groups are reviewed here.

2.2.2.1 Luiseño

The earliest substantial Spanish contact with the Luiseño was with the Portola expedition in 1769 (Bean and Shipek 1978:557), the land expedition along the coastline from San Diego to San Francisco (Treutlein 1968). The impact of the establishment of the Spanish mission system and colonization along the coast, beginning during the end of the eighteenth century and the beginning of the nineteenth century, while not as substantial as to the Gabrielino, was still also immediate and profound to the Luiseño. The rapid spread of deadly European diseases and their early absorption into the mission system greatly reduced their population and disrupted their social organization and religious practices. Kroeber estimates that the Luiseño population was approximately 4,000 at the beginning of the Mission era (1770), but only about 500 by 1910 (1925:883). Unlike the Gabrielino, however, several early ethnographers were able to record their native culture (e.g., Sparkman 1908).

Prior to contact, the Luiseño subsisted by hunting and gathering practices making use of resources available in the natural environment. In addition to terrestrial resources, their access to the coast allowed them to expand their resource base to include marine resources as well. (Sparkman 1908; White 1963). Luiseño territory was subdivided and occupied by different families or bands. Family groups were known as *tunglam* or *kamalum*. Chiefs acted as religious leaders of clans and directed religious ceremonies. This position was hereditary (Sparkman 1908). The Luiseño subsisted on seeds, acorns, fruits, and berries, as well as meat caught by hunting and fishing (Kroeber 1925; Sparkman

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

1908). The Luiseño followed a seasonal gathering cycle, with bands occupying a series of campsites within their territory (Bean and Shipek 1978; White 1963). One band could have multiple areas depending on the season such as in the mountains or valley areas (Sparkman 1908). Each band was typically restricted to their territory for hunting and resource gathering. The resources used depended on the seasons, as the Luiseño moved through the coastal, foothill, or mountain zones (Lightfoot and Parrish 2009).

The Luiseño lived in semi-sedentary villages usually located along major drainages, in valley bottoms, and also on the coastal strand, with each family controlling gathering areas (Sparkman 1908; White 1963; Bean and Shipek 1978). True (1990) indicated that the predominant determining factor for placement of villages and campsites was locations where water was readily and consistently available. Studies of the Luiseño indicate that within their territory, the village territorial units were fairly small, on the order of 30 square miles (78 square kilometers [km^2]) according to White (1963). Based on the distribution of known villages along the San Luis Rey River in northern San Diego County, however, Oxendine (1983) suggests that rancheria (village) territories may have been as small as 4 square miles (10 km^2) but notes that lineages or bands may have held gathering tracts in discontinuous areas. Prehistorically, the distribution of such village units generally correlated with available water sources such as drainages and springs (Koerper et al 2002:64; True 1990).

2.2.2.2 Cahuilla

The earliest Spanish contact with the Cahuilla may have been with the Anza expedition trips in 1774 and 1777. The route followed San Felipe Creek west through Borrego Springs, up into the San Jacinto Mountains (Pourade 1962:164; Schaefer 2006:23). The impact of the Spanish mission system and colonization along the coast was much less immediate and profound within the isolated desert and mountain groups. It was not until 1819, after the establishment of the San Bernardino estancia and cattle ranch at San Gorgonio, that a more direct Spanish influence was felt.

The diversity of Cahuilla territory reflected the range of environmental habitats in inland Southern California. Topographically, their territory ranged from the summit of the southern San Bernardino Mountains, in excess of 11,000 feet, to the Coachella Valley and Salton Sink, well below sea level. Ecological habitats included the full range of mountains, valleys, passes, foothills, and desert areas. Villages were typically situated in canyons or on alluvial fans near water and food resources, and a village's lineage owned the immediately surrounding land (Bean 1978). Well-developed trails were used for hunting and traveling to other villages. Village houses ranged from brush shelters to large huts 15 to 20 feet long. Important plant foods exploited from the Cahuilla's diverse habitat included mesquite and screw beans, piñon nuts, and various cacti. Other important plant foods included acorns (six oak varieties), various seeds, wild fruits and berries, tubers, roots, and greens (Barrows 1900; Bean and Saubel 1972). Women were instrumental in the collection and preparation of vegetal foods. The material culture of the Cahuilla included implements such as baskets and pottery, bow and arrows, awls, arrow shaft straighteners, bags and storage pouches, stone pipes, musical instruments, nets, and costumes were made of plant fibers, stone materials, wood, bone, and shell (Bean 1978).

The Cahuilla recognized two nonpolitical and nonterritorial moieties: The wildcats (*túktem*) and coyotes (*ˀístam*) (Bean 1978:580); *tukut* and *isil* (Gifford 1918:186). The moieties were exogamous - marriage took place to a person of the opposite moiety and patrilocal with patrilinear lines of descent, with women relocating to live with their husband while remaining a member of the moiety into which she was born. The moieties were divided into numerous localized political-religious clans (often referred to

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

as localized groups, kins, bands, or sibs), with the name of the clans frequently translated as "living at 'such a place'" (Bean 1972; Gifford 1918). Clans were autonomous from one another and commonly owned well-defined territories.

When Lake Cahuilla was present, it undoubtedly affected the settlement and subsistence patterns, with the desert area becoming a more productive resource area. Schaefer (2006:22) states that "Cahuilla mythology and oral tradition also indicate that when Lake Cahuilla dried up, it was the mountain people who resettled the desert floor. The time of Lake Cahuilla is also best documented in the oral traditions of the Cahuilla, both with regard to settlement patterns, song cycles, and the effects of Lake Cahuilla on patrilineal clan segmentation."

During the Spanish period and into the Mexican period, political leadership became more centralized as Juan Antonio from the Mountain Cahuilla and Chief Cabazon in the desert emerged as central figures (Strong 1929). Juan Antonio's group played a significant role during the Mexican-American War, siding with the Mexicans against the Luiseño who supported the American invasion (Phillips 1975). Along with the rise of powerful chiefs and political restructuring, Mexican language, clothing, and food were incorporated into traditional culture during this era.

With the 1848 signing of the Treaty of Guadalupe Hidalgo, the American government promised to preserve the liberty and property of the inhabitants of California, and in 1852, a treaty was drafted to settle land rights issues for the Cahuilla (as well as Serrano and Luiseño). The treaty was never ratified by Congress and the best farming and grazing lands were claimed by Euro-American settlers. In addition, Cahuilla land was substantially reduced during the 1860s and 1870s, primarily as a result of two Executive Orders establishing reservations. The result of this was a checkerboard of 48 sections of reservation lands spread across the eastern edge of the Santa Rosa and San Jacinto mountains and the Coachella Valley (CSRI 1983). Although various modifications have occurred over time, this has remained the permanent home of the Cahuilla to date.

2.2.2.3 Serrano

Because the San Bernardino Mountains were the central home of the Serrano, villages were primarily located in the forest; however, many were located in the foothills and a few on the desert floor (Strong 1929; Bean and Smith 1978). The primary factor for village choice was proximity to a year-round water source (Bean and Smith 1978). Like their neighbors, the Serrano subsisted by hunting and gathering practices making use of resources available in the natural environment. As with the Cahuilla, the Serrano had access to several diverse resource areas including montane, foothill, and desert habitats. Foothill areas and desert locales provided vegetal resources such as mesquite and screw beans, piñon nuts, yucca, and various cacti. Other important plant foods included acorns; various seeds, particularly chia (*Salvia columbariae*); wild fruits and berries; tubers, roots; and greens. Women were instrumental in the collection and preparation of vegetal foods, while men were responsible for the hunting of game. Principal game animals included deer, mountain sheep, antelope, rabbits, rodents, and quail. Larger game were obtained using bow and arrow, with traps, snares, throwing sticks, and deadfalls were used to procure smaller game and birds (Bean and Smith 1978:571). According to Bean and Smith, the material culture of the Serrano was similar to their neighboring tribes, in particular, that of the Cahuilla, and included implements such as baskets and pottery, bow and arrows, awls, arrow shaft straighteners, bags and storage pouches, stone pipes, musical instruments, nets, and costumes were made of plant fibers, stone materials, wood, bone, and shell (1978).

The Serrano social organization and cosmology were largely the same as their neighbors the Cahuilla, with the social organization consisting of exogamous moieties, patrilineal clans, ceremonial exchange parties. As with the Cahuilla, the Serrano recognized two nonpolitical and nonterritorial moieties: The wildcats (*tukʷutam*) and coyotes (*wahiˀiam*) (Bean and Smith 1978:572); *tukum* and *wahilyam* (Gifford 1918:178). The moieties were exogamous—marriage took place to a person of the opposite moiety—and patrilocal with patrilineal lines of descent, with the woman going to live with the husband but remaining a member of the moiety into which she was born. The moieties were divided into numerous localized political-religious clans (often referred to as localized groups, kins, bands, or sibs), with the name of the clans being associated with a particular location or place. Clans were autonomous from one another and commonly owned well-defined territories (Bean 1972; Bean et al. 1991; Gifford 1918).

2.2.3 Historical Background

Southern California's historic period began in September 1542 when Juan Rodriguez Cabrillo landed on Santa Catalina Island as part of his exploration expedition up the coast north of "New Spain." Although the impact of this initial contact did not usher in instant changes in the region, it marks the opening of the area to new contact, colonialism, and cultural shifts.

2.2.3.1 Spanish Period

During the mid-eighteenth century, Spain escalated its involvement in California from exploration to colonization (Weber 1992). In 1769, a Spanish expedition headed by Gaspar de Portolá and Junípero Serra traveled north from San Diego seeking suitable locations to establish military presidios and religious missions in order to extend the Spanish Empire into Alta California. The Presidio of San Diego and the Mission San Diego de Alcalá were established in 1769 followed by the Presidio of Monterey and Mission San Carlos Borromeo de Carmelo in 1770 in northern California. The missions and presidios stood, literally and figuratively, as symbols of Spanish colonialism, importing new systems of labor, demographics, settlement, and economies to the area. Agriculture and animal husbandry were the main pursuits of the Missions.

The first documented Spanish contact in what is now Riverside County was by Spanish military captain Juan Bautista de Anza, who led expeditions in 1774 and 1775 from Sonora to Monterey (Bolton 1930). Anza embarked on the initial expedition to explore a land route northward through California from Sonora, with the second expedition bringing settlers across the land route to strengthen the colonization of San Francisco (Rolle 1963). Anza's route led from the San Jacinto Mountains northwest through the San Jacinto Valley, which was named "San José" by Anza. Little documentation exists of Anza's route being used after the two expeditions, although it was likely used to bring Spanish supplies into the newly colonized Alta California (Lech 2004). In 1781, the Spanish government closed the route due to uprisings by the Yuman Indians. However, by that time, the missions were established and self-sufficient; thus, the need for Spanish supplies from Sonora had begun to diminish.

Although Riverside County proved to be too far inland to include any missions within its limits, Missions San Juan Capistrano and San Luis Rey de Francia, established in 1776 and 1798 respectively, claimed a large part of southwestern Riverside County. Due to the inland geographical location of the Cahuilla territory, the Spanish missions did not have as direct an effect on them as they did on the Luiseño, who lived along the coast (Bean 1978). On the coast, the Luiseño were moved into the Mission environment where living conditions and diseases promoted the decline of the Luiseño population (Bean and Shipek 1978). However, throughout the Spanish Period, the influence of the Spanish progressively spread further from the coast and into the inland areas of southern California as Missions San Luis Rey and San Gabriel extended their influence into the surrounding regions and used the lands for grazing cattle and other animals.

In the 1810s, ranchos and mission outposts, called *asistencias*, were established near the Project area, increasing the amount of Spanish contact in the region. An asistencia was established in Pala in 1818 and another in San Bernardino in 1819. Additionally, Rancho San Jacinto was established for cattle grazing in the San Jacinto Valley (Bean and Vane 1980; Brigandi 1999). In 1820, Father Payeras, a senior mission official, promoted the idea that the San Bernardino and Pala *asistencias* be developed into full missions in order to establish an inland mission system (Lech 2004). However, Mexico won its independence from Spain in 1821, bringing an end to the Spanish Period in California.

2.2.3.2 Mexican Period

Although Mexico gained its independence from Spain in 1821, Spanish patterns of culture and influence remained for a time. The missions continued to operate as they had in the past, and laws governing the distribution of land were also retained in the 1820s. Following the secularization of the missions in 1834, large ranchos were granted to prominent and well-connected individuals, ushering in the Rancho Era, with the society making a transition from one dominated by the church and the military to a more civilian population, with people living on ranchos or in pueblos. With the numerous new ranchos in private hands, cattle ranching expanded and prevailed over agricultural activities.

In order to obtain a rancho, an applicant submitted a petition containing personal information and a land description and map (*diseño*). In 1835, Jose Antonio Estudillo of San Diego submitted a petition for the San Jacinto Rancho. Although Estudillo's petition was for four square leagues (approximately 30,000 acres), in 1842 he was granted close to the maximum size allowed of 11 square leagues (Lech 2004; State Lands Commission 1982). In 1845, Estudillo's son-in-law, Miguel de Pedrorena filed a petition for half of the San Jacinto Viejo Rancho and a small additional portion of land two miles to the northeast in the hills east of Lamb Canyon (Lech 2004). This portion, the northern half of the San Jacinto Viejo Rancho, became known as the San Jacinto Nuevo y Potrero Rancho.

During the Mexican period, the Cahuilla were increasingly influenced by Mexican culture. Some of the Cahuilla acquired Spanish names, learned Spanish, and adopted forms of Spanish subsistence, such as raising cattle, agriculture, and wage labor (Ward 1967; Bean 1978). Many Cahuilla worked seasonally for the Mexicans, traveling to and from their villages (Bean 1978).

2.2.3.3 American Period

American governance began in 1848, when Mexico signed the Treaty of Guadalupe Hidalgo, ceding California to the United States at the conclusion of the Mexican–American War. California's acquisition by the United States substantially increased the growth of the population in California. The California gold rush, the end of the Civil War, and the passage of the Homestead Act implementing the United States' "manifest destiny" to occupy and exploit the North American continent brought many people to California after 1848. While the American system required that the newly acquired land be surveyed prior to settlement, the Treaty of Guadalupe Hidalgo bound the United States to honor the land claims of Mexican citizens who were granted ownership of ranchos by the Mexican government (Lech 2004). The Land Act of 1851 established a board of commissioners to review land grant claims, and land patents for the land grants were issued from 1876 to 1893. The San Jacinto Nuevo y Potrero Rancho land grant was patented in 1883 to Miguel Pedrorena, Maria Antonia Estudillo Pedrorena, Isabel Pedrorena, and Helena Pedrorena.

Initially, southern California was divided into only two counties: Los Angeles and San Diego. In 1853, San Bernardino County was added, placing what is now Riverside County primarily within San Diego County and partially within San Bernardino County.

Southern California was developed by Americans and other immigrants who migrated to the western frontier in pursuit of gold and other mining, agriculture, trade, and land speculation (Lech 2004). This population growth of southern California during the early years of the American Period brought a need for mail and freight travel. In 1857, John Butterfield was awarded a six-year contract to transport mail twice a week between St. Louis, Missouri, and San Francisco, California (Helmich 2008). The Butterfield Stage Route used the same trail as the Sonora (or Southern Emigrant) Trail from Yuma through Warner Springs and Temecula, and then up through Temescal Valley to Chino, and then to Los Angeles. By the mid-nineteenth century, the Southern Emigrant Trail ran through western Riverside County in a similar alignment to the current Interstate (I-)15 freeway. The Butterfield Overland Stage route went through a major stop called "Alamos," the Spanish word for cottonwoods, in Murrieta. Another branch of the Southern Emigrant Trail veered northward from Temecula to Box Springs near present-day Moreno Valley, roughly following the present-day route of I-215 (Lech 2004).

Local mail routes within southern California were also developed beginning in the 1850s, such as the line established in 1852 by Phineas Banning between Los Angeles and San Diego (Stott 1968). In 1868, Tomlinson & Co. briefly operated a daily mail route from Tucson, Arizona to Los Angeles via San Diego and San Bernardino (Stott 1968), although, after only four months, the company had lost $12,000 and discontinued service (Mills 1957). In 1867, the U.S. Mail Company sent weekly stages that ran between San Diego and San Bernardino.

While stagecoaches were successful at transporting gold, people, and mail, the need for a railroad to California was imperative. In the 1850s, surveys were initiated by the federal government to determine a railroad route to the Pacific coast (Lech 2004). Although the first transcontinental railroad was completed in 1869 to northern California, in the 1870s the Southern Pacific Railroad Company, incorporated in 1865 and consolidated in 1870, began to construct a southern route that would traverse the state (Fickewirth 1992). In the early 1880s, the California Southern Railway, a subsidiary of the Atchison, Topeka and Santa Fe Railway (Santa Fe), was completed and allowed for travel through the Cajon Pass to Barstow to a junction of the Atlantic and Pacific Railroad and down to San Diego through western Riverside County. In 1887, Santa Fe officials consolidated their family of railroads in southern California, forming the California Central Railway. Although the California Southern Railway remained an individual subsidiary at that time, it consolidated with the California Central Railway and the Redondo Beach Railway two years later in 1889. The resulting corporation was the Southern California Railway Company, wholly owned by Santa Fe (Price 1988). Later, in 1906, all lines of Southern California Railway Company were deeded to the Atchison, Topeka and Santa Fe Railway Company.

The Project area and surrounding region developed along with the railroad. The trains were used to transport settlers into the area, creating a period of agricultural and land development, ultimately resulting in the establishment of Riverside County in 1893, formed from portions of San Bernardino and San Diego counties. Moreno Valley, which consisted of small, unincorporated communities, got its name from Frank E. Brown ("Moreno" in Spanish), who formed the Bear Valley Land and Water Company in 1883. Brown built a dam at Bear Valley and provided water to the Perris and Moreno communities until

1899, when he lost a legal suit, and thereby the water rights, to the City of Redlands. This litigation and a period of natural drought devastated the local farming communities, forcing families to either move or abandon their homes in favor of better irrigated areas. The few who remained turned to "the dry farming of hay, grain, and grapes" (City of Moreno Valley, n.d.).

The community was revived in 1918, with the construction of March Field in anticipation of America's entry into World War I. It began as a temporary base for training fighter pilots but was established as a permanent base and flight training school in the late 1920s. This led to a population boom in the Moreno Valley, with the Base supporting up to 85,000 troops at a time. The establishment of the Riverside International Raceway in 1958 and the Lake Perris Recreation Area in 1973 led to further population increases. The unincorporated communities of Moreno, Edgemont, and Sunnymead were combined into the City of Moreno Valley in 1984 (City of Moreno Valley, n.d.).

3.0 ARCHIVAL RESEARCH AND CONTACT PROGRAM

3.1 RECORDS SEARCH

HELIX requested a record search of the California Historical Resources Information System (CHRIS) at the Eastern Information Center (EIC) on February 23, 2021. Due to the COVID-19 pandemic, the EIC has significantly reduced staff and temporarily revised record search policies to limit the breadth of study areas. To accommodate these revised policies, HELIX requested a records search that consisted of the Project site and a half-mile search radius around the Project site. The record search includes the bibliographic information relating to the resources and reports intersecting the records search area (Appendix A, *Record Search Results*), copies of the resource records intersecting the records search area, copies of the reports intersecting the Project site, and the location maps extracted from reports identified within the overall search area but outside the Project site. The EIC is not providing a map detailing the results of the record search at this time.

3.1.1 Previous Surveys

The records search results identified 23 previous cultural resource studies (Table 1, *Previous Studies Within a Half-mile of the Project Site*) within the record search study area. Two studies, RI-00182 (Weaver 1975) and RI-00742 (Wilke 1979) studied the Project site in the mid to late 1970s. RI-00182 investigated the Project site and the surrounding area to support a water systems addition along Brodiaea Avenue; this study did not identify cultural resources within the Project site, but one resource (33-000857, discussed below) was identified adjacent to the Project site. RI-00742 also studied the Project site in support of a potential planning zone change, but no resources were identified within the Project site.

The record search identified 21 studies previously undertaken within a half mile radius of the Project site. Of these, six studies (RI-06269, RI-07335, RI-07645, RI-08944, RI-09510, and RI-10150) are located within a quarter-mile of the Project site; these six investigations studied the immediate areas adjacent to the Project site resulting in the identification of six resources (33-000857 (update), 33-015454, 33-000857, 33-003159, 33-003341, and 33-003342) located outside of the Project site, but in close proximity to the Project. The remaining 15 studies investigated areas exceeding a quarter mile but are located within a half-mile of the Project site. All the investigations identified within the record search area consisted of cultural resource assessments.

Table 1
PREVIOUS STUDIES WITHIN A HALF-MILE OF THE PROJECT SITE

Report Number (RI-)	Report Title	Author, Date
00182*	Environmental Impact Evaluation: Archaeology of Brodiaea Avenue, Pl 984, Water Systems Addition, Riverside County, California	Weaver, 1975
00742*	Environmental Impact Evaluation: An Archaeological Assessment of 17.64 Acres Considered for Change of Zone (CZ 2707), Southeast of Sunnymead, Riverside County, California	Wilke, 1979
01665	Devers-Serrano-Villa Park Transmission System Supplement to the Cultural Resources Technical Report - Public Review Document and Confidential Appendices	Wirth Associates, 1983
01786	Cultural Resource Report on Tracts 12608, 12606-2 and 11410 Located in the Sunnymead Area, Riverside County, California	Scientific Resource Surveys, 1983
02171	Cultural Resources Inventory for the City of Moreno Valley, Riverside County, California	McCarthy, 1987
04397	Archaeological Survey of Parcel Map 29700, Moreno Valley, Riverside County, California.	McCarthy, 2000
06269	An Historical Resources Identification of Alessandro Pointe Project, Tract 34681, 25817 Alessandro Boulevard, City of Moreno Valley, Riverside County, California	Alexandrowicz, 2006
06886	An Archaeological Survey of Approximately 20 Acres (AP 477-180-012 and -013) for the Tentative Tract 34397 Moreno Valley Project Located Southeast of Cottonwood Avenue and Nason Street, Moreno Valley, Riverside County, California 92555	Tetra Tech, Inc., 2006
07333	Letter Report: Cultural Resource Records Search and Site Visit Results for T-Mobile Candidate IE 24092C, (14375 Nason Street) 14375 Nason Street, Moreno Valley, Riverside County, California.	Bonner and Aislin-Kay, 2006
07335	An Archaeological Survey of 10-Acres (APN 486-280-001) Southeast of the Intersection of Alessandro Boulevard and Lasselle Street, Moreno Valley, Riverside County, California 92555	Tetra Tech, Inc., 2007
07645	An Archaeological Survey for the Alessandro Plaza Project, City of Moreno Valley, County of Riverside, California	Rosenberg and Smith, 2005
08154	Letter Report: Cultural Resource Records Search and Site Visit Results for Royal Street Communications Candidate	Bonner and Aislin-Kay, 2008
08266	Negative Survey of Approximately 25 Acres for the Riverside County Regional Medical Center Expansion Project, City of Moreno Valley, County of Riverside, California	Bray, 2009
08358	Identification and Evaluation of Historic Properties: Moreno Valley Medical Village Project, Assessor's Parcel Nos. 486-290-001 and -002, City of Moreno Valley, Riverside County, California.	Encarnacion and Ballester, 2010
08688	Letter Report: Cultural resources Records Search and Site Visit Results for T-Mobile USA Candidate IE24226-A	Bonner, 2011
08802	Phase I Archaeological Assessment: Moreno Master Drainage Plan Revision	Hogan, Encarnacion, and Ballester, 2012
08944	Historical/Archeological Resources Survey Report, Assessor's Parcel No. 486-280-043, City of Moreno Valley, Riverside County, California	Tang and Hogan, 2013
08945	Historical/Archaeological Resources Survey Report, Desilting Basin Site, Boulder Ridge Family Apartments Project, City of Moreno Valley, Riverside County, California	Hogan, 2013

Report Number (RI-)	Report Title	Author, Date
09209	Cultural Resources Survey: I CARE/ CLV5965, 14315 Nason Street, Moreno Valley, Riverside County, California 92557	Greenberg, 2014
09308	Cultural Resources Assessment of the Dracaea Project, Moreno Valley, Riverside County, California (BCR Consulting Project No. TRF1401)	Brunzell, 2014
09510	Update to Historical/Archaeological Resources Survey Assessor's Parcel No. 486-280-043 (Rocas Grandes Project) City of Moreno Valley, Riverside County, California CRM TECH Contract No. 2980	Tang, 2015
09901	Phase I Cultural Resources Survey for the TTM 37060 Project, City of Moreno Valley, County of Riverside	Stropes and Smith, 2016
10150	Cultural Resources Assessment the Alessandro Apartments Project City of Moreno Valley, Riverside County, California	Brunzell, 2016

* Studies located within the Project site.

3.1.2 Previously Recorded Sites

The EIC identified 16 previously recorded cultural resources near the Project site. However, four of these sites (P-33-003133, P-33-007277, P-33-007282, and P-33-015027) were recorded outside of the half mile search radius. As such, the EIC has a record of 12 previously recorded cultural resources within a half-mile radius of the Project site (Table 2, *Previously Recorded Resources Within a Half-mile of the Project Site*). Nine of these resources are prehistoric, and the remaining three resources relate to the historic era. The prehistoric resources include sites comprised of lithic scatters, bedrock milling features, cairns/rock features, and rock shelters. The historic resources consist of historic archaeological sites containing structural pads or foundations, privies or historic trash scatters, wells/cisterns, and historic (single-family) properties.

Of the 12 resources identified by the EIC, two resources (P-33-003249 and P-33-016788) are recorded within the Project site. P-33-003249 (Swope 1987) consists of a red brick and concrete water cistern and associated constructions identified in 1987 within the southeast corner of the eastern (Windsong) parcel. P-33-016788 (Sanka 2007) was recorded in 2007 along the northeastern boundary of the western (Skylar Place) parcel and consists of two granitic boulders with a total of four small mortars. However, the recorders suspected that the feature was relocated from its original location into the Project site.

Table 2
PREVIOUSLY RECORDED RESOURCES WITHIN A HALF-MILE OF THE PROJECT SITE

Resource Number (P-33-#)	Resource Number (CA-RIV-#)	Description	Recorder, Date
000857	000857	Prehistoric site. Fourteen bedrock milling slicks, one mortar, and one basalt flake.	Weaver, 1975; Conroy, 1987; Ballester and Perez, 2013
003133	3133	Prehistoric site. Bedrock milling features.	Weaver, 1975; Prior et al., 1987; Ballester and Perez, 2013;

Resource Number (P-33-#)	Resource Number (CA-RIV-#)	Description	Recorder, Date
003134	3134	Prehistoric site. Bedrock milling features.	McCarthy, 1986
003135	3135	Prehistoric site. Bedrock milling features.	McCarthy, 1986
003159	3159	Prehistoric site. Bedrock milling features.	Prior et al., 1987; Ballester and Perez, 2013; Ballester, 2015
003223	3223	Prehistoric site. Bedrock milling feature.	Pinto, 1987
003224	3224	Prehistoric site. Bedrock milling feature	Pinto, 1987
003249*	3249-H	Historic Site. Red brick and concrete water cistern and associated constructions.	Swope, 1987
003341	3341	Prehistoric site. Bedrock milling features.	Prior and Conroy, 1987; Ballester and Perez, 2013
003342	3342	Prehistoric site. Bedrock milling feature.	Neiditch, 1987; Ballester and Perez, 2013
007276		Historic structure. Single family property	Warner, 1983
007277		Historic structure. Single family property.	Warner, 1983
007282		Historic structure. Single family property.	Warner, 1983
015027	7991	Historic site. Water conveyance system.	Goodwin, 2004
015454	008149	Historic site. Foundations/structure pad, privies/dumps/trash scatters, wells/cisterns.	Alexandrowicz, 2006
016788*		Prehistoric site. Bedrock milling features.	Sanka, 2007

* Resources located within the Project site.

The EIC identified seven resources located outside of the Project site but within a quarter-mile. Of these seven resources, three resources (P-33-000857, P-33-003159, and P-33-003342) are located adjacent to the Project site (Table 2), south of Alessandro Boulevard. These three resources consist of boulder outcrops containing several bedrock milling slicks located on the hill immediately south of the Project. An additional site (P-33-003341) containing three bedrock milling slicks is located on the south side of the hill. The remaining three resources are located north of the Project site along Cottonwood Avenue (P-33-003223) and along Alessandro Boulevard (P-33-007276 and P-33-015454).

The EIC identified three resources (Table 2) located outside the Project site (but within a half-mile). These resources consist of three prehistoric sites containing bedrock milling features and three historic sites containing historic structures. P-33-003134 and P-33-003135 are comprised of bedrock milling features, located northeast of the Project along Cottonwood Avenue. P-33-003224 is located along Alessandro Boulevard and is comprised of a bedrock milling slick.

Additional site descriptions are provided below for the resources identified within the Project site and the immediate surrounding area.

P-33-000857 (CA-RIV-857)

P-33-000857 is a prehistoric site located south of the Project site on the south side of Alessandro Boulevard. The site, originally recorded in 1975, consisted of 14 bedrock milling slicks, one mortar, and one basalt flake. The site was revisited in 1987, but only five slicks located on two boulders were observed at the time. The boundaries of the site changed between the 1975 and 1987 site records. The site, as recorded in the 1975 site record, was originally delineated to encompass the entire hill that it is situated on. The current configuration of the site, as shown on the EIC's map, resulted from the 1987 site record update and only includes the eastern portion of the hillside that contained the two boulders. These two boulders were revisited in 2013; both of the boulders were reidentified, and a total of seven slicks were observed.

P-33-003159 (CA-RIV-3159)

Site 33-003159 is a prehistoric site located south of the Project site, south of Alessandro Boulevard. The site was first recorded in 1987 as three slicks located on two boulders. The site was revisited in 2013, but the slicks could not be found. However, the surface visibility was compromised because most of the boulders in the area were covered with graffiti or paint used for graffiti abatement. The site was revisited in 2015; the surface of the boulders had better visibility because some of the paint had worn off. The 2015 site visit observed three slicks on top of a small hill covered with granitic bedrock outcrops.

P-33-003223 (CA-RIV-3223)

P-33-003223 is a prehistoric site located north of the Project site, south of Cottonwood Avenue. The site was first recorded in 1987 as a single boulder containing two milling slicks. The site was evaluated in 1990 prior to a local development. P-33-003223 was found to be ineligible for inclusion on the NRHP, and the State Historic Preservation Officer (SHPO) agreed with these findings. The site has not been updated since its original recordation. As such, the EIC does not have documentation regarding the site’s condition or integrity after the 1990 development.

P-33-003249 (CA-RIV-3249-H)

P-33-003249 was recorded as a red brick and concrete water cistern and associated constructions identified in 1987 within the southeast corner of the eastern (Windsong) parcel. The cistern was described as a red fired brick and mortar constructions, plastered with concrete. The cistern depth was approximated to extend eight feet below ground surface and 18 inches above ground. The above-ground portion of the cistern was described as a series of bricks laid in a stairstep fashion to constrict the diameter of the structure. Concrete mortar was used to fill in the gaps created by the stairsteps to create a smooth exterior. The inside of the brick walls is plastered with concrete. The exterior of the cistern was once covered with concrete plaster that has since fallen off or been removed. An eight-inch diameter concrete-covered steel pipe extends through the wall of the cistern and continues below the ground surface. At the time of recordation, a boulder was observed to the north-northeast; the boulder contained patches of plaster and concrete, but the function of the feature was undetermined. The recorder posited that perhaps another pipe extended from the cistern and was anchored to the boulder. No additional site update or evaluation has been conducted since the cistern’s original recordation.

P-33-003341 (CA-RIV-3341)

Site 33-003341 is a prehistoric site located south of the Project site, south of Alessandro Boulevard, and east of Lasselle Street. The site was first recorded in 1987 as three slicks located on two boulders. The site was noted as compromised by vandalism; most of the boulders had extensive graffiti. The site was revisited in 2013, but no notable changes were observed in the site condition or description.

P-33-003342 (CA-RIV-3342)

P-33-003342 is a prehistoric site located south of the Project site, south of Alessandro Boulevard. The site was first recorded in 1987 as an isolated boulder containing one milling slick situated between boulder outcrops to the south and northeast. In 1987, the site had evidence of vandalism, littering, and graffiti. The site was revisited in 2013, but the boulder containing the slick could not be found. The 2013 investigation used satellite imagery to approximate that the boulder was removed between March 9, 2011 and June 7, 2012.

P-33-007276

P-33-007276 is a historic structure located west of the Project site. This historic structure is a vernacular ranch house. The construction date is unknown; however, it was estimated to have been constructed in approximately 1920. The building was described as L-shaped in plan with a composition gable roof, redwood siding, a bay window, and tall trees that shade it. The structure has no historic name, and both the architect and builder of the structure are unknown. Although the structure has not been evaluated, the resource was documented as a good example of a vernacular ranch house in the Sunnymead area. As such, the house was documented as a resource that appeared eligible for the NRHP or CRHR during the 1983 survey.

P-33-015454 (CA-RIV-8149)

P-33-015454 is a historic-era site containing remnants of two early to mid-twentieth century residences. The site was documented in 2006 and is located west of the Project site along Alessandro Boulevard. The site contains historic foundations or structural components, historic refuse, and a septic tank. In 2006, the site showed evidence of compromised integrity caused by mechanical discing for weed abatement. No additional evaluations or site updates have been completed since its original recordation in 2006.

P-33-016788

P-33-016788 was recorded in 2007 along the northeastern boundary of the western (Skylar Place) parcel. P-33-016788 was documented as an isolated prehistoric resource consisting of two granitic boulders with a total of four small mortars. The first boulder (Feature 001) exhibits one mortar (or mortar-start), measuring approximately 8 cm in diameter and 5 cm in depth. The second boulder (Feature 002) is located 1.5 meters east of Feature 001 and contains three mortars (or mortar-starts). Each mortar measures approximately 7 cm in diameter and 2 cm in depth. Both boulders were observed out of context within a large push-pile of soil containing modern concrete structural remains and fragmented granitic boulders. These resources were recorded as isolated resources because they were observed out of context and the original site location is unknown.

3.1.3 Other Archival Research

Various additional archival sources were also consulted, including historic topographic maps and aerial imagery. The purpose of this research was to identify historic structures and land use in the area.

Historical aerials from 1966, 1967, and 1978 (NETR Online 2017), and the 1901 (1: 125,000) Elsinore, 1942 (1: 62,500) Perris, and 1953 and 1967 (1: 24,000) Sunnymead USGS topographic maps were reviewed.

The town of Moreno was established in 1891 at the junction of Alessandro and Redlands Boulevards, located to the east of the Project. The 1901 topographic map shows Box Springs and Alessandro are located along the Southern California Railway (Atchison, Topeka and Santa Fe Railroad) to the northwest and west, respectively. The valley is labeled as Alessandro Valley. Many of the roads seen on the 1901 map no longer appear on the 1942 topographic map; however, several additional structures are depicted along Alessandro Boulevard, labeled and shown as a secondary, two-lane, hard surface, all-weather road. Midland School is illustrated and labeled along Alessandro Boulevard at Kitching Street. Several areas within the valley, now labeled as Moreno Valley, are shown as agricultural crops. The 1953 and 1967 topographic maps are essentially the same as the 1942 topographic map.

The 1966, 1967, and 1978 aerial photographs reflect essentially the same information as the 1953 and 1967 topographic maps. While a few blocks begin to show denser development and the beginnings of housing tracts and mobile home parks, especially within the western region of the Project vicinity, much of the area surrounding the Project is characterized by rural residences and agricultural crops, particularly in the eastern region of the Project area, with development increasing each decade. Residential communities surrounding the Project site to the east and north were in place by the late 1990s. The residential community directly to the east was developed in phases between 2005 and 2016.

3.2 NATIVE AMERICAN CONTACT PROGRAM

HELIX contacted the Native American Heritage Commission (NAHC) on February 23, 2021, for a Sacred Lands File search and a list of Native American contacts for the Project site and vicinity. The NAHC completed its search and responded on March 4, 2021. The Sacred Lands File search did not identify any known sacred lands or Native American cultural resources are within the Project site or the surrounding vicinity. Letters were sent to Native American representatives and interested parties identified by the NAHC on March 11, 2021. To date, four responses have been received from the San Manuel Band of Mission Indians, Quechan Indian Tribe, Rincon Band of Luiseño Indians, and Agua Caliente Band of Cahuilla Indians (Table 3, *Native American Contact Program Responses*).

The San Manuel Band of Mission Indians submitted an email response on March 17, 2021; their response indicated that the proposed Project is located outside of Serrano ancestral territory and, as such, the San Manuel Band of Mission Indians will not be requesting to receive consulting party status with the lead agency or to participate in the scoping, development, or review of documents created pursuant to legal and regulatory mandates. Similarly, the Quechan Indian Tribe emailed on March 17, 2021, to indicate that the tribe does not have any additional comments and they would like to defer to the tribes more local to the Project. The Rincon Band of Luiseño Indians submitted a letter via email on March 23, 2021. In their letter, the Rincon Band of Luiseño Indians stated they have no knowledge of any specific sites within the Project site or the surrounding area. However, the Project site may contain unidentified tribal resources. As such, the Rincon Band of Luiseño Indians requests a copy of the archaeological record search. The Agua Caliente Band of Cahuilla Indians submitted a letter via email on April 12, 2021. In their letter, the Agua Caliente Band of Cahuilla Indians indicated that the Project resides within the Tribe's Traditional Use Area. As such, the Agua Caliente Band of Cahuilla Indians requests that the Project complete a cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area and a copy of the record search and any cultural resource documentation (report and site records) generated in connection with this project be sent to the Tribe. None of the other tribes responded to HELIX's letter. If any further responses are received, they will be forwarded to the City. Native American correspondence is included as Appendix B, *Native American Correspondence* (Confidential Appendices, bound separately). The City will initiate AB 52 government-to-government consultation with registered tribal contacts, separate from this contact program.

Table 3
NATIVE AMERICAN CONTACT PROGRAM RESPONSES

Contact/Tribe		Response
Agua Caliente Band of Cahuilla Indians	Jeff Grubbe, Chairperson	Mailed a letter on March 11, 2021. No response to date.
	Patricia Garcia-Plotkin, Director	Mailed a letter on March 11, 2021. A letter received from Lacy Padilla via email on April 12, 2021. The Project site is located within the Tribe's Traditional Use Area. The Tribe requests a cultural resources inventory of the project area by a qualified archaeologist prior to any development activities in this area, a copy of the records search results, and copies of report and site records.
Augustine Band of Cahuilla Mission Indians	Amanda Vance, Chairperson	Mailed a letter on March 11, 2021. No response to date.
Cabazon Band of Mission Indians	Doug Welmas, Chairperson	Mailed a letter on March 11, 2021. No response to date.
Cahuilla Band of Indians	Daniel Salgado, Chairperson	Mailed a letter on March 11, 2021. No response to date.
Los Coyotes Band of Cahuilla and Cupeño Indians	Ray Chapparosa, Chairperson	Mailed a letter on March 11, 2021. No response to date.
Morongo Band of Mission Indians	Robert Martin, Chairperson	Mailed a letter on March 11, 2021. No response to date.
	Denisa Torres, Cultural Resources Manager	Mailed a letter on March 11, 2021. No response to date.
Pala Band of Mission Indians	Shasta Gaughen, Tribal Historic Preservation Officer	Mailed a letter on March 11, 2021. No response to date.
Pechanga Band of Luiseño Indians	Mark Macarro, Chairperson	Mailed a letter on March 11, 2021. No response to date.
	Paul Macarro, Cultural Resources Coordinator	Mailed a letter on March 11, 2021. No response to date.
Quechan Tribe of the Fort Yuma Reservation	Jill McCormick, Historic Preservation Officer	Mailed a letter on March 11, 2021. Email received on March 17, 2021- The tribe has no comments on the project. The tribe would like to defer to the more local Tribes and support their decisions on the project.

Contact/Tribe		Response
	Manfred Scott, Acting Chairman Kw'ts'an Cultural Committee	Mailed a letter on March 11, 2021. No response to date.
Ramona Band of Cahuilla	Joseph Hamilton, Chairperson	Mailed a letter on March 11, 2021. No response to date.
	John Gomez, Environmental Coordinator	Mailed a letter on March 11, 2021. No response to date.
Rincon Band of Luiseño Indians	Bo Mazzetti, Chairperson	Mailed a letter on March 11, 2021. No response to date.
	Cheryl Madrigal, Tribal Historic Preservation Officer	Mailed a letter on March 11, 2021. Letter via email received on March 23, 2021. The tribe does not have knowledge of cultural resources within the proposed project area. However, this does not mean that none exist. The tribe recommends that an archaeological record search be conducted and ask that a copy of the results be provided to the Rincon Band.
San Manuel Band of Mission Indians	Jessica Mauck, Director of Cultural Resources	Mailed a letter on March 11, 2021. Email from Ryan Nordness received on March 17, 2021- The proposed project is located outside of Serrano ancestral territory and, as such, SMBMI will not be requesting to receive consulting party status with the lead agency or to participate in the scoping, development, or review of documents created pursuant to legal and regulatory mandates.
Santa Rosa Band of Mission Indians	Lovina Redner, Tribal Chair	Mailed a letter on March 11, 2021. No response to date.
Soboba Band of Luiseño Indians	Joseph Ontiveros, Cultural Resource Department	Mailed a letter on March 11, 2021. No response to date.
	Scott Cozart, Chairperson	Mailed a letter on March 11, 2021. No response to date.
Torres-Martinez Desert Cahuilla Indians	Michael Mirelez, Cultural Resource Coordinator	Mailed a letter on March 11, 2021. No response to date.

4.0 METHODS

4.1 SURVEY METHODOLOGY

A pedestrian survey of the Project site was conducted on February 26, 2021, by HELIX archaeologists Julie Roy and Dominique Diaz de Leon and a Native American monitor from the Soboba Band of Luiseño Indians (Soboba), Victoria Banda. The Project site was surveyed in 15-meter intervals within both (east and west) parcels. As discussed above, the EIC identified two resources (P-33-003249H and P-33-016788) within the Project site. These sites were revisited during the pedestrian survey to assess their current condition and location.

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

5.0 RESULTS

The east parcel appears to have been disked or ripped by machinery in the past. Granitic boulders show evidence of being scraped and moved by large equipment. Soils in the east parcel are sandy decomposing granite. The west parcel appears to have been cut down approximately 10 to 20 feet below the east parcel. There appears to be almost no soil left on the surface of the ground, which consists of decomposing quartz granite and chunks of quartz. Visibility averaged 50 percent in the east parcel and up to 90 percent in the west parcel.

As noted above, two resources have been previously recorded within the Project site (Figure 4, *Cultural Resources within and Adjacent to the Project Site*; Confidential Appendix C, bound separately). These sites consist of one historic brick cistern (P-33-003249) recorded in the southeast corner in the east parcel and a disturbed prehistoric site containing two bedrock features (P-33-016788) located towards the center of the west parcel. No new cultural resources were identified within the Project study area.

P-33-003249 (CA-RIV-3249H)

This resource was a red brick and concrete water cistern recorded in 1987. The cistern was noted as being west of a dirt road and approximately 170 feet north of Alessandro Boulevard, located within the Project site. The site was not reidentified during the current survey and was possibly destroyed during road construction or residential development activities. The cistern, observable on Google Earth imagery from 2002, was likely destroyed by the development of Darwin Drive and the housing tract to the east sometime between December 2004 and October 2005. However, the top of the feature may have been taken off during disking/ripping, and portions of the cistern may be buried under soils and concrete.

P-33-016788

P-33-016788 was recorded in 2007 along the northeastern boundary of the western (Skylar Place) parcel. P-33-016788 was documented as an isolated prehistoric resource consisting of two granitic boulders with a total of four small mortars. The first boulder (Feature 001) exhibited one mortar (or mortar-start), measuring approximately 8 cm in diameter and 5 cm in depth. The second boulder (Feature 002) was located 1.5 meters east of Feature 001 and contained three mortars (or mortar-starts). Both boulders were observed out of context within a large push-pile of soil containing modern concrete structural remains and fragmented granitic boulders. These resources were recorded as isolated resources because they were observed out of context and the original site location was unknown.

P-33-016788 was reidentified during the survey (Plate 1). However, the recorded elements appear to be a modern disturbance from construction activity, consistent with their original documentation; the “mortars” do not appear to be prehistoric in nature. Most of the boulders within and surrounding the feature show signs of rock-breaking equipment and bucket teeth marks, which would have been used with an excavator to break apart and dismantle the boulders prior to being pushed/relocated along the edges of the parcel. The “mortars” pictured on the original site record appear to be mechanically drilled holes in the rock, rather than bedrock milling features. This is consistent with the current survey results – only mechanically drilled holes were observed, no actual mortars. The “feature” remains heavily disturbed and out of context, consistent with the observations made in 2007 when it was originally recorded. Although the Project site has been cleared and several non-cultural boulders have been pushed to the edges of the Project boundary, the feature has not been moved from its documented location within the Project site.

Plate 1. Observation of P-33-016788 during HELIX's 2021 pedestrian survey.

6.0 SUMMARY AND MANAGEMENT RECOMMENDATIONS

The EIC has a record of 12 previously recorded cultural resources within a half-mile radius of the Project. Two of these resources (P-33-003249 and P-33-016788) are recorded within the Project site. P-33-003249, a historic red brick and concrete water cistern, was demolished between 2004 and 2005. As such, the cistern was not observed on-site during the pedestrian survey. P-33-016788, a bedrock milling feature consisting of two granitic boulders with a total of four small mortars, was located and observed during the pedestrian survey. However, it was determined not to be prehistoric in origin; rather, it appears to be the result of equipment used to break up the rocks and is not an archaeological resource. The resource was originally recorded in 2007 as heavily disturbed and out of context. HELIX archaeologists detected additional disturbances to the boulders during their pedestrian survey. Although these boulders were suspected of being relocated from their original local to the Project site, as recorded in 2007, they have subsequently been broken apart and dismantled. However, the feature remains in the same location within the Project site despite significant site clearing. P-33-003249 fails to meet the criteria for a significant cultural resource, as it is not archaeological in nature. No additional resources were identified during the pedestrian survey.

The EIC identified seven resources located outside of the Project site but within a quarter-mile. Of these, three resources (P-33-000857, P-33-003159, and P-33-003342) are located adjacent to the Project site, south of Alessandro Boulevard. These three resources consist of boulder outcrops containing several bedrock milling slicks located on the hill immediately south of the Project. An additional site (P-33-003341) containing three bedrock milling slicks is located on the south side of the hill, located along Brodiaea Avenue. The remaining four resources, located within a quarter-mile of the Project, are located north of the Project site along Cottonwood Avenue (P-33-003223 and P-33-003224) and Alessandro Boulevard (P-33-007276 and P-33-015454). These resources are located outside of the Project footprint. As such, these resources are not expected to be directly impacted by the Project. However, impacts to the sites adjacent to the Project may be encountered if Project activities expand beyond the development footprint. Project-related activities, such as lay-down areas, Project-related traffic, or temporary administration modules, should avoid the outcrops located south of the Project to prevent impacts to these resources.

Based upon the findings of the cultural resources survey, the Project is expected to have no impact to significant cultural resources. However, the general vicinity of the Project has been occupied and used by the Luiseño, Cahuilla, and other native people for thousands of years. As such, there are numerous previously recorded cultural resources within the vicinity of the Project. Although no tribal cultural resources have been identified within the Project site, the Project site falls within the Traditional Use Area of several local tribes and may be sensitive for cultural resources. As discussed in this document, several sites in Perris Valley, particularly near the Perris Reservoir located approximately four miles south of the Project site, produced archaeological data that contributed to our broad understanding of prehistory and chronology. Although these sites are outside of the study area, the proximity of these sites increases the cultural sensitivity within the Project site.

In addition to prehistoric resources, the Project may have buried historic era resources, such as the remnants of P-33-003249, the historic brick cistern located within the eastern (Windsong) parcel. Although this brick cistern was demolished between 2004 and 2005, portions of the cistern may still exist beneath the surface of the site. If present, buried historic era resources present a potential Project impact. However, this potential impact may be reduced by implementing appropriate mitigation.

Based on these factors, the following measures are recommended to ensure cultural resources are not impacted by project development. By developing and implementing an archaeological and Native American monitoring program, the Project will reduce any potential impact to cultural or tribal cultural resources to a less than significant level.

MM-CULT-1 **Cultural Resources Monitoring Agreement.** At least 30 days prior to beginning any ground-disturbing activities for the Project, the developer/applicant shall contact the Monitoring Tribe(s) to coordinate and develop a Cultural Resources Monitoring Agreement. The Agreement shall address the designation, responsibilities, and participation of the professional Native American Tribal monitor(s) during grading, excavation, and other ground-disturbing activities; Project grading and excavation schedule; and terms of compensation for the monitor(s). The Tribal monitor(s) shall be allowed to monitor all grading, excavation, and ground-disturbing activities and shall have the authority to temporarily stop or redirect grading and excavation activities in the event of a discovery.

MM-CULT-2 **Archaeological Monitoring.** Prior to earth-moving activity, the City shall retain a qualified principal investigator (PI), defined as an archaeologist who meets the Secretary of the Interior’s Standards for professional archaeology, to oversee the cultural resources-related mitigation efforts. A qualified archaeological monitor (Project Archaeologist [PA]) shall work under the supervision of the PI and shall be on-site during ground-disturbing activities, including brushing/grubbing, grading, excavation, trenching, etc. in areas that retain the potential for cultural material (e.g., not in formational material). The archaeological monitor shall have the authority to temporarily stop or redirect grading and excavation activities in the event of a discovery. The duration and timing of the monitoring shall be determined by the PI in consultation with the City. If, in consultation with the City, the PI determines that full-time monitoring is no longer warranted, he or she may recommend a reduction in the level of monitoring to periodic spot-checking or may recommend that monitoring cease entirely.

MM-CULT-3 **Cultural Resources Worker Sensitivity Training.** Prior to the start of ground-disturbing activities, the City shall hold a pre-grading meeting. The PI or PA shall attend the pre-grading meeting with the City's Project Administrator, Field Engineering Inspector, representatives from the Monitoring Tribe(s), and Project contractors to conduct a Cultural Resources Worker Sensitivity Training for construction personnel working on the proposed Project. The training shall include an overview of potential cultural resources that could be encountered during ground-disturbing activities; the requirements of the monitoring program; the protocols that apply in the event inadvertent discoveries of cultural resources are identified, including who to contact and appropriate avoidance measures until the find(s) can be properly evaluated; and other appropriate protocols.

MM-CULT-4 **Discovery of Cultural Resources.** If inadvertent discoveries of cultural resources are encountered at any time during construction, these materials and their context shall be avoided until a qualified archaeologist and representative(s) from the Monitoring Tribe(s) have consulted with the City regarding appropriate avoidance and mitigation measures for the newly discovered resources. Project personnel shall not collect or retain cultural resources. Prehistoric resources include but are not limited to: chert or obsidian flakes; projectile points; mortars and pestles; dark, friable soil containing shell and bone; dietary debris; heat-affected rock; or human burials. Historic resources include but are not limited to: stone or adobe foundations or walls; structures and structural remains; and refuse deposits (glass, metal, wood, ceramics), often found in old wells and privies. Pursuant to California PRC Section 21083.2(b), avoidance is the preferred method of preservation for archaeological resources. Cultural material recovered that is not Native American in origin shall be curated at an appropriate repository in Riverside County, such as the Western Science Center.

MM-CULT-5 **Discovery of Native American Cultural Resources.** In the event that Native American cultural resources are inadvertently discovered during the course of ground-disturbing activities for this Project, the following procedures shall be carried out for treatment and disposition of the discoveries:

Temporary Curation and Storage: During the course of construction, all discovered resources shall be temporarily curated in a secure location on-site or at the offices of the PA. The removal of artifacts from the Project site will need to be thoroughly inventoried with the Tribal Monitor oversite of the process; and

Treatment and Final Disposition: The City and Developer shall relinquish ownership of all cultural resources, including all archaeological artifacts and non-human remains as part of the required mitigation for impacts to tribal cultural resources. Human remains, sacred/ ceremonial items, and burial goods shall be addressed per State Law. On-site reburial of the discovered items may be conducted as adequate treatment and disposition of discovered resources. This shall include measures and provisions to protect the future reburial area from future impacts in perpetuity. Reburial shall not occur until all legally required cataloging and basic recordation have been completed. No recordation of sacred items is permitted without the written consent of the Tribes.

MM-CULT-6 **Sacred Sites.** All sacred sites, should they be encountered within the Project site, shall be avoided and preserved as the preferred mitigation, if feasible.

MM-CULT-7 **Discovery of Human Remains.** In the event that human remains (or remains that may be human) are discovered at the Project site during grading or earthmoving, the construction contractors, PA, and/or designated Native American Monitor(s) shall immediately stop all activities within 100 feet of the find. The City shall then inform the Riverside County Coroner, and the coroner shall be permitted to examine the remains as required by California Health and Safety Code Section 7050.5(b). Section 7050.5 requires that excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If human remains are determined to be of Native American origin, the City shall comply with the State laws relating to the disposition of Native American burials that fall within the jurisdiction of the NAHC (PRC Section 5097). The coroner shall contact the NAHC to determine the most likely descendant(s) (MLD). The MLD shall complete his or her inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site. The disposition of the remains shall be overseen by the MLD to determine the most appropriate means of treating the human remains and associated grave artifacts.

If the NAHC is unable to identify an MLD, or the MLD identified fails to make a recommendation, or the developer/applicant or their authorized representative rejects the recommendation of the descendants and the mediation provided for in Subdivision (k) of PRC Section 5097.94, if invoked, fails to provide measures acceptable to the developer/applicant, the developer/applicant or an authorized representative shall inter the human remains and items associated with Native American human remains with appropriate dignity on the property in a location not subject to further and future subsurface disturbances.

7.0 REFERENCES

Applied Earth Works, Inc.
2001 *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations*. Volumes I to V. General editor, Susan K. Goldberg. Report prepared for the Metropolitan Water District of Southern California, Los Angeles.

Barrows, David P.
1900 *The Ethnobotany of the Cahuilla Indians of Southern California.* The University of Chicago Press, Chicago, Illinois. Reprinted, 1977, Malki Museum Press, Banning, California.

Bean, Lowell John
1972 *Mukat's People: The Cahuilla Indians of Southern California*. University of California Press, Berkeley and Los Angeles.

1978 Cahuilla. In *California*, edited by Robert F. Heizer, pp. 575-587. Handbook of North American Indians, vol. 8. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bean, Lowell, and Harry Lawton
1992 *The Cahuilla Indians of Southern California*. Malki Museum Brochure No. 1. (Originally published 1965) Malki Museum Press, Banning, California.

Bean, Lowell John, and Katherine Siva Saubel
1972 *Temalpakh: Cahuilla Indian Knowledge and Usage of Plants*. Malki Museum Press, Banning.

Bean, Lowell John, and Florence C. Shipek
1978 Luiseño. In *California*, edited by Robert F. Heizer, pp. 550-563. Handbook of North American Indians, vol. 8. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bean, Lowell John, and Charles R. Smith
1978 Serrano. In *California*, edited by Robert F. Heizer, pp. 570-574. Handbook of North American Indians, vol. 8. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bean, Lowell J., and Sylvia B. Vane (editors)
1980 *The Ethnography and History of the Devers to Lamb Canyon Transmission Corridor Area, Riverside County, California*. Prepared by Cultural Systems Research, Inc., Menlo Park, California, for Southern California Edison Company, Rosemead California.

Bean, Lowell J., Sylvia B. Vane, and Jackson Young
1991 *The Cahuilla Landscape: The Santa Rosa and San Jacinto Mountains.* Ballena Press, Menlo Park, CA.

Bettinger, Robert L.
1974 Dating the Perris Reservoir Assemblages. In *Perris Reservoir Archaeology,* edited by James F. O'Connell, Phillip J. Wilke, Thomas F. King, and Carol L. Mix, pp. 159–162. California Department of Parks and Recreation Reports No. 14. Sacramento.

Bolton, Herbert E.
1930 *Anza's California Expeditions, Vols. I–IV*. University of California Press, Berkeley.

Brigandi, Phil
1999 *The Outposts of Mission San Luis Rey*. Journal of San Diego History 45(2):106–112.

Bull, Charles S.
1983 Shaking the Foundations: The Evidence for San Diego Prehistory. *Casual Papers: Cultural Resource Management* 1(3):15-64. Cultural Resource Management Center, San Diego State University.

Carrico, Richard L., Theodore G. Cooley, and Joyce M. Clevenger
1993 *Archaeological Excavations at the Harris Site Complex, San Diego County, California.* Report prepared by Ogden Environmental and Energy Services, and on file at the South Coastal Information Center (SCIC), San Diego State University, San Diego.

City of Moreno Valley
n.d. *About Moreno Valley: History*. Electronic document, available at: http://www.moreno-valley.ca.us/community/about.shtml, accessed on March 28, 2016.

Cultural Systems Research, Inc. (CSRI)
1983 *Paniktum Hemki: A Study of Cahuilla Cultural Resources in Andreas and Murray Canyons.* Cultural Systems Research, Inc., Menlo Park, California.

Des Lauriers, Matthew R.
2008 A Paleoindian Fluted Point from Isla Cedros, Baja, California. *Journal of Island & Coastal Archaeology* 3:271–276.

Dibblee, T.W. and Minch, J.A.
2003 "Geologic Map and Digital Database of the Sunnymead/South ½ if Redlands Quadrangle, San Bernardino and Riverside Counties, California," U.S Geological Survey DF-110, scale 1:24,000.

Dillon, Brian D.
2002 California Paleo-Indians: Lack of Evidence, or Evidence of a Lack? In *Essays in California Archaeology: A Memorial to Franklin Fenenga*. Edited by William J. Wallace and Francis A. Riddell. Contributions of the University of California Archaeological Research Facility, No. 60. Berkeley, California.

Erlandson, Jon M.
1994 *Early Hunter-Gatherers of the California Coast*. New York, Plenum Press.

1997 The Middle Holocene along the California Coast. In Archaeology of the California Coast during the Middle Holocene, edited by Jon M. Erlandson and Michael A. Glassow. pp. 61–72. Perspectives in California Archaeology, Vol. 4, Jeanne E. Arnold, series editor. Institute of Archaeology, University of California, Los Angeles.

Erlandson, Jon M., Torben C. Rick, Terry L. Jones, and Judith F. Porcasi
2007 One If by Land, Two If by Sea: Who Were the First Californians? In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 53–62. Altamira Press, Lanham, Maryland.

Ezell, Paul H.
1987 The Harris Site – An Atypical San Dieguito Site, or Am I Beating a Dead Horse? In *San Dieguito–La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 15-22. San Diego County Archaeological Society Research Paper Number 1. San Diego.

Fickewirth, A.A.
1992 *California Railroads*. Golden West Books, San Marino, California.

Fitzgerald, Richard T., and Michael F. Rondeau
2012 A Fluted Projectile Point from Crystal Cove State Park, Orange County, Alta California. *California Archaeology* 4(2):247-256.

Gallegos, Dennis R.
1985 Batiquitos Lagoon Revisited. *Casual Papers Cultural Resource Management* 2(1). Department of Anthropology, San Diego State University, California.

1987 A Review and Synthesis of Environmental and Cultural Material for the Batiquitos Lagoon Region. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 23-34. San Diego County Archaeological Society, Research Paper 1.

1991 Antiquity and Adaptation at Agua Hedionda, Carlsbad, California. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colten., pp. 19–42. Perspectives in California Archaeology, Vol. 1, J. E. Arnold, series editor. Institute of Archaeology, University of California, Los Angeles.

Gifford, Edward W.
1918 Clans and Moieties of Southern California. *University of California Publications in American Archaeology and Ethnology* 14(2):155-219. Berkeley.

Goldberg, Susan
2001 Land Use, Mobility, and Intensification Evaluation and Refinement of the Model. In *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations, Volume IV: Prehistoric Archaeology Synthesis of Findings*, edited by Susan K. Goldberg, Chapter 14. Report prepared by Applied Earthworks, Hemet, California for Metropolitan Water District of Southern California, Los Angeles.

Grenda, Donn R.
1997 *Continuity & Change: 8,500 Years of Lacustrine Adaptation on the Shores of Lake Elsinore*. Statistical Research Technical Series 59, Tucson.

Hedges, Ken, and Christina Beresford
1986 *Santa Ysabel Ethnobotany*. San Diego Museum of Man Ethnic Technology Notes No. 20.

Helmich, Mary A.
2008 *The Butterfield Overland Mail Company*. California State Parks, Interpretation and Education Division.

Hertzberg, Jason, Philip Buchiarello, and David C. Smith
2005 Geotechnical Investigation for Due-Diligence Purposes, 20-acre, 74-Lot Tentative Tract 31589 (CHEN 74), Southwest of bay Avenue and Regis Drive, City of Moreno Valley, California.

Horne, Melinda C, and Dennis P. McDougall
2008 *CA-RIV-6069: Early Archaic Settlement and Subsistence in the San Jacinto Valley. Western Riverside County, California*. Report prepared for and submitted to the Metropolitan Water District of Southern California. On file at the EIC.

Hyland, Justin R., and Maria De La Luz Gutierrez
1995 An Obsidian Fluted Point from Central Baja California. *The Journal of California and Great Basin Anthropology* 17(1): 126–128.

Johnston, Francis J.
1980 *The Serrano Indians of Southern California*. Malki Museum Brochure No. 2. (Originally published 1965) Malki Museum Press, Banning, California.

Jones, Terry L., Gary M. Brown, L. Mark Raab, Janet L. McVickar, W. Geoffrey Spaulding, Douglas J. Kennett, Andrew York, and Phillip L. Walker
1999 Environmental Imperatives Reconsidered. Demographic Crises in Western North America during the Medieval Climatic Anomaly. *Current Anthropology* 40:137–170.

Keller, Jean Salpas, and Daniel F. McCarthy
1989 Data Recovery at the Cole Canyon Site (CA-RIV-1139), Riverside County, California. *Pacific Coast Archaeological Society Quarterly* 25(1):1-89.

Kennett, Douglas J., and James P. Kennett
2000 Competitive and Cooperative Responses to Climatic Instability in Coastal Southern California. *American Antiquity* 65:379–395.

Kline, George E., and Victoria L. Kline
2007 Fluted Point Recovered from San Diego County Excavation. *Proceedings of the Society for California Archaeology* 20:55–59.

Knell, Edward J., and Mark S. Becker
2017 Early Holocene San Dieguito Complex Lithic Technological Strategies at the C.W. Harris Site, San Diego, California. *Journal of California and Great Basin Anthropology* 37(2):183-201.

Koerper, Henry C., Roger D. Mason, and Mark L. Peterson
2002 Complexity, Demography, and Change in Late Holocene Orange County. In Catalysts to *Complexity: Late Holocene Societies of the Southern California Coast*, edited by Jon M. Erlandson and Terry L. Jones, pp. 63–81. Perspectives in California Archaeology, Vol. 6, Jeanne E. Arnold, series editor. Institute of Archaeology, University of California, Los Angeles.

Koerper, Henry C., Paul E. Langenwalter II, and Adella Schroth
1991 Early Holocene Adaptations and the Transition Phase Problem: Evidence from the Allan O. Kelly Site, Agua Hedionda Lagoon. In *Hunter-Gatherers of Early Holocene Coastal California*, edited by Jon M. Erlandson and Roger H. Colton, pp. 43–62. Perspectives in California Archaeology, Vol. 1, Jeanne E. Arnold, series editor. Institute of Archaeology, University of California, Los Angeles.

Kowta, Makoto
1969 *The Sayles Complex: A Late Milling Stone Assemblage from the Cajon Pass and the Ecological Implications of its Scraper Planes.* University of California Publications Anthropology 6. Berkeley and Los Angeles.

Kroeber, A.L.
1925 *Handbook of the Indians of California*. American Bureau of Ethnology Bulletin 78. Washington, D.C. Lithographed edition 1953, Third Printing 1970, California Book Company, LTD, Berkeley.

LaMont, Edward H., Gaby M. Bogdanoff, and Kyle R. McHargue
2020 Updated Geotechnical Evaluation Proposed Single-Family Residential Development APN 487-470-025, Winco Site Northeast of Alessandro Boulevard and Lasselle Avenue Intersection City of Moreno Valley, Riverside County, California.

Lech, Steve
2004 *Along the Old Roads: A History of the Portion of Southern California That Became Riverside County, 1772–1893*. Steve Lech, Riverside, California

Lightfoot, Kent G., and Otis Parrish
2009 *California Indians and the Environment*. University of California Press: Berkeley.

McCarthy, Daniel F.
1986 Archaeological Studies at Hi Card Ranch (CA-RIV-1806), Santa Rosa Plateau, Riverside, County, California. *Pacific Coast Archaeological Society Quarterly* 22(2):45-79.

1987 Archaeological Studies at Wildomar, CA-RIV-2769, Riverside, County, California. *Pacific Coast Archaeological Society Quarterly* 23(1):1-46.

McCown, B.E.
1955 *Temeku: A Page from the History of the Luiseño Indians*. Archaeological Survey Association of Southern California Paper No. 3.

McDougall, Dennis P.
2001 CA-RIV-5086/H. In *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations, Volume II:* Archaic and Late Prehistoric Occupation Sites, edited by Susan K. Goldberg, Chap. 9. Prepared by Applied Earthworks, Hemet, California for Metropolitan Water District of Southern California, Los Angeles.

Meighan, Clement W.
1954 A Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology* 10(2):215-227.

Miller, Wick R.
1984 The Classification of the Uto-Aztecan Languages Based on Lexical Evidence. *International Journal of American Linguistics* 50(1):1–24.

Mills, James
1957 Journalistic Remarks on the Los Angeles and Tucson Mails. *San Diego Historical Society Quarterly* 3(3).

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, Orlando.

Morton, Douglas M. and Jonathan C. Matti
2001 *Geologic Map of the Sunnymead 7.5' Quadrangle, Riverside County, California, version 1.0*. United States Geological Survey

Natural Resources Conservation Service (NRCS)
2017 Web Soil Survey. United States Department of Agriculture (USDA). Retrieved from: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.Aspx.

NETR Online
2017 Historic Aerials. Nationwide Environmental Title Research, LLC. Electronic document available at: http://www.historicaerials.com, accessed March 15, 2021.

National Oceanic and Atmospheric Administration (NOAA)
2014 Electronic document available at http://forecast.weather.gov/MapClick.php?zoneid=CAZ048#.VGlzkP0tA1U, accessed in September 2014.

O'Connell, James F, Philip J. Wilke, Thomas F. King and Carol L. Mix, editors
1974 *Perris Reservoir Archaeology: Late Prehistoric Demographic Change in Southeastern California*. Report prepared by the Archaeological Research Unit, Department of Anthropology, University of California, Riverside, California, for the State of California Department of Parks and Recreation.

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Oxendine, Joan
1983 *The Luiseño Village during the Late Prehistoric Era*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Riverside.

Phillips, George Harwood
1975 *Chiefs and Challengers, Indian Resistance and Cooperation in Southern California.* University of California Press, Berkeley.

Pigniolo, Andrew R.
2004 Points, Patterns, and People: Distribution of the Desert Side-Notched Point in San Diego. *Proceedings of the Society for California Archaeology* 14:27–40.

2005 A Different Context: San Dieguito in the Mountains of Southern California. *Proceedings of the Society for California Archaeology* 18:255-262.

Pourade, Richard F.
1962 The History of San Diego: The Early Explorers. The Union-Tribune Publishing Company, San Diego.

Price, James N.
1988 The Railroad Stations of San Diego County. In *The Journal of San Diego History*, Spring 1988, Volume 34, Number 2. San Diego Historical Society Quarterly.

Robinson, Mark C.
2001 Units of Analysis. In *Metropolitan Water District of Southern California, Eastside Reservoir Project, Final Report of Archaeological Investigations, Volume IV: Prehistoric Archaeology Synthesis of Findings*, edited by Susan K. Goldberg, Chapter 4. Prepared by Applied Earthworks, Hemet, California for Metropolitan Water District of Southern California, Los Angeles.

Rogers, Malcolm J.
1936 *Yuman Pottery Making.* San Diego Museum of Man Papers No. 2. San Diego Museum of Man.

1939 *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas*. San Diego Museum of Man Papers No. 3. San Diego Museum of Man.

1966 *Ancient Hunters of the Far West*. Union-Tribune Publishing Company, San Diego.

Rolle, A. F.
1963 *California: A History*. Thomas Y. Crowell Company, New York, New York.

Rondeau, Michael F., James Cassidy, and, and Terry L. Jones
2007 Colonization Technologies: Fluted Projectile Points and the First Californians. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar. AltaMira Press, Lanham, Maryland.

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Sanka, J.

2007 Site record form for P-33-016788. Form on file at Eastern Information Center, University of California, Riverside.

Schaefer, Jerry

2006 *A Class I Cultural Resources Inventory of the Truckhaven Geothermal Leasing Area, Imperial County, California*. Report prepared for Ecology and Environmental, Inc., San Diego, California. Prepared by ASM Affiliates, Inc., Carlsbad, California.

Shipley, William F.

1978 Native Languages of California. In *California*, edited by Robert F. Heizer, pp. 80-90. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Sparkman, Philip Stedman

1908 The Culture of the Luiseño Indians. *University of California Publications in American Archaeology and Ethnology* 8(4):187-234.

State Lands Commission

1982 *Grants of Land in California Made by Spanish or Mexican Authorities*. Boundary Determination Office, State Lands Commission, Boundary Investigation Unit.

Stine, S.

1994 Extreme and Persistent Drought in California and Patagonia during Mediaeval Time. *Nature* 369:546–549.

Stott, K. W.

1968 Fifty Years of Stagecoaching in Southern California. In *Brand Book Number One: The San Diego Corral of the Westerners*, edited by R. Brandes.

Strong, William D.

1929 *Aboriginal Society in Southern California.* University of California Publications in American Archaeology and Ethnology 26(1):1–358. Berkeley.

Sutton, Mark Q., and Jill K. Gardner

2010 Reconceptualizing the Encinitas Tradition of Southern California. *Pacific Coast Archaeological Society Quarterly*, 42(4)1–64. Costa Mesa.

Sutton, Mark Q., and Donn R. Grenda

2012 Defining Level 1 at Malaga Cove (CA-LAN-138), Alta California. *California Archaeology* 4(1): 123–144.

Sutton, Mark Q., Mark E. Basgall, Jill K. Gardner, and Mark W. Allen

2007 Advances in the Understanding of Mojave Desert Prehistory. In *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar. Altamira Press, Lanham, Maryland.

Swope, Karen K.
1987 Site record form for P-33-003249/ CA-RIV-3249-H. Form on file at Eastern Information Center, University of California, Riverside.

Treutlein, Theodore E.
1968 The Portolá Expedition of 1769-1770. *California Historical Society Quarterly* 47(4):291–313.

True, D.L.
1958 An Early Complex in San Diego County, California. *American Antiquity* 23(3): 255–263.

1980 The Pauma Complex in Northern San Diego County: 1978. *Journal of New World Archaeology* 3(4): 1–30. Institute of Archaeology, University of California, Los Angeles.

1990 Site Locations and Water Supply: A Perspective from Northern San Diego County, California. *Journal of New World Archaeology* 7(4):37-60. Institute of Archaeology, University of California, Los Angeles.

True, D.L., and Paul D. Bouey
1990 Gladishill: A Probable San Dieguito Camp Near Valley Center, California. *Journal of New World Archaeology* 7(4): 1-28.

True, D.L., Clement W. Meighan, and Harvey Crew
1974 *Archaeological Investigations at Molpa, San Diego County, California.* University of California Publications in Anthropology, Vol 11.

Vaughan, Sheila J.
1982 *A Replicative Systems Analysis of the San Dieguito Component at the C.W. Harris Site.* Master's thesis, Department of Anthropology, University of Nevada, Las Vegas.

Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. Southwestern Journal of Anthropology 11:214-230.

Ward, J.W.
1967 *The Cahuilla: A Historical-Anthropological Study of a Southern California People*. Los Angeles, California.

Warren, Claude N.
1967 The San Dieguito Complex: A Review and Hypothesis. *American Antiquity* 32:168-185.

1968 Cultural Tradition and Ecological Adaptation on the Southern California Coast. In *Archaic Prehistory in the Western United States*, edited by C. Irwin-Williams, pp. 1–14. Eastern New Mexico Contributions in Anthropology 1(3). Portales, New Mexico.

1984 The Desert Region. In *California Archaeology*, edited by Michael J. Moratto, pp. 339–430. Academic Press, Orlando, Florida.

Warren, Claude N. (editor)
1966 *The San Dieguito Type Site: M. J. Rogers' 1938 Excavation on the San Dieguito River*. San Diego Museum Papers No. 5. San Diego Museum of Man.

Warren, Claude N., and H.T. Ore
2011 The Age of the San Dieguito Artifact Assemblage at the C. W. Harris Site. *Journal of California and Great basin Anthropology* 31(1):81-97.

Warren, Claude N., and D.L. True
1961 The San Dieguito Complex and Its Place in San Diego County Prehistory. *Archaeological Survey Annual Report*, 1960-1961, pp. 246-291. University of California, Los Angeles.

Warren, Claude N., Gretchen Siegler, and Frank Dittmer
1998 Paleoindian and Early Archaic Periods. In *Prehistoric and Historic Archaeology of Metropolitan San Diego: A Historic Properties Background Study*. Prepared for the Metropolitan Wastewater Department, City of San Diego. ASM Affiliates, Encinitas, California

Weber, David
1992 *The Spanish Frontier in North America*. Yale University Press.

Weaver, Richard A.
1975 Environmental Impact Evaluation: Archaeology of Brodiaea Avenue, Pl 984, Water Systems Addition, Riverside County, California. On file at the Eastern Information Center, University of California, Riverside.

White, Raymond C.
1963 Luiseño Social Organization. *University of California Publications in American Archaeology and Ethnology* 48(2):91-194.

Wilke, Philip
1974 Settlement and Subsistence at Perris Reservoir: A Summary of Archaeological Investigations. In *Perris Reservoir Archaeology,* edited by James F. O'Connell, Phillip J. Wilke, Thomas F. King, and Carol L. Mix, pp. 20–30. California Department of Parks and Recreation Reports No. 14. Sacramento.

1978 *Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California.* Contributions of the University of California Archaeological Research Facility, No. 38. Berkeley, California.

1979 Environmental Impact Evaluation: An Archaeological Assessment of 17.64 Acres Considered for Change of Zone (CZ 2707), Southeast of Sunnymead, Riverside County, California. On file at the Eastern Information Center, University of California, Riverside.

Attachment: Appendix C - Cultural Resources [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Worthington, David

2006 Geotechnical Investigation for 17.7 Acre Proposed Mixed Use Commercial and Residential Property Located at NEC of Alessandro Blvd. and Lasselle Street. Moreno Valley, California.

2007 Update to Soils Report Dated 5/10/06 by EGA Consultants for 17.7 Acre Proposed Mixed Use Commercial and Residential Property Located at NEC of Alessandro Blvd. and Lasselle Street. Moreno Valley, California.

UPDATED GEOTECHNICAL EVALUATION

PROPOSED SINGLE-FAMILY RESIDENTIAL DEVELOPMENT

TRACT NO. 31589 – DARWIN SITE

APN 487-470-028

NORTHWEST OF ALESSANDRO BOULEVARD AND DARWIN DRIVE INTERSECTION

CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

D.R. HORTON LOS ANGELES HOLDING COMPANY, INC.
2280 WARDLOW CIRCLE, SUITE 100
CORONA, CALIFORNIA 92880

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92880

PROJECT NO. 2437-CR **AUGUST 26, 2020**

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92880
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

August 26, 2020
Project No. 2437-CR

D.R. Horton Los Angeles Holding Company, Inc.
2280 Wardlow Circle, Suite 100
Corona, California 92880

Attention: Ms. Megan Whieldon

Subject: Updated Geotechnical Evaluation
Proposed Single-Family Residential Development
Tract No. 31589 – Darwin Site
APN 487-470-028
City of Moreno Valley, Riverside County, California

Dear Ms. Whieldon:

We are pleased to provide the results of our updated geotechnical evaluation for the subject project located northwest of the intersection of Alessandro Boulevard and Darwin Drive in the city of Moreno Valley, Riverside County, California. This report presents the results of our evaluation and discussion of our findings.

In our opinion, site development appears feasible from a geotechnical viewpoint. Final site development and grading plans should be reviewed by this firm as they become available, as it will be necessary to provide appropriate recommendations for intended specific site development as those plans become refined.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

EDWARD H. LaMONT
No. 1892
Exp.

GABY M. BOGDANOFF
NO. 3133

Gaby Bogdanoff

Edward H. LaMont
CEG 1892, Exp. 07/31/22
Principal Geologist

Gaby M. Bogdanoff
GE 3133, Exp. 06/30/22
Project Engineer

KYLE R. MCHARGUE
9790

Kyle R. McHargue
PG 9790, Exp. 02/28/22
Project Geologist

Distribution: (1) Addressee via email

G:\Projects\2401 to 2450\2437CR DR Horton Tract 31589 Darwin 72 Moreno Valley\Rock Hardness Study\2437CR Updated Geotechnical Evaluation Tract 31589.doc

TABLE OF CONTENTS

TABLE OF CONTENTS

ENCLOSURES

Figure 1 – Site Location Map
Figures 2a and b – Exploration Location Maps

Appendix A – Exploratory Trenches and Borings Logs, Seismic Refraction Traverses, and Laboratory Test Results by Leighton and Associates (2005)
Appendix B – Logs of Exploratory Trenches and Borings by GeoTek
Appendix C – Seismic Refraction Survey Results by GeoTek
Appendix D – Results of Laboratory Testing by GeoTek
Appendix E – Soil Corrosivity Study
Appendix F – General Grading Guidelines

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the general geotechnical conditions on the site and provide updated geotechnical recommendations as deemed appropriate. Services for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Review of the referenced *Draft Geotechnical Investigation for Due-Diligence Purposes,* prepared by Leighton and Associates, Inc. (2005*) and Geotechnical Investigation for 17.7 Acre Site*, prepared by EGA Consultants (2006),
- Perform a reconnaissance of the site,
- Excavation of eight exploratory trenches and two exploratory borings to assess general subsurface soil conditions of the property,
- Site evaluation of rock hardness via a seismic refraction/tomography survey, performed by a subconsultant,
- Collection of relatively undisturbed and bulk samples of the onsite materials including samples for corrosion evaluation,
- Laboratory testing of selected soil samples,
- A corrosion study for the property,
- Review and evaluation of site seismicity, and
- Compilation of this updated geotechnical evaluation report which presents our findings, conclusions, and recommendations for the site development.

The intent of this report is to aid in the evaluation of the site for future development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report will likely need to be updated based on our review of final site development plans. These should be provided to GeoTek for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The site consists of a rectangular-shaped property located northwest of the Alessandro Boulevard and Darwin Drive intersection in the city of Moreno Valley, Riverside County, California. The site encompasses approximately 17.94 acres of land is identified with Riverside County Assessor's Parcel Number (APN) 487-470-028. The general location of the site is shown in Figure 1.

Based on a review of available maps, information provided within the referenced report, and observations at the time of our recent site reconnaissance, the site consists of vacant land with a light to moderate growth of dry weeds and brush and some dispersed trees and bushes. The site also has some visible trash and litter.

The site has a gently sloping terrain to the south-southeast with a total relief of approximately 29 feet across the site. Knobs of exposed granitic bedrock were observed within the southern portion of the site and adjacent to the west side of the site. Generally, site elevations range from approximately 1,616 feet above mean sea level (amsl) located in the northwest edge of the site and lowest ground elevation of 1,587 feet amsl towards the southeastern corner. Surface drainage is to the south-southeast.

The site is bounded by Alessandro Boulevard and vacant land to the south, a vacant parcel of land and Lasselle Street to the west, Darwin Drive and residential developments to the east, and Bay Avenue and residential developments to the north.

2.2 PROPOSED DEVELOPMENT

According to the referenced Tract *31589 Lotting Study Plan* and *Cut/Fill Plan,* prepared by Proactive Engineering Consultants West, Inc, plot date July 31, 2020, site development includes the grading and construction of 106 single-family residential lots, a water quality facility, underground utilities, and street improvements. Cuts and fills up to 20 and 9 feet, respectively, are anticipated to be required to reach design grades. Also, cut and fill slopes up to about 5 to 10 feet in height, respectively, at 2:1 (h:v) maximum gradients as well as retaining walls are expected. Plans for utility construction were not available at the time of this review. However, it is our assumption that the deepest utility proposed will be the sewer line at a depth of approximately 8 feet below proposed street grades.

A stormwater detention/catch basin is also proposed within the southeastern portion of the property. Cuts ranging from 4 to 14 feet are expected to be required to reach the proposed basin bottom. However, it is currently unknown whether the basin will be utilized for infiltration or storage. As such, infiltration testing was not included as a part of this evaluation.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Final site development plans should be reviewed by GeoTek when they become available. Additional geotechnical field exploration, analyses, and recommendations may be necessary upon review of site development plans.

Copies of the *Lotting Study Plan and Cut/Fill Plan* are presented as Figures 2a and 2b.

3. REPORT REVIEW

GeoTek reviewed previous draft reporting by Leighton and Associates (Leighton) titled, *Geotechnical Investigation for Due-Diligence Purposes, 20-Acre, 74-Lot tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California*, dated April 22, 2005. The study included four hollow-stem auger borings, ten backhoe test pits, four D9R bulldozer test pits, and a seismic refraction rippability study. The borings were excavated to a depth of 20 feet below existing ground surface, and the backhoe test pits were excavated to a maximum depth of 10 feet.

Leighton's described the site subsurface conditions as granitic bedrock overlain by a thin veneer of alluvial and colluvial soils. The alluvial soils reportedly encountered were generally 2-3 thick and consisted of loose to very dense gravelly sand to silty sand. Also encountered was medium stiff to very stiff sandy silt. Locally deeper alluvium encountered in the east-central portion of the site ranged from approximately 4 to 10 feet in thickness. Granitic bedrock of tonalite composition was noted below the alluvium and at the ground surface at some areas throughout the site.

The alluvial soils in the upper 5 to 10 feet were described as slightly compressible with a low collapse potential. Leighton recommended partial removal and recompaction of these soils. Representative sample of subsurface soils indicated an expansion index of 7 and 13 (very low), soluble sulfate content was described as negligible, and corrosivity testing indicated the onsite soils is considered severely corrosive to ferrous metals.

Groundwater was not encountered by Leighton to an explored depth of 20 feet below existing ground surface. A water seepage was reportedly encountered by Leighton in their trench TP-3 which was likely caused by recent rains and low topographic relief of the area. Leighton also stated that the historic high groundwater level is estimated to be about 110 feet below the existing ground surface.

Leighton stated that no traces of active or potentially active faults have been mapped onsite and the potential for fault-induced ground rupture at the site is considered very low. Additionally, secondary seismic hazards such as liquefaction and seismically induced settlement were described as very low and minor, respectively.

Leighton used backhoe test pits, bulldozer test pits, and a seismic refraction survey to assess the rippability of the onsite bedrock. The backhoe test pits generally encountered refusal on hard bedrock materials after penetrating 2 to 3 feet into bedrock. The bulldozer test pits utilized a D9R dozer with 32-inch rippers. The dozer was generally able to excavate to 10 feet below ground surface. However, at deeper depths it required heavy ripping and cross-ripping. Also, along the western half of the southern boundary a bulldozer test pit reportedly encountered refusal at 2 feet below grade. The exact location of this exploration was not provided in Leighton's report. The seismic refraction survey conducted for Leighton consisted of five seismic refraction lines about 250-foot long each. The survey concluded that granitic material was weathered and/or fractured to a depth of approximately 40 to 60 feet throughout the site. In light of the findings of the dozer test pits, Leighton concluded that cuts on the order of 5 to 10 feet deep in the elevated areas of the site can generally be made without the need for blasting; although floaters may be difficult to excavate. Additionally, deeper cuts are expected to require blasting, particularly the southwest corner of the site.

A copy if the boring and trench logs, seismic refraction lines, and laboratory test results by Leighton (2005) are presented in Appendix A of this report.

GeoTek received reporting by EGA Consultants, LLC. (EGA) on the adjacent property to the west titled *Geotechnical Investigation, for 17.7 Acre Proposed Mixed Use Commercial and Residential Property, Located at Northeast Corner of Alessandro Boulevard and Lasselle Street, Moreno Valley, California*, dated May 10, 2006. EGA's field investigation consisted of 20 hollow-stem auger borings and a seismic refraction survey. The borings were excavated to a maximum depth of 36 feet below existing ground surface, and the seismic refraction survey consisted of three 156-foot long seismic traverses.

EGA described the subsurface soil conditions at the site as being fill and/or topsoil underlain by igneous bedrock. The fill/topsoil was encountered in all exploratory borings to average depths of 1-3 feet with exception of the northeast portion of the site where approximately 13 feet of fill was encountered. The fill/topsoil consisted generally of light brown and gray, dry, loose silty sands. Underlying the fill/topsoil materials was igneous bedrock in all test borings by EGA. The bedrock was described as Cretaceous-age bedrock consisting primarily of very coarse grained crystalline tonalite, that is well-foliated and massive. The expansion index of the fill and the granitic bedrock was determined to be "very low" according to EGA.

Groundwater was not encountered by EGA to an explored depth of 36 feet below existing ground surface. EGA stated that the regional groundwater level is estimated to be greater than 50 feet below the existing ground surface.

EGA stated that no traces of active faults have been mapped onsite. Additionally, secondary seismic hazards such as liquefaction was considered "nil". EGA also stated that expansive clays and landsliding do not appear to be evident at the subject site.

Based on the seismic refraction traverses, EGA concluded that the upper 10 feet to 20 feet of site strata is considered weathered and rippable using conventional grading equipment (specified as D9R dozer with a multi- or single-shank ripper). EGA also stated that there were areas of non to marginally rippable bedrock, particularly at seismic line "S-1". EGA concluded that some light blasting may be required to achieve desired grade.

4. FIELD EXPLORATION, LABORATORY TESTING, AND CORROSION TESTING

4.1 FIELD EXPLORATION

GeoTek investigated the project site via exploratory trenches and borings which were performed between July 13, 2020 and July 17, 2020. The trenching exploration consisted of eight trenches to depths ranging from 10.5 to 16 feet and were excavated to log the subsurface materials and examine the rippability and/or hardness of localized areas throughout the site. The boring exploration consisted of drilling two exploratory borings to approximately 20 feet below grade. The trenches were excavated utilizing a Western SK500 excavator, and the borings were drilled with a track-mounted hollow-stem auger drill rig.

Also, a seismic refraction survey was conducted on July 27, 2020 by a subconsultant (Subsurface Surveys & Associates, Inc.). The seismic refraction survey involved the recording and measuring of man-made energy waves from seven seismic refraction lines placed in site areas where deep excavations are proposed. The seismic survey summary report is included in Appendix C.

The approximate locations of our site explorations are shown on the Exploration Location Maps, Figures 2a and 2b. Logs of the borings and trenches by Leighton, in addition to the borings, trenches and seismic refraction lines by GeoTek are provided in Appendices A through C, respectively.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively bulk soil and bedrock samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the subsurface materials encountered and to evaluate the soil/bedrock physical properties for use in the engineering design and analysis. Our test results along with a brief description and relevant information regarding testing procedures are included in Appendix D.

4.3 CORROSION TESTING

GeoTek collected a total of 12 samples across the site from the upper one foot. The samples were taken to the laboratory to be evaluated for their corrosion potential. The locations of the samples obtained for the site are shown on the Exploration Location Maps, Figures 2a and 2b. The results of corrosion tests are presented in Appendix E.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends from the point of contact with the Transverse Ranges geomorphic province, southerly to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are mostly found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province, and the San Jacinto fault borders the province adjacent the Colorado Desert province.

More specific to the subject property, the site is located in an area geologically mapped by others to be underlain by granitic bedrock of quartz diorite to granodiorite (Dibblee, T.W. and Minch, J.A., 2003). The regional geologic maps noted the general trend of foliations in the bedrock had a northwest-southeast orientation and a 50-degree to 50-degree inclination to the northeast. Locally, one trend of foliations in the bedrock had a northeast-southwest orientation with no defined inclination.

No active faults are shown in the immediate site vicinity on the maps reviewed for the area. The site is not located within an Earthquake Fault Zone (Alquist-Priolo) as designated by the State of California. The Riverside County website (https://gis.countyofriverside.us/) has designated the site as “not in a fault zone”, “not in a fault line”, having “low” potential for liquefaction, and “susceptible” to subsidence.

5.2 EARTH MATERIALS

A brief description of the earth materials reported to be on the site by Leighton (2005) and encountered in our explorations is presented in the following sections.

5.2.1 Alluvium

Alluvium was encountered in our exploratory trenches, borings and during Leighton’s previous field investigation. These materials consist of silty to clayey sand and extended from the ground surface to average depths of about 2 to 3 feet. However, within the eastern-central and northern regions of the site, the alluvium extended to up 10 feet below grade. The alluvium had various shades of brown and red in color, dry to moist, and was generally medium dense to dense, based on our field observations. Verification testing conducted by our firm indicated that the alluvium has a “very low” expansion potential (EI = 8) and slight potential for collapse.

5.2.2 Granitic Bedrock

Granitic bedrock was observed at the property as rock outcrops or encountered in site explorations at typical depths of 1 to 5 feet and in some areas as deep as approximately 10 feet. Also, bedrock materials were found at or near the ground surface in the seismic refraction lines placed at the site by our firm. The regional geologic map shows the bedrock is foliated, generally in a northwest/southeast orientation with inclinations ranging from 50 degrees to 80 degrees to the northeast.

The on-site bedrock consists of tonalite which is moderately to highly weathered within its upper portions and is recovered as grayish brown fine to coarse sand when excavated. The bedrock becomes less weathered with depth. All our test pits experienced refusal due to hard granitic bedrock at depths between 10.5 and 16 feet.

The seismic refraction survey generally identified three zones of subsurface materials. The uppermost zone is comprised of mostly soil and colluvium and is estimated to extend up to 5 feet below grade. The middle zone was noted to correspond to highly weathered to weathered bedrock to depths ranging from 10 to 38 feet with refraction velocities ranging from 2,630 to 4,887 fps. The bottom zone was noted to be comprised of less weathered bedrock with velocities ranging from 4,020 to 6,494 fps. Tomographic models conducted for selected seismic lines confirmed that the seismic velocity (hardness) of the rock increases with depth. No evidence of hardrock floaters were noted on the topographic models, but some ridges and anomalies were observed.

To estimate the approximate depth to rippable bedrock and rippable trenching (utility construction) using the seismic refraction data collected at the site, we have utilized cut-off velocities of 5,000 fps and 3,800 fps, respectively. We have also used our field observations during the excavation of the recent site trenches and borings. Based on the above and per the proposed grades shown on the referenced *Cut/Fill Site Plan* (Proactive, 2020) and assuming a maximum wet utility depth of 8 feet below street grade and over-excavation of about 5 feet deep for cut lots into bedrock, we estimate that grading operations within the south-southeastern, elevated portions of the site will encounter marginally rippable bedrock. Hard, marginally rippable bedrock is anticipated to exist in that area at general depths ranging from 10 to 15 feet. While these materials may still be rippable with a Caterpillar D-9 Ripper, excavations may be slow and blasting or other excavation techniques could be more cost-effective.

Similarly, very difficult to non-rippable trenching areas were encountered near Lines 3 through 6 and Trenches T-1, 4, and 5, and dozer Test Pits DP-1 and DP-3 by Leighton (2005) starting at depths of about 10 feet below existing grade. All these areas are also located near the elevated portions of the property towards the south-southeast region.

It should be noted that the seismic refraction traverses performed by Leighton (2005) suggested that rippable bedrock exist near the locations of the lines evaluated until a depth of 30 feet or more is reached. This information, however, is in contradiction with the data from their dozer test pits and our explorations.

Results of the seismic refraction survey are provided in Appendix C.

Detailed logs of the subsurface conditions of the site are presented in Appendices A and B.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

Surface water was not noted during our field work. If encountered during earthwork construction, surface water on this site is the result of precipitation or possibly some minor surface run-off from immediately surrounding properties. Overall site area drainage is generally to the south-southeast, as directed by site topography. Provisions for surface drainage will need to be accounted for by the project civil engineer.

5.3.2 Groundwater

Groundwater was not encountered in any of our exploratory borings or test pits to a depth of 20 feet. Groundwater was not encountered by Leighton to an explored depth of 20 feet below existing ground surface. Leighton stated that the historic high groundwater level is estimated to be about 110 feet below the existing ground surface.

California Department of Water Resources, Water Data Library, indicates that the groundwater depth for a well (State Well No. 03S03W15F001S) is greater than 100 feet below ground surface. The well is located approximately 1.5 miles southeast of the site. Based on the above, groundwater is not anticipated to be a factor during the site grading. However, seasonal perched groundwater may be encountered during grading within the lower elevations of the site.

GeoTek should review grading plans once available to determine if groundwater is anticipated to adversely affect the proposed developments.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within a State of California designated *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986).

The County of Riverside has designated the site as "not in a fault zone" and "not in a fault line."

5.4.1 Seismic Design Parameters

The site is located at approximately 33.9190 Latitude and -117.2056 Longitude. Site spectral accelerations (S_a and S_1), for 0.2 and 1.0 second periods for a Class "C" site, were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. Due to the presence of shallow bedrock, a Site Class C is considered appropriate. The results are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.769g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.692g
Site Coefficient for Site Class "C", F_a	1.2
Site Coefficient for Site Class "C", F_v	1.4
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	2.122g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.969g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.415g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.646g
Site Modified Peak Ground Acceleration, PGA_M	0.898g

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.4.2 Surface Fault Rupture

The site is in a seismically active region; however, no active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone

(Bryant and Hart, 2007). No faults are identified on geologic maps readily available and reviewed by this firm for the immediate study area. The nearest known active fault zone is the Elsinore Fault - Glen Ivy Section located approximately 8.5 miles southwest of the site. Therefore, the potential for surface rupture at the site is considered negligible.

5.4.3 Liquefaction and Seismically Induced Settlement

The County of Riverside has designated the site having "low" liquefaction potential, and "susceptible" to subsidence.

Liquefaction is not considered to be a hazard at the subject site due the presence of shallow bedrock materials. Also, the potential for seismically induced settlement at the property is considered to be nil because of the minimal thickness of soil atop bedrock.

5.4.4 Other Seismic Hazards

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

6.2 EARTHWORK CONSIDERATIONS

6.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Moreno Valley, the 2019 California Building Code (CBC), and recommendations contained in this report. The General Grading Guidelines included in Appendix F outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix F.

Final site grading plans should be reviewed by this office when they become available. Additional recommendations will likely be offered subsequent to review of these plans.

6.2.2 Site Clearing

Site preparation should start with removal of any existing improvements, deleterious materials, and vegetation within the planned development areas of the site. These materials should be properly disposed of off-site.

6.2.3 Remedial Grading

All topsoil, colluvium, loose alluvium, and highly weathered bedrock should be removed to expose competent native materials. Competent native materials are defined as either alluvium which is not visibly porous having an in-place compaction of at least 85 percent of the soil's maximum dry density (per ASTM D 1557) or firm, unyielding bedrock. A representative of this firm should observe and approve the bottom of all excavations.

Based on the data available, removals generally on the order of three to five feet from existing grade or to a minimum of three feet below proposed grades, whichever is greater, should be performed below structural areas in fill. Actual depths of removals should be determined in the field based on observation and in-place density testing. As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally, whichever is greater. The bottom of the removals should be graded to drain toward the front of the lot at a gradient of at least two percent.

In order to facilitate footing excavation and installation of house services, consideration should be given to overexcavate cut lots to a minimum depth of five feet below proposed grades. We recommend that the entire lot be over-excavated. We also recommend that utility alignments be overexcavated to at least one foot below the depth of the lowest underground utility.

To prevent potential differential settlement, the cut portions of transition (i.e. cut/fill) lots should be overexcavated a minimum of five feet below proposed grades or to a depth of one-half of the maximum fill thickness on the lot, whichever is greater. The horizontal extent of over-excavation could comprise the entire lot or extend at least five feet outside the structural area, or a distance equal to the depth of overexcavation below the bottom of the structural

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

elements, whichever is greater. Overexcavation bottoms should be graded to drain toward the front of the lot (two percent minimum).

The approved removal/over-excavation bottom exposed should then be scarified to a depth of about six inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density, per ASTM D 1557.

6.2.4 Engineered Fill

The onsite materials are considered suitable for reuse as engineered fill provided they are free from vegetation, roots, and rock/hard lumps greater than six inches in maximum dimension.

The undercut areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in six- to eight-inch loose lifts, moisture conditioned to the optimum moisture content, and compacted to a minimum relative compaction of 90 percent as determined by ASTM D 1557. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

If oversized materials (greater than six inches) are generated from cuts into bedrock, the oversized rock should be disposed of offsite or stockpiled on site and crushed for future use. Alternatively, general rock placement guidelines are presented in Appendix F.

6.2.5 Excavation Characteristics

The preliminary *Site Cut/Fill Plan* (Proactive, 2020) indicates that the deepest cuts (up to 20 feet) are proposed to be conducted within the southeastern region of the site. The results of the seismic refraction survey (Appendix C) and our trenching and boring exploration suggest that bedrock materials marginally rippable with a Caterpillar D9R Ripper may be encountered within this zone starting at general depths of about 10 to 15 feet.

Similarly, the data suggests that very difficult to non-rippable trenching conditions may be experienced within the future utility areas located within the cited zone starting at depths of 10 feet, due to hard unweathered bedrock. Localized blasting, chipping to dislocate and remove corestones, or other special techniques may be warranted.

Excavation of alluvial deposits and granitic bedrock (with the exception of the south-southeastern elevated region) to the design elevations is expected to be feasible with heavy-duty grading equipment in good operating condition. All temporary excavations for grading

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for cuts less than ten feet in height.

6.2.6 Slope Construction

An engineering geologist should observe all cut slopes. Cut slopes should expose competent bedrock. If adverse structure or incompetent materials are exposed and identified in the cut slopes, stabilization fills may be recommended.

Fill slopes constructed at maximum gradients of 2:1 (h:v), in accordance to industry standards, are anticipated to be both grossly and surficially stable. Where fill is to be placed against sloping terrain with gradients of 5:1 (h:v) or steeper, the sloping ground surface should be benched to remove loose and disturbed surface soil to assure that the new fill is placed in direct contact with competent bedrock and to provide horizontal surfaces for fill placement. A 10- to 15-foot wide keyway should be constructed at the toe of the fill slope areas extending at least 2 to 3 feet vertically into competent natural material.

The base of the keyways and benches should be sloped back into the hillside at a gradient of at least two percent. The base of the benches should be evaluated by a representative of GeoTek prior to processing. Upon approval, the exposed materials should be moistened to at least the optimum moisture content and densified to a relative compaction of at least 90 percent (ASTM D 1557).

Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction and then roll the final slope to provide a dense, erosion resistant surface.

6.2.7 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for short durations during construction and where cuts do not exceed ten feet in height. We anticipate that temporary cuts to a maximum height of four feet can be excavated vertically.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.2.8 Shrinkage and Bulking

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of five to ten percent may be considered for the surficial soils. Bedrock materials may bulk up to ten percent. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction.

Subsidence is not considered to be a factor with the underlying site materials.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2019 CBC, are presented herein. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Based on the results of laboratory testing, the on-site materials are classified as having "very low" ($0 \leq EI \leq 20$) expansion potential per ASTM D 4829. Additional laboratory testing should be performed at the completion of site grading to verify the expansion potential of the near-surface soils.

A summary of our preliminary foundation design recommendations is presented in the table below:

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALY REINFORCED SHALLOW FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential (0≤EI≤20)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- and Two-Story – 12
Minimum Foundation Width (Inches)*	One- and Two-Story – 12
Minimum Slab Thickness (actual)	4 inches
Minimum Slab Reinforcing	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab
Minimum Footing Reinforcement	Two No. 4 Reinforcing bars, one top and one bottom
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% to a depth of 12 inches

*Code minimums per Table 1809.7 of the 2019 CBC.

It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

An allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This value may be increased by 400 psf for each additional 12 inches in depth and by 400 psf for each additional 12 inches in width to a maximum value of 3,000 psf. Additionally, an increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads).

Based on the recommended site grading, we estimate a total static settlement of less than 1 inch. A differential static settlement of about ½ inch over a 30-foot span is also estimated. Seismically induced total and differential settlement are considered to be negligible.

The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

A grade beam, a minimum of 12 inches wide and 12 inches deep, should be utilized across large entrances. The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as the result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. It is GeoTek's opinion that a minimum ten mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and atmospheric conditions.

Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeance) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

We recommend that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural engineer.

6.3.2 Miscellaneous Foundation Recommendations

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.

Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

6.3.3 Foundation Set Backs

Where applicable, the following setbacks should apply to all foundations. Any improvements not conforming to these setbacks may be subject to lateral movements and/or differential settlements:

- The outside bottom edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least 5 feet and need not exceed 40 feet.
- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least 5 feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom inside edge of the wall footing.
- The bottom of any proposed foundations for structures should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom of the nearest excavation.

6.4 RETAINING WALL DESIGN AND CONSTRUCTION

6.4.1 General Design Criteria

Recommendations presented herein may apply to typical masonry or concrete vertical walls retaining up to six feet of soil. Additional review and recommendations should be requested for higher walls.

Retaining wall foundations embedded a minimum of 12 inches below the lowest adjacent grade and should rest on either 24 inches of compacted fill placed on competent bedrock or on competent bedrock. Wall footings should be designed using an allowable bearing capacity of 2,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

An equivalent fluid pressure approach may be used to compute the horizontal active pressure against the wall. The appropriate fluid unit weights are given in the table below for specific slope gradients of retained materials.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (H:V)	Equivalent Fluid Pressure (PCF) Native Materials*
Level	41
2:1	60

*The design pressures assume the native backfill material has an expansion index less than or equal to 20. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

The above equivalent fluid weights do not include superimposed loading conditions such as expansive soils, vehicular traffic, structures, seismic conditions or adverse geologic conditions.

6.4.2 Restrained Retaining Walls

Any retaining wall that will be restrained prior to placing backfill or walls that have male or reentrant corners should be designed for at-rest soil conditions using an equivalent fluid pressure of 61 pcf, plus any applicable surcharge loading. For areas having male or reentrant corners, the restrained wall design should extend a minimum distance equal to twice the height of the wall laterally from the corner, or as otherwise determined by the structural engineer.

6.4.3 Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have and expansion index of less than 20. Retaining walls should be provided with an adequate pipe

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one-cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one-foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The rock should be separated from the earth with filter fabric. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within two feet of the ground surface. The subdrain should be placed at the base of the wall in direct contact with the Miradrain 2000.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained.

Walls from two to four feet in height may be drained using localized gravel packs behind weep holes at eight feet maximum spacing (e.g. approximately 1.5 cubic feet of gravel in a woven plastic bag). Weep holes should be provided or the head joints omitted in the first course of block extended above the ground surface. However, nuisance water may still collect in front of the wall.

Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements.

6.4.3.1 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.

- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

6.4.4 Pavement Design Considerations

Pavement design for proposed on-site and off-site street improvements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements. Based on traffic indices (TIs) of 6.0 and 7.0 generally associated with these types of projects and using an assumed design R-value of 50, the following preliminary sections were calculated:

PRELIMINARY PAVEMENT SECTIONS

TI	R-Value	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
6.0	50	4*	6*
7.0		4*	6*

*Minimum pavement structural section per City of Moreno Valley Street Standards

The TIs used in our pavement design are considered reasonable values for the proposed street areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper 12 inches) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2

and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.4.5 Soil Corrosivity

A corrosion report was prepared for the site by our sub-consultant HDR based on various samples recently obtained across the site. The site corrosion report is included in Appendix E. In general, the report concluded that the on-site materials are "moderately corrosive" to ferrous metals and "aggressive" to copper.

6.4.6 Soil Sulfate Content

The corrosion evaluation performed by HDR, Inc. states that the site soils have "negligible" sulfate concentrations. Based upon the test results, no special concrete mix design is required by Code for sulfate attack resistance. Additional recommendations for mitigation of soil corrosion are provided in Appendix E.

6.4.7 Import Soils

Import soils should have expansion characteristics similar to the on-site soils. GeoTek also recommends that the proposed import soils be tested for expansion and sulfate potential. GeoTek should be notified a minimum of 72 hours prior to importing so that appropriate sampling and laboratory testing can be performed.

6.4.8 Concrete Flatwork

6.4.8.1 Exterior Concrete Slabs, Sidewalks, and Driveways

Exterior concrete slabs, sidewalks, and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required from a geotechnical perspective. However, some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in industrial construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

Subgrade soils should be pre-moistened prior to placing concrete. The subgrade soils below exterior flatwork should be pre-saturated to a minimum of 100 percent of optimum moisture content to a depth of at least 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City inspector, if necessary.

6.4.8.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 0.125-inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent upon a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

6.5 POST CONSTRUCTION CONSIDERATIONS

6.5.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundations. This type of landscaping should be avoided. Due to the presence of high expansive soils, irrigation should be minimized adjacent to the buildings. Planters within 30 feet of the buildings should be above ground and underlain by a concrete slab. Waterproofing of the foundation and/or subdrains may be warranted and advisable. We could discuss these issues, if desired, when plans are made available.

6.5.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times, as directed by the project civil engineer. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings and floor-slabs. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

Roof gutters should be installed that will direct the collected water at least 20 feet from the buildings.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.6 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading, specifications, retaining wall/shoring plans and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. Additional recommendations may be necessary based on these reviews. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek's representative perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement including utility trenches.
- Test the fill for field density and relative compaction.
- Test the near-surface soils to verify proper moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

7. LIMITATIONS

This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our proposal (Proposal No. P-0506320-

CR) dated July 1, 2020 and geotechnical engineering standards normally used on similar projects in this region.

The materials observed on the project site appear to be representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

8. SELECTED REFERENCES

American Society of Civil Engineers (ASCE), 2016, “Minimum Design Loads for Buildings and Other Structures,” ASCE/SEI 7-16.

Bowles, J. E., 1977, “Foundation Analysis and Design”, Second Edition.

Bryant, W.A., and Hart, E.W., 2007, "Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," California Geological Survey: Special Publication 42.

California Code of Regulations, Title 24, 2019 “California Building Code,” 2 volumes.

California Geological Survey (CGS, formerly referred to as the California Division of Mines and Geology), 1977, “Geologic Map of California.”

_____, 1998, “Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada,” International Conference of Building Officials.

_____, 2008, “Guidelines for Evaluating and Mitigating Seismic Hazards in California,” Special Publication 117A.

Dibblee, T.W. and Minch, J.A., 2003, “Geologic Map and Digital Database of the Sunnymead/South ½ if Redlands Quadrangle, San Bernardino and Riverside Counties, California,” U.S Geological Survey DF-110, scale 1:24,000.

EGA Consultants, 2006, "Geotechnical Investigation for 17.7 Acre Proposed Mixed Use Commercial and Residential Property L:ocated at NEC Alessandro Blvd. and Lasselle Street, Moreno Valley, California", May 10, Project No. VB435.1.

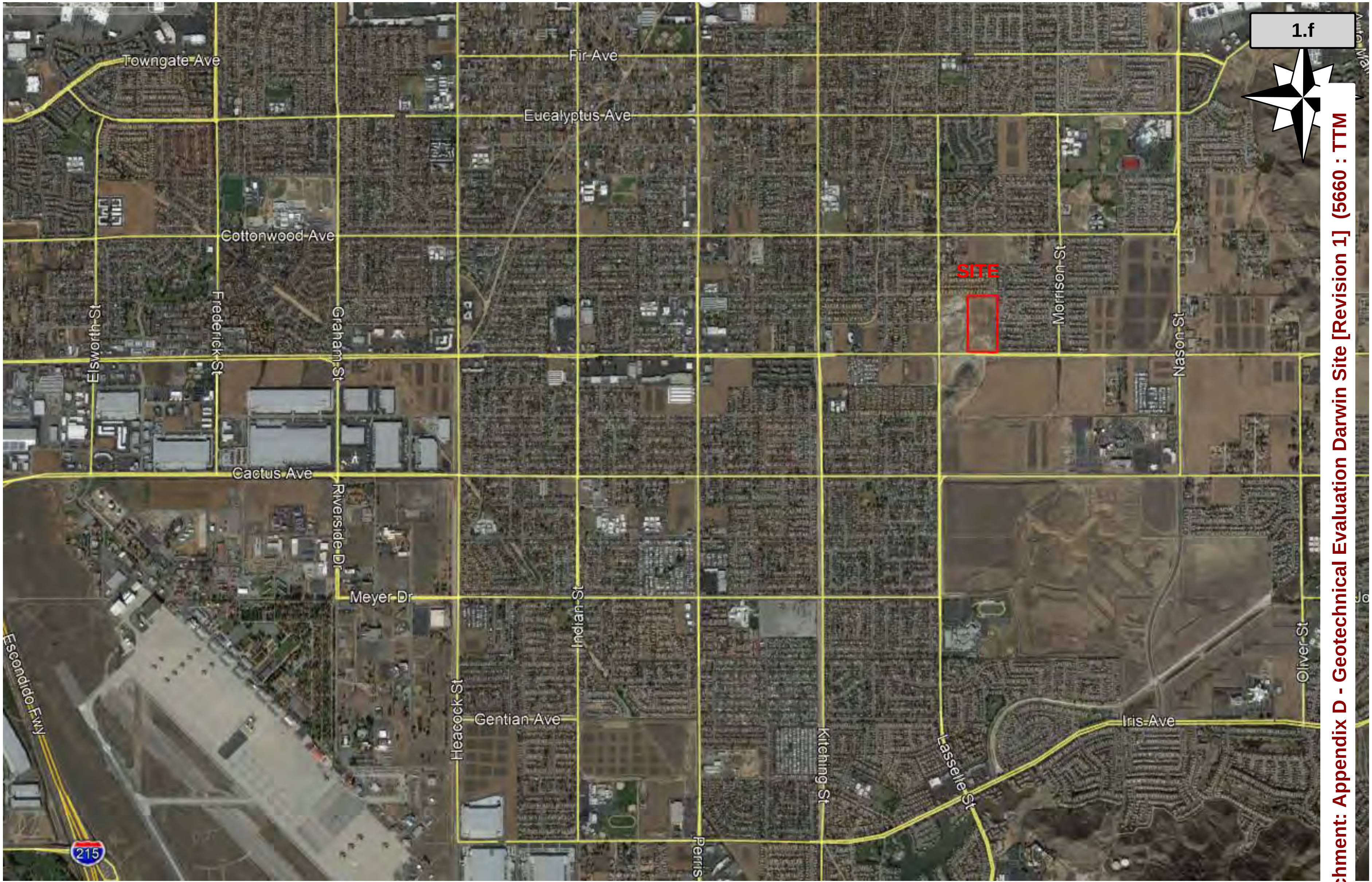
GeoTek, Inc., In-house proprietary information.

Leighton and Associates, Inc., 2005, Draft version of "Geotechnical Investigation for Due-Diligence Purposes, 20-Acre, 74-Lot Tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California", dated April 22, Project No. 021521-001.

Proactive Engineering Consultants West, Inc., 2020, Lotting Study Plan and Cut/Fill Plan, dated July 31.

Terzaghi, K. and Peck, R. B., 1967, "Soil Mechanics in Engineering Practice", Second Edition.

U.S. Seismic Design Maps (http://earthquake.usgs.gov/designmaps).



D•R•Horton Los Angeles Holding Company
Darwin Site
Moreno Valley, Riverside County, California

Project No. 2437-CR

Scale: As Shown

0 0.75 mi.

Figure 1

Site Location Map

GEOTEK

LEGEND
(Locations are Approximate)

- ● B-2 Exploratory Borings by GeoTek
- T-8 16' Exploratory Trenches by GeoTek (Depth of Refusal)
- ▲ S-1 Corrosion Sample
- Line 9 Seismic Refraction Line by GeoTek
- ● B-4 Exploratory Borings by Leighton (2005)
- ▬ TP-10 Exploratory Backhoe Test Pits by Leighton (2005)
- ▬ DP-3 Exploratory Bulldozer Test Pits by Leighton (2005)
- Line 12 Seismic Refraction Lines by Leighton (2005)
- Geologic Contact

Geologic Units:

Qal- Alluvium

DR Horton Los Angeles Holding Company, Inc.
Darwin Site
Moreno Valley, Riverside County, California

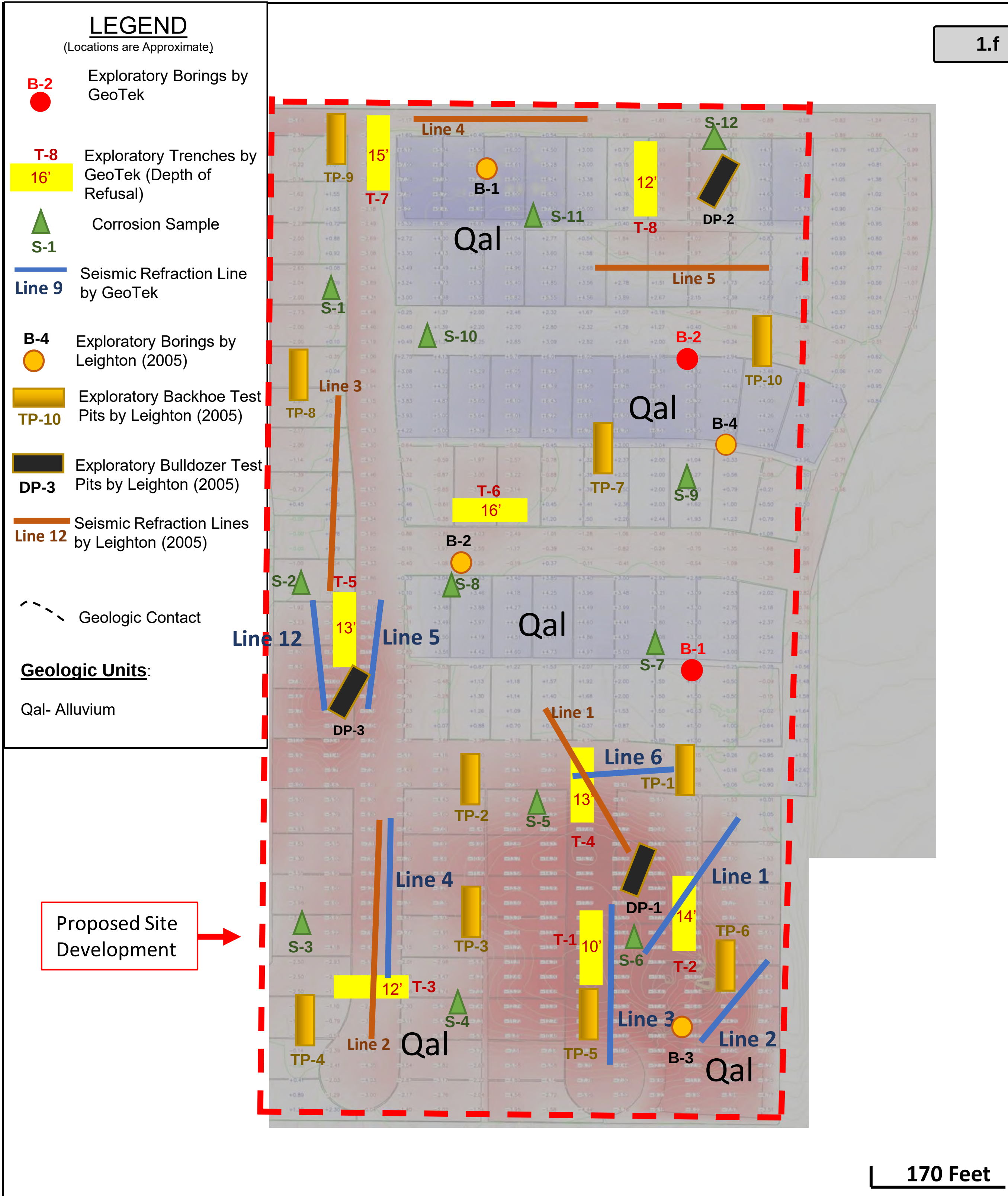
GeoTek Project No. 2437-CR

N

Figure 2a

Exploration Location Map

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family



DR Horton Los Angeles Holding Company, Inc.
Darwin Site
Moreno Valley, Riverside County, California

GeoTek Project No. 2437-CR

Figure 2b

Exploration Location Map

APPENDIX A

LOGS OF EXPLORATORY TRENCHES AND BORINGS AND SEISMIC REFRACTION TRAVERSES BY LEIGHTON AND ASSOCIATES, INC. (2005)

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

GEOTECHNICAL BORING LOG B-1

Date 3-14-05
Sheet 1 of 1
Project DR Horton / Chen 74
Project No. 021521-001
Drilling Co. Martini
Type of Rig CME 75
Hole Diameter 8"
Drive Weight 140 lb Automatic Hammer
Drop 30"
Elevation Top of Hole 1595'
Location See Geotechnical Map

Logged By MKZ
Sampled By

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1595	0								@ 0' **ALLUVIUM (Qal)**	EI
				B-1						
				R-1	3 14 23	125.5	12.4	SC/CL	@ 2' Sandy CLAY to Clayey SAND, brown, moist, very stiff/medium dense, decomposed granite in sampler tip	
									@ 3½' **UNDIFFERENTIATED TONALITE (Kt)**	
1590	5			R-2	24 50/6"				@ 5' BEDROCK, decomposed granitic rock, gray brown, damp, coarse-grained, biotite-rich, friable	Col
1585	10			R-3	50/6"	119.1	8.0		@ 10' BEDROCK, decomposed granitic rock, gray to dark brown, very moist, abundant mica, less friable than above	
1580	15			R-4	50/4"				@ 15' BEDROCK, decomposed granitic rock, damp, becoming harder	
1575	20			R-5	50/5"				@ 20' BEDROCK, decomposed granitic rock, damp, becoming harder	
									Total depth 20½ feet No groundwater Bedrock at 3½ feet Boring backfilled with soil cuttings	
1570	25									
1565	30									

SAMPLE TYPES:

S	SPLIT SPOON
R	RING SAMPLE
B	BULK SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

DS	DIRECT SHEAR
MD	MAXIMUM DENSITY
CN	CONSOLIDATION
Col	COLLAPSE
CR	CORROSION
SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS
EI	EXPANSION INDEX
RV	R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-2

Date	3-14-05	**Sheet**	1 **of** 1
Project	DR Horton / Chen 74	**Project No.**	021521-001
Drilling Co.	Martini	**Type of Rig**	CME 75
Hole Diameter	8"	**Drive Weight**	140 lb Automatic Hammer
Drop	30"	**Elevation Top of Hole**	1599'
Location	See Geotechnical Map		

Logged By MKZ

Sampled By

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								@ 0' **ALLUVIUM (Qal)**	
				R-1	2 4 8	120.4	12.9	CL	@ 2' Sandy CLAY with Silt, reddish brown, moist, medium stiff	
1595									@ 4' **UNDIFFERENTIATED TONALITE (Kt)**	
	5			R-2	13 39 50/4"				@ 5' BEDROCK, decomposed granite, gray, damp, dense to very dense, partially friable	CN
1590				B-1						
	10			R-3	11 26 50/4"	124.9	8.2		@ 10' BEDROCK, decomposed granitic rock, gray, damp, ½-inch wide seam in tip filled with sandy silt, friable, pale orange feldspars, some mica present	
1585										
	15			R-4	15 50/5"	122.1	9.4		@ 15' BEDROCK, decomposed granitic rock, gray, damp, ¼-inch wide seam filled with clayey soil, friable, pale orange feldspars, some mica present	
1580										
	20			R-5	50/3"				@ 20' BEDROCK, decomposed granitic rock, gray, very moist, friable, pale orange feldspars, some mica present	
									Total depth 20¼ feet No groundwater Bedrock at 4 feet Boring backfilled with soil cuttings	
1575										
	25									
1570										
	30									

SAMPLE TYPES:

S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
Col COLLAPSE
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GEOTECHNICAL BORING LOG B-3

Date	3-14-05	**Sheet**	1 **of** 1
Project	DR Horton / Chen 74	**Project No.**	021521-001
Drilling Co.	Martini	**Type of Rig**	CME 75
Hole Diameter	8"	**Drive Weight**	140 lb Automatic Hammer
Drop	30"		
Elevation Top of Hole	1605'	**Location**	See Geotechnical Map

Logged By MKZ

Sampled By

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
1605	0								@ 0' **ALLUVIUM (Qal)**	MD
				B-1						
				R-1	5 7 6	118.0	6.2	SM/ML	@ 2' Silty SAND to Sandy SILT, brown, damp to moist, loose/medium stiff, decomposed granite in sampler tip	
									@ 3½' **UNDIFFERENTIATED TONALITE (Kt)**	
1600	5			R-2	10 17 38				@ 5' BEDROCK, decomposed granitic rock, gray with orange brown oxidation staining, damp to moist, friable, micaceous	Col
1595	10			R-3	36 50/1"	118.1	4.7		@ 10' BEDROCK, decomposed granitic rock, gray to dark gray brown, damp to moist, friable, very micaceous	
1590	15			R-4	50/3"	102.9	3.3		@ 15' BEDROCK, decomposed granitic rock, gray to dark gray brown, damp, friable, very micaceous	
1585	20			R-5	50/2"				@ 20' BEDROCK, decomposed granitic rock, gray to dark gray brown, damp, friable, very micaceous	
									Total depth 20¼ feet No groundwater Bedrock at 3½ feet Boring backfilled with soil cuttings	
1580	25									
1575	30									

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- Col COLLAPSE
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-4

Date 3-14-05

Project DR Horton / Chen 74

Drilling Co. Martini

Hole Diameter 8"

Drive Weight 140 lb Automatic Hammer

Drop 30"

Elevation Top of Hole 1599'

Location See Geotechnical Map

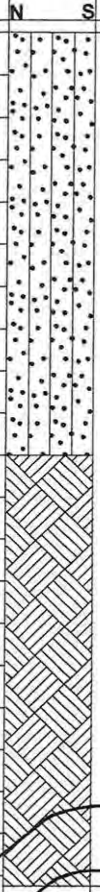
Sheet 1 **of** 1

Project No. 021521-001

Type of Rig CME 75

Logged By MKZ

Sampled By



Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per Six Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
	0								@ 0' **ALLUVIUM (Qal)**	
				R-1	2 1 1	111.1	11.5	ML	@ 2' Sandy SILT, brown, very moist, very soft, fine- to coarse-grained sand, micaceous, trace rootlets, some clay	
1595										
	5			R-2	2 3 4	116.2	15.0	ML	@ 5' Sandy SILT, brown, very moist to very moist, soft, fine- to coarse-grained sand, micaceous, trace rootlets, some clay	
1590										
	10			R-3	50/6"	117.8	7.1		@ 10' **UNDIFFERENTIATED TONALITE (Kt)** Decomposed Granite, gray, damp	
1585										
	15			R-4	50/3"	107.1	3.4		@ 15' BEDROCK, decomposed granitic rock, gray brown, damp to moist, friable, micaceous	
1580										
	20			R-5	50/3"		5.3		@ 20' BEDROCK, decomposed granitic rock, gray brown, very moist to wet, friable, micaceous	
									Total depth 20¼ feet No groundwater Bedrock at 10 feet Boring backfilled with soil cuttings	
1575										
	25									
1570										
	30									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- Col COLLAPSE
- CR CORROSION
- SA SIEVE ANALYSIS
- AL ATTERBERG LIMITS
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Test Pit TP-1

Date Excavated: March 3, 2005

Project: DR Horton/Chen 74

Logged By: SFR

Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	2.0	SM	Silty SAND, medium gray brown, moist to very moist, fine gravel, rootlets	Qal				
2.0	3.1	SC	Clayey SAND, reddish brown, most, slightly cohesive			2	89.9	15.0
3.1	4.8		Undifferentiated Tonalite (granitic rock), decomposed, orange brown, slightly moist	Kt				
4.8	5.0		Becomes hard, refusal					

Total Depth: 5 feet (refusal)
No groundwater encountered.
Test pit backfilled with native soil, tamped with bucket and wheel rolled at surface.

Test Pit TP-2

Date Excavated: March 3, 2005

Project: DR Horton/Chen 74

Logged By: SFR

Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	0.8	ML	Sandy SILT, gray brown, moist, trace organics, disturbed	Afu				
0.8	3.5	ML	Sandy SILT, medium brown, very moist, abundant rootlets	Qal	B-1	3		
3.5	5.0	SC	Sandy CLAY, light brown, medium-grained, mixed with decomposed granite					
5.0	6.0		Undifferentiated Tonalite (granitic rock), decomposed, light brown, slightly moist, very hard	Kt				

Total Depth: 6 feet
No groundwater encountered.
Test pit backfilled, tamped with bucket, wheel rolled at surface.

Project No. 021521-001

Leighton and Associates, Inc.

Test Pit TP-3

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	1.5	SM	Silty SAND, medium brown, moist, rootlets, fine gravel	Qal				
1.5	3.0	SM	Silty SAND, reddish brown, very moist to wet, medium- to coarse-grained, seeping water					
3.0	3.4		Undifferentiated Tonalite (granitic rock), light orange brown to gray, dry, hard	Kt				

Total Depth: 3.4 feet (refusal)
No groundwater encountered.
Test pit backfilled with native soil, tamped with bucket and wheel rolled at surface.

Test Pit TP-4

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	1.5	SM	Silty SAND, moist, few rootlets	Qal				
					B-1	1.5		
1.5	2.0		Undifferentiated Tonalite (granitic rock), decomposed, gray, slightly moist, fine- to medium-grained, very hard	Kt				

Total Depth: 2 feet (refusal)
No groundwater encountered.
Test pit backfilled, tamped with bucket, wheel rolled at surface.

Project No. 021521-001

Leighton and Associates, Inc.

Test Pit TP-5

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	3.0	ML	Sandy SILT, medium brown, moist to very moist, fine-grained sand, rootlets, upper 1 foot heavily rooted	Qal				
3.0	4.0		Undifferentiated Tonalite (granitic rock), decomposed, iron staining, coarse-grained, hard, slightly moist	Kt				

Total Depth: 4 feet (refusal)
No groundwater encountered.
Test pit backfilled with native soil, tamped with bucket and wheel rolled at surface.

Test Pit TP-6

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	0.8	SM	Silty SAND, gray brown, moist, some rootlets	Qal				
0.8	3.5	ML	Sandy SILT, medium brown, trace fine gravel, trace rootlets			2.5	93.0	13.1
3.5	4.5		Undifferentiated Tonalite (granitic rock), decomposed, iron staining, coarse-grained, hard, slightly moist	Kt				

Total Depth: 4.5 feet (refusal)
No groundwater encountered.
Test pit backfilled, tamped with bucket, wheel rolled at surface.

Test Pit TP-7

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	0.5	SM	Silty SAND, brown, slightly moist, well rooted	Qal				
0.5	2.0	SC	Clayey SAND, orange brown, contains fine gravel, mixed with decomposed granite			2	94.1	12.0
2.0	5.0		Undifferentiated Tonalite (granitic rock), decomposed, light orange gray, very dense, pink feldspars	Kt				

Total Depth: 5 feet
No groundwater encountered.
Test pit backfilled with native soil, tamped with bucket and wheel rolled at surface.

Test Pit TP-8

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	2.0	CL	Sandy CLAY, medium brown, very moist, tight, few rootlets, grades to Clayey SAND	Qal	B-1	0-2		
2.0	4.0	SC	Clayey SAND, reddish brown, moist to very moist, no rootlets			2.0	96.8	14.9
4.0	5.0		Undifferentiated Tonalite (granitic rock), decomposed, iron staining, slightly moist	Kt				

Total Depth: 5 feet (refusal)
No groundwater encountered.
Test pit backfilled, tamped with bucket, wheel rolled at surface.

Test Pit TP-9

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	1.8	CL	Sandy CLAY, reddish brown to medium brown, moist, rootlets in upper 1/2 foot	Qal				
						2	99.3	14.1
1.8	4.0		Undifferentiated Tonalite (granitic rock), decomposed, coarse-grained, slightly moist	Kt	B-1	0-2		
						4	109.7	8.0

Total Depth: 4 feet
No groundwater encountered.
Test pit backfilled with native soil, tamped with bucket and wheel rolled at surface.

Test Pit TP-10

Date Excavated: March 3, 2005
Project: DR Horton/Chen 74

Logged By: SFR
Sampled By: SFR

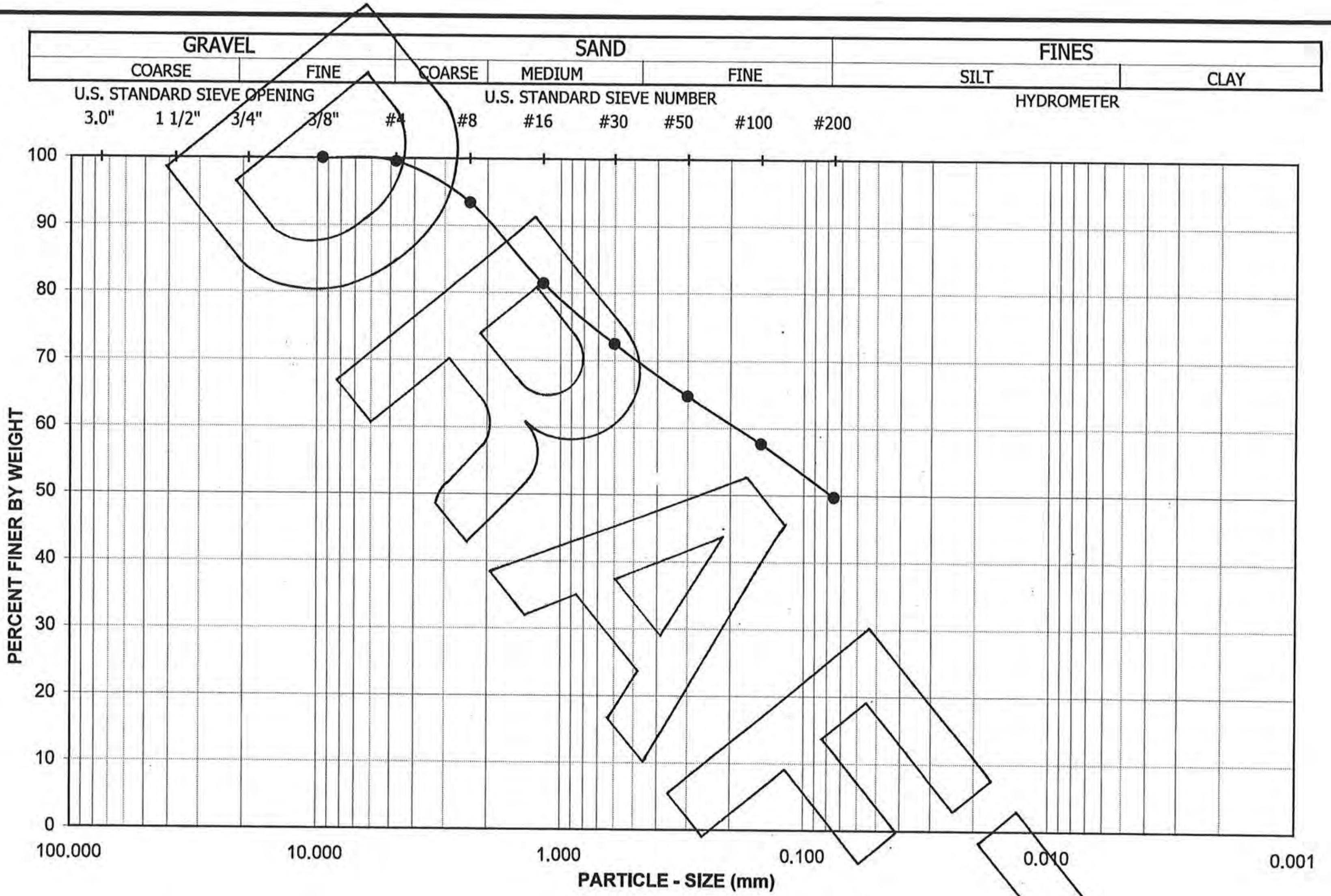
Depth (feet)		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top	Bottom				Sample Number	Depth (feet)	Density, Dry (pcf)	Moisture (%)
0.0	1.0	SM	Silty SAND, gray brown, moist, fine-grained, rootlets	Qal				
1.0	4.0	ML	Clayey SILT, medium brown, moist, micaceous, few roots		B-1	0-2		
						2.0	87.4	14.0
4.0	6.0	SM	Silty SAND, reddish brown, moist to very moist, fine-grained			4.8	86.6	18.5
6.0	9.0	SW-SM	SAND with Silt, orange brown, blocky, stringers, about 2 percent porosity, increasing DG w/ depth					
9.0	10.0		Undifferentiated Tonalite (granitic rock), decomposed, hard	Kt				

Total Depth: 10 feet (refusal)
No groundwater encountered.
Test pit backfilled, tamped with bucket, wheel rolled at surface.

Project No. 021521-001

Leighton and Associates, Inc.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Project Name: D. R. Horton / Chen 74

Project No.: 021521-001

Exploration No.: TP-2

Sample No.: B-1

Depth (feet): 2.5

Soil Type : s(ML)

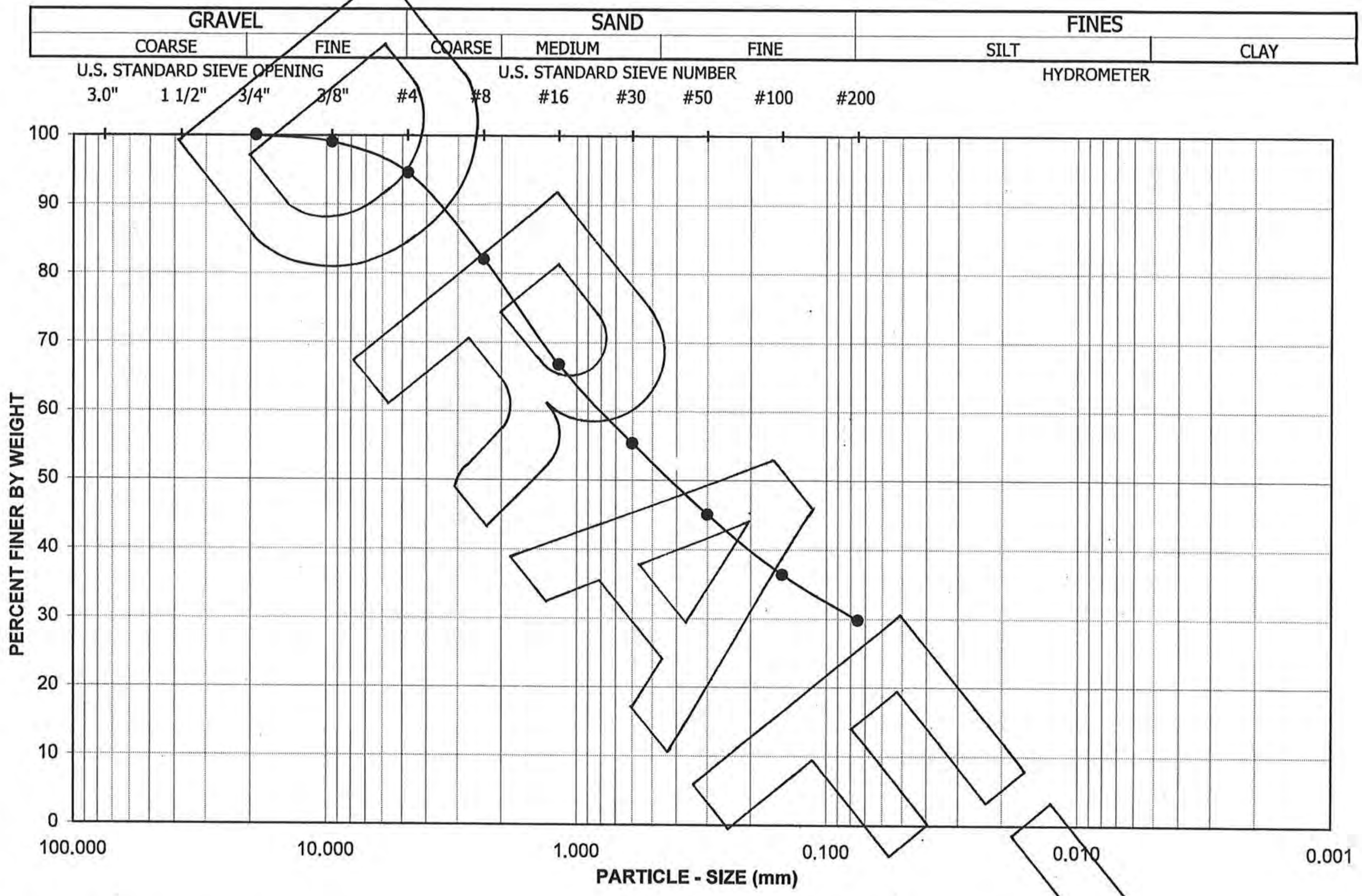
Soil Identification: Olive Brown Sandy Silt s(ML)

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 422

GR:SA:FI : (%) **1 : 49 : 50**

Mar-05



Project Name: D. R. Horton / Chen 74

Project No.: 021521-001

Exploration No.: TP-4

Sample No.: B-1

Depth (feet): 0-1.5

Soil Type : (SC-SM)

Soil Identification: Dark Yellowish Brown Silty Clayey Sand (SC-SM)

GR:SA:FI : (%) **5 : 65 : 30**

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 422

Mar-05

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD

Leighton

ATTERBERG LIMITS

ASTM D 4318

Project Name:	D. R. Horton / Chen 74	Tested By:	VJ	Date:	03/22/05
Project No. :	021521-001	Input By:	JHW	Date:	03/23/05
Boring No.:	TP-4	Checked By:	JHW		
Sample No.:	B-1	Depth (ft.)	0-1.5		

Soil Identification: Dark Yellowish Brown Silty Clayey Sand (SC-SM)

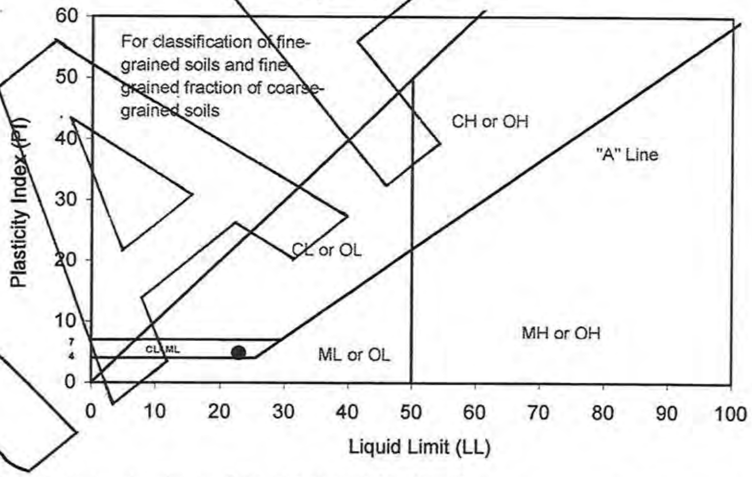
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			35	29	22	
Wet Wt. of Soil + Cont. (g)	10.87	10.10	11.76	12.20	13.72	
Dry Wt. of Soil + Cont. (g)	9.36	8.72	9.83	10.17	11.28	
Wt. of Container (g)	1.06	1.09	1.09	1.13	1.02	
Moisture Content (%) [Wn]	18.19	18.09	22.08	22.46	23.78	

Liquid Limit	**23**
Plastic Limit	**18**
Plasticity Index	**5**
Classification	**CL-ML**

PI at "A" - Line = 0.73(LL-20) 2.19

One - Point Liquid Limit Calculation

LL =Wn(N/25)$^{0.12}$



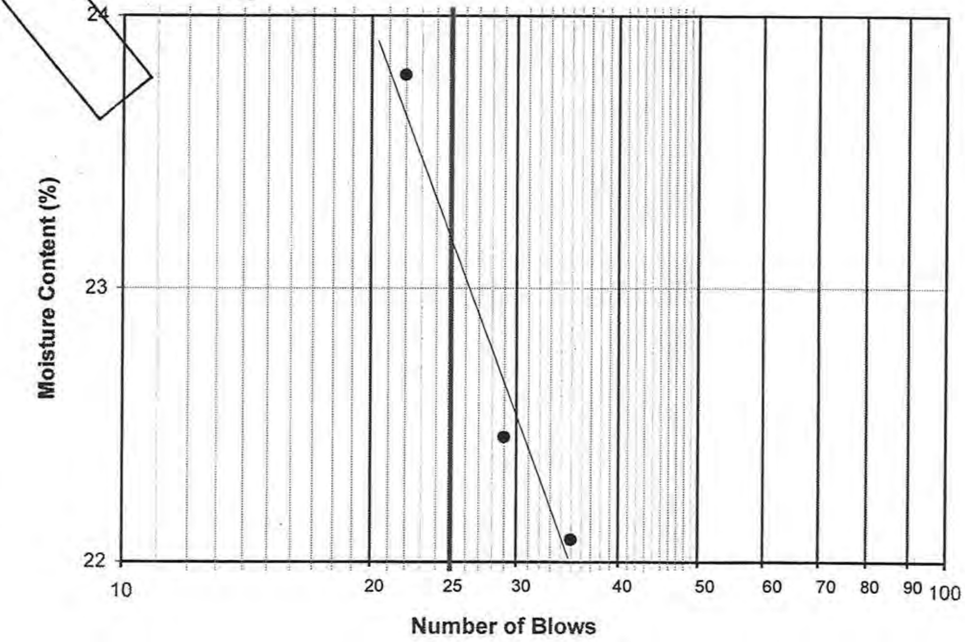
PROCEDURES USED

☐ Wet Preparation
Multipoint - Wet

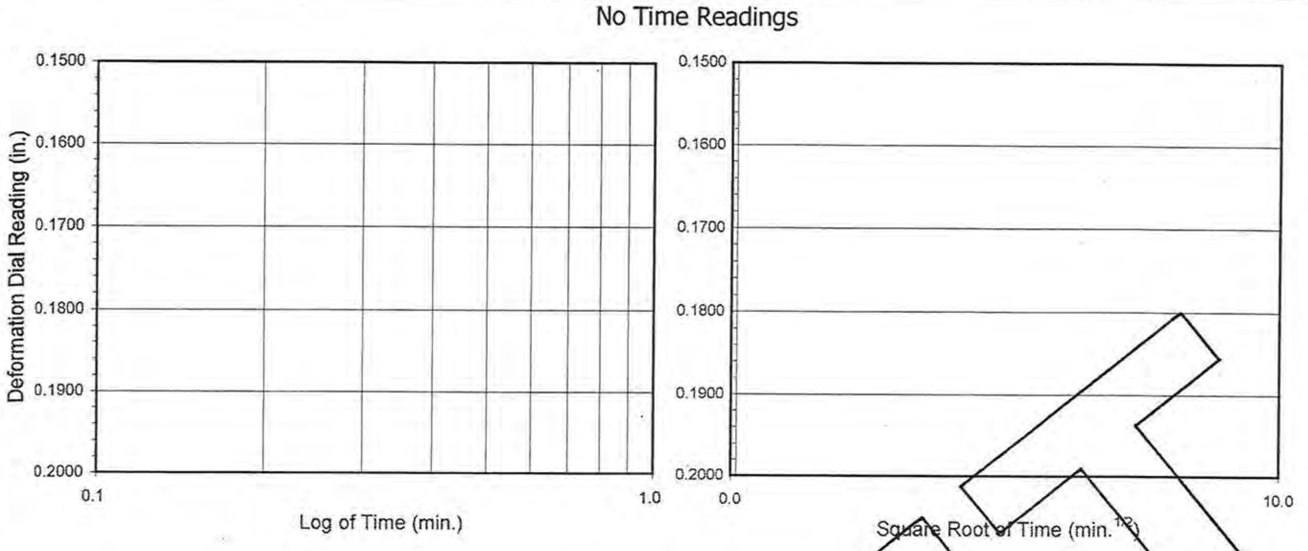
☒ Dry Preparation
Multipoint - Dry

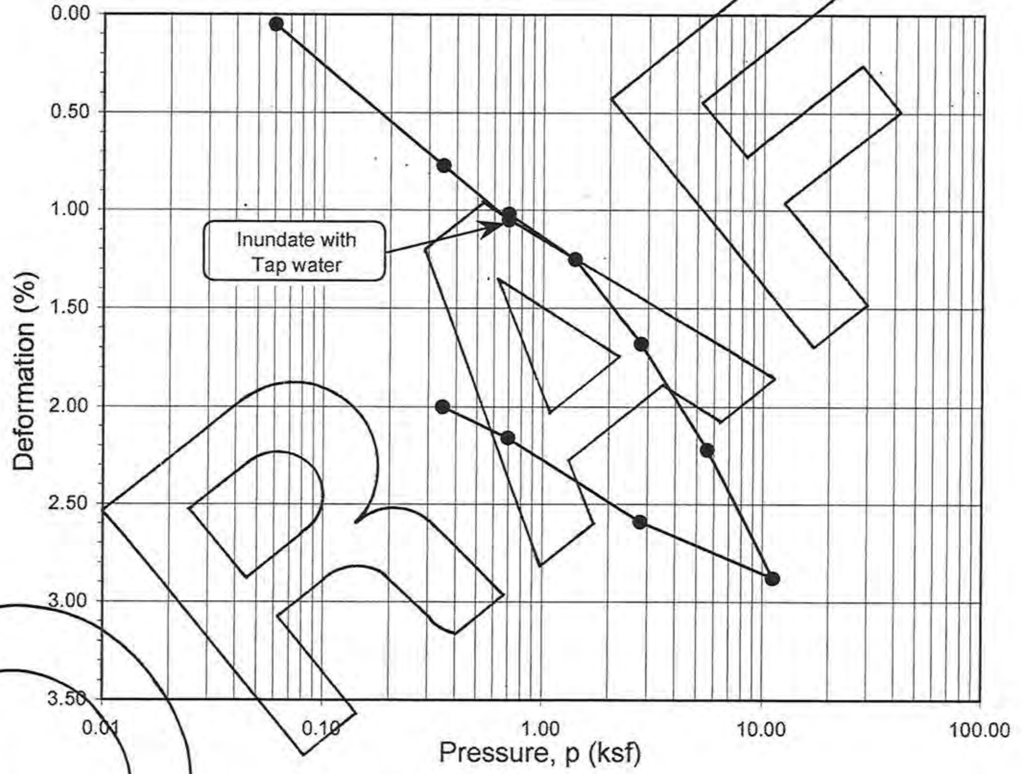
☒ Procedure A
Multipoint Test

☐ Procedure B
One-point Test



Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-2	**R-2**	**5**	**7.8**	**10.5**	**126.4**	**126.8**	**0.334**	**0.307**	**63**	**86**

Soil Identification: Brown Silty Clayey Sand (SC-SM)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
(ASTM D 2435)

Project No.: 021521-001

D. R. Horton / Chen 74

04-05

Leighton

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	D. R. Horton / Chen 74	Tested By:	FT, ESS	Date:	03/30/05
Project No.:	021521-001	Checked By:	JHW	Date:	04/05/05
Boring No.:	B-1	Sample Type:	Drive		
Sample No.:	R-2	Depth (ft.)	5.0		

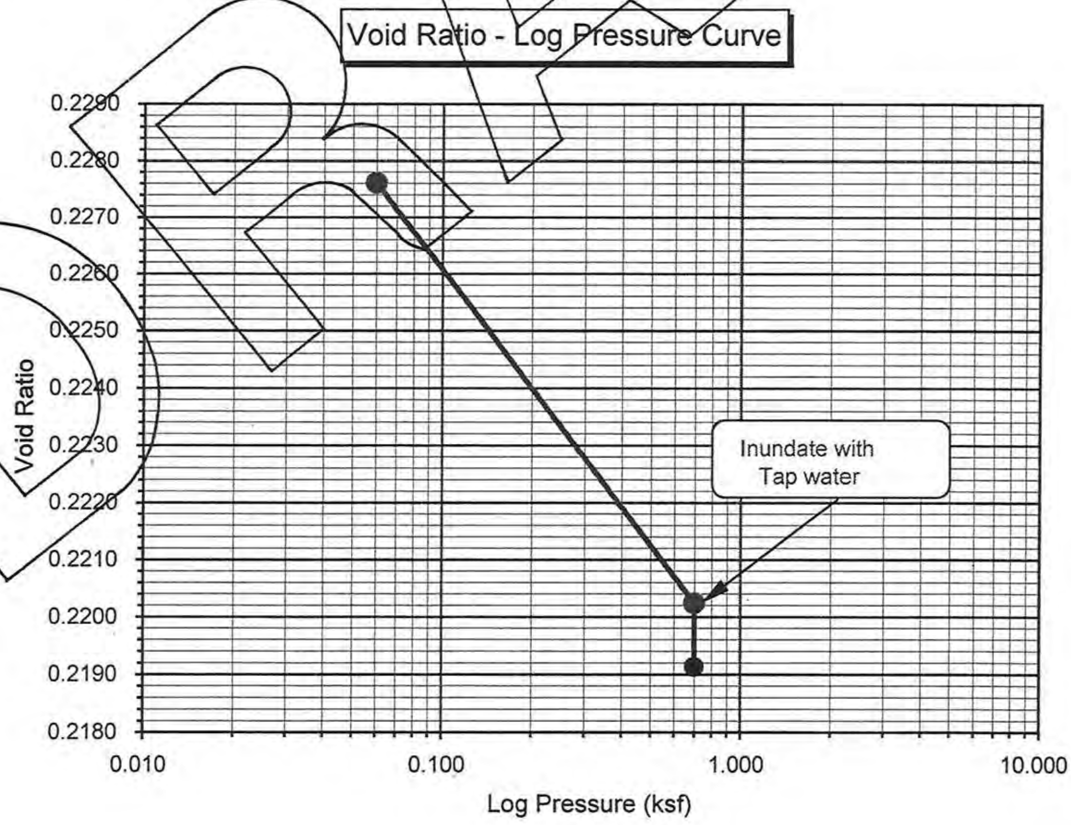
Sample Description: Brown Poorly-graded Sand (SP)

Initial Dry Density (pcf):	137.3
Initial Moisture (%):	6.04
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1373
Diameter(in):	2.416

Final Dry Density (pcf):	136.5
Final Moisture (%) :	9.8
Initial Void ratio:	0.2276
Specific Gravity(assumed):	2.70
Initial Saturation (%)	71.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1373	1.0000	0.00	0.00	0.2276	0.00
0.700	0.1433	0.9940	0.00	-0.60	0.2202	-0.60
H2O	0.1442	0.9931	0.00	-0.69	0.2191	-0.69

Percent Swell (+) / Settlement (-) After Inundation = -0.09



Collapse B-1, R-2 @ 5

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Leighton

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546)

Project Name:	D. R. Horton / Chen 74	Tested By:	FT, ESS	Date:	03/30/05
Project No.:	021521-001	Checked By:	JHW	Date:	04/05/05
Boring No.:	B-3	Sample Type:	Drive		
Sample No.:	R-2	Depth (ft.)	5.0		

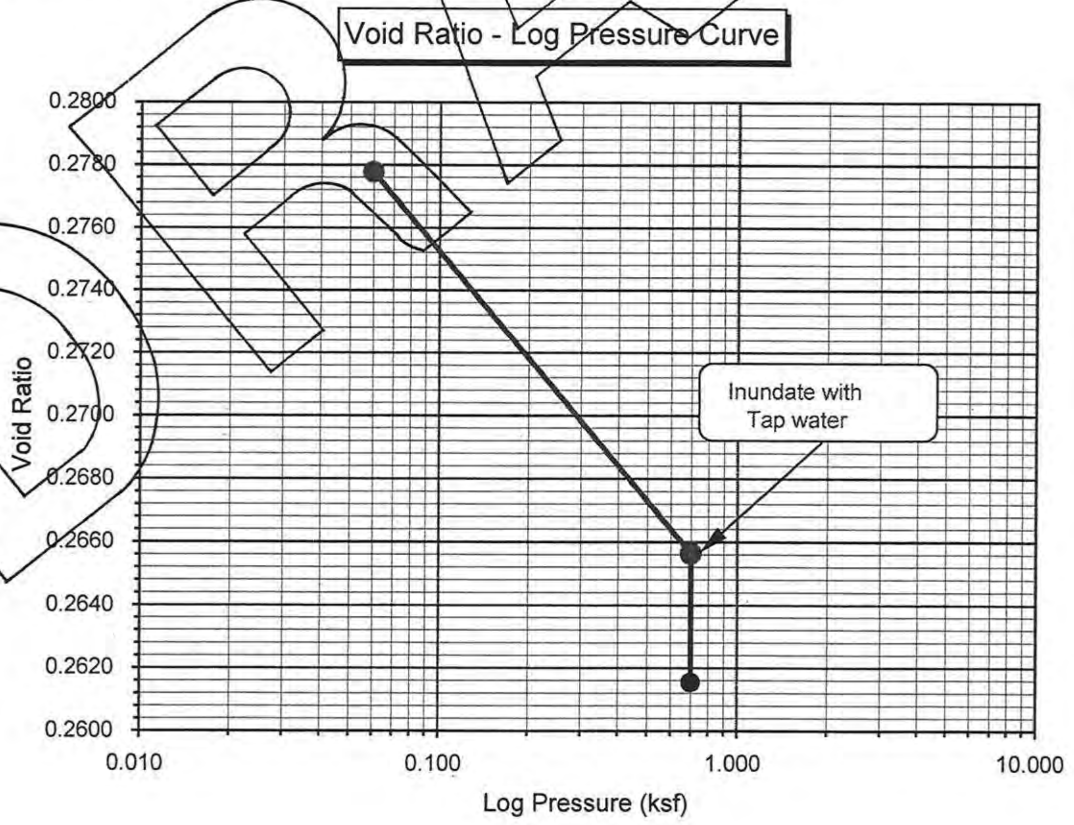
Sample Description: Brown Poorly-graded Sand (SP)

Initial Dry Density (pcf):	131.9
Initial Moisture (%):	4.79
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1885
Diameter(in):	2.416

Final Dry Density (pcf):	132.5
Final Moisture (%) :	10.9
Initial Void ratio:	0.2780
Specific Gravity(assumed):	2.70
Initial Saturation (%)	46.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1887	0.9998	0.00	-0.02	0.2778	-0.02
0.700	0.1982	0.9903	0.00	-0.97	0.2656	-0.97
H2O	0.2014	0.9871	0.00	-1.29	0.2615	-1.29

Percent Swell (+) / Settlement (-) After Inundation = -0.32



Collapse B-3, R-2 @ 5

Leighton

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name: D. R. Horton / Chen 74
Project No.: 021521-001
Boring No.: B-3
Sample No.: R-2
Sample Description: Brown Poorly-graded Sand (SP)

Tested By: FT, ESS Date: 03/30/05
Checked By: JHW Date: 04/05/05
Sample Type: Drive
Depth (ft.) 5.0

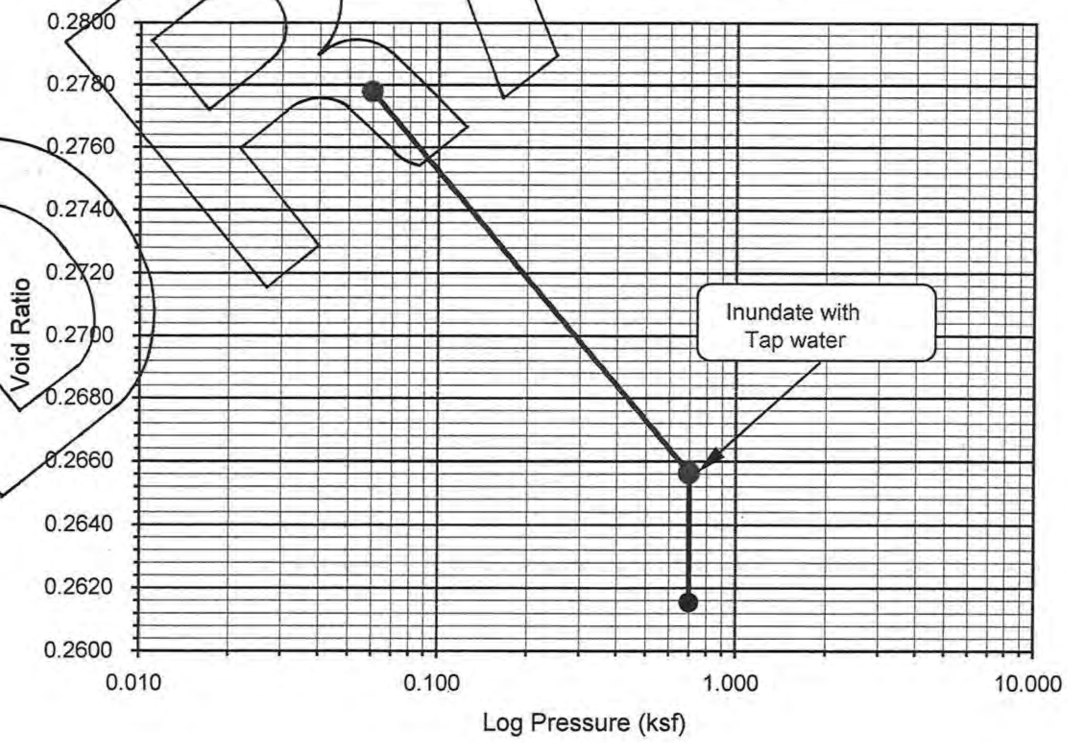
Initial Dry Density (pcf):	131.9
Initial Moisture (%):	4.79
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1885
Diameter(in):	2.416

Final Dry Density (pcf):	132.5
Final Moisture (%) :	10.9
Initial Void ratio:	0.2780
Specific Gravity(assumed):	2.70
Initial Saturation (%)	46.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1887	0.9998	0.00	-0.02	0.2778	-0.02
0.700	0.1982	0.9903	0.00	-0.97	0.2656	-0.97
H2O	0.2014	0.9871	0.00	-1.29	0.2615	-1.29

Percent Swell (+) / Settlement (-) After Inundation = -0.32

Void Ratio - Log Pressure Curve



Collapse B-, R-2 @ 5

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name: D. R. Horton / Chen 74
Project No. : 021521-001
Boring No.: B-1
Sample No. : B-1
Soil Identification: Dark Brown Silty Sand (SM)

Tested By: JHW Date: 03/31/05
Checked By: JHW Date: 04/05/05
Depth (ft.) 0-5

Dry Wt. of Soil + Cont. (g)	1000.00
Wt. of Container No. (g)	0.00
Dry Wt. of Soil (g)	1000.00
Weight Soil Retained on #4 Sieve	0.00
Percent Passing # 4	100.00

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0106
Wt. Comp. Soil + Mold (g)	605.80	446.30
Wt. of Mold (g)	181.50	0.00
Specific Gravity (Assumed)	2.70	2.70
Container No.	O	O
Wet Wt. of Soil + Cont. (g)	831.10	627.80
Dry Wt. of Soil + Cont. (g)	766.00	572.60
Wt. of Container (g)	0.00	181.50
Moisture Content (%)	8.50	14.11
Wet Density (pcf)	128.0	133.2
Dry Density (pcf)	118.0	116.7
Void Ratio	0.429	0.444
Total Porosity	0.300	0.308
Pore Volume (cc)	62.2	64.3
Degree of Saturation (%) [S meas]	**53.5**	85.8

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
03/31/05	15:31	1.0	0	0.0875
03/31/05	15:41	1.0	10	0.0871
		Add Distilled Water to the Specimen		
03/31/05	16:10	1.0	29	0.0964
04/01/05	6:44	1.0	903	0.0981
04/01/05	8:39	1.0	1018	0.0981

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	11.0
Expansion Index (EI)$_{50}$	= EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**13**

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

EXPANSION INDEX of SOILS

ASTM D 4829

Leighton

Project Name:	D. R. Horton / Chen 74	Tested By:	JHW	Date:	03/22/05
Project No. :	021521-001	Checked By:	JHW	Date:	03/23/05
Boring No.:	TP-4	Depth (ft.)	0-1.5		
Sample No. :	B-1				
Soil Identification:	Dark Yellowish Brown Silty Clayey Sand (SC-SM)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0078
Wt. Comp. Soil + Mold	(g)	610.10	441.30
Wt. of Mold	(g)	190.70	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	851.30	632.00
Dry Wt. of Soil + Cont.	(g)	791.20	580.50
Wt. of Container	(g)	0.00	190.70
Moisture Content	(%)	7.60	13.21
Wet Density	(pcf)	126.5	132.1
Dry Density	(pcf)	117.6	116.7
Void Ratio		0.434	0.445
Total Porosity		0.303	0.308
Pore Volume	(cc)	62.6	64.2
Degree of Saturation (%) [S meas]		**47.3**	80.2

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
03/22/05	15:15	1.0	0	0.1132
03/22/05	15:25	1.0	10	0.1130
Add Distilled Water to the Specimen				
03/22/05	15:37	1.0	12	0.1189
03/23/05	6:42	1.0	917	0.1210
03/23/05	8:43	1.0	1038	0.1210

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	8.0
Expansion Index (EI)$_{50}$	= EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**7**

Leighton

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	D. R. Horton / Chen 74	Tested By :	PP	Date:	03/25/05
Project No.:	021521-001	Input By :	JHW	Date:	04/05/05
Boring No.:	B-3	Depth (ft.)	0-5		
Sample No. :	B-1				
Soil Identification:	Dark Brown Silty Sand (SM)				

Preparation Method: ☒ Moist ☐ Dry ☒ Mechanical Ram ☐ Manual Ram

Mold Volume (ft³) 0.03326 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3821.0	3950.4	3863.7	3778.1		
Weight of Mold (g)	1749.0	1749.0	1749.0	1749.0		
Net Weight of Soil (g)	2072.0	2201.4	2114.7	2029.1		
Wet Weight of Soil + Cont. (g)	386.50	439.90	475.70	422.40		
Dry Weight of Soil + Cont. (g)	368.10	410.30	434.70	377.80		
Weight of Container (g)	50.40	54.80	53.80	48.80		
Moisture Content (%)	5.79	8.33	10.76	13.56		
Wet Density (pcf)	137.3	145.9	140.2	134.5		
Dry Density (pcf)	129.8	134.7	126.5	118.4		

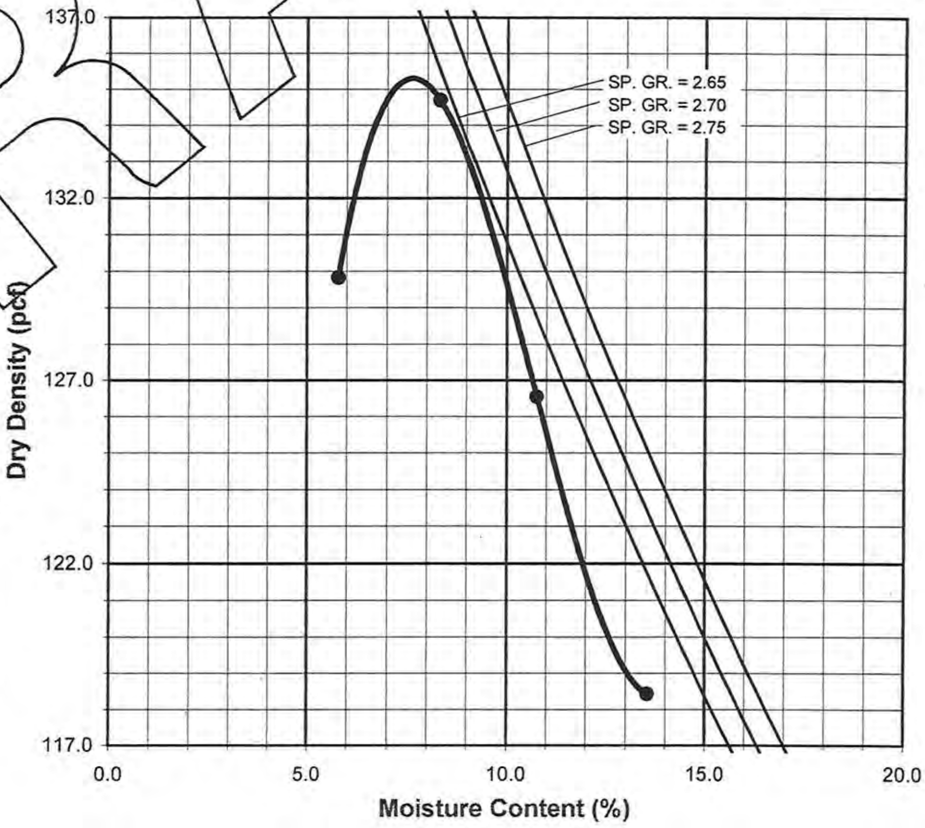
Maximum Dry Density (pcf) 135.5 **Optimum Moisture Content (%)** 7.5

PROCEDURE USED

☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%



Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI

MX B-3, B-1 @ 0-5

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Leighton

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name: D. R. Horton / Chen 74
Tested By : PP
Date: 03/17/05
Project No.: 021521-001
Input By : JHW
Date: 03/23/05
Boring No.: TP-2
Depth (ft.) 2.5
Sample No. : B-1
Soil Identification: Olive Brown Sandy Silt s(ML)

Preparation Method: ☒ Moist ☐ Dry

☒ Mechanical Ram ☐ Manual Ram

Mold Volume (ft³) 0.03326

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3788.7	3931.7	3839.7	3766.6		
Weight of Mold (g)	1749.0	1749.0	1749.0	1749.0		
Net Weight of Soil (g)	2039.7	2182.7	2090.7	2017.6		
Wet Weight of Soil + Cont. (g)	405.40	405.30	390.90	448.40		
Dry Weight of Soil + Cont. (g)	384.30	376.70	356.10	399.90		
Weight of Container (g)	50.00	50.30	51.90	51.80		
Moisture Content (%)	6.31	8.76	11.44	13.93		
Wet Density (pcf)	135.2	144.7	138.6	133.7		
Dry Density (pcf)	127.2	133.0	124.4	117.4		

Maximum Dry Density (pcf) 133.5 **Optimum Moisture Content (%)** 8.0

PROCEDURE USED

☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

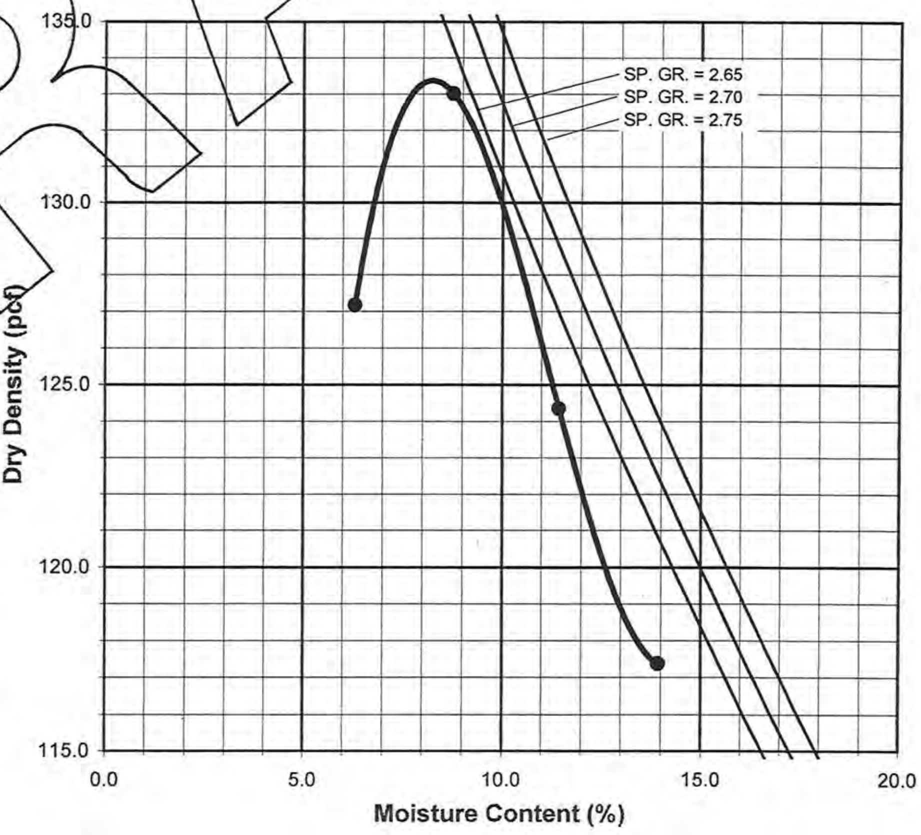
☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
1:49:50
GR:SA:FI

Atterberg Limits:

LL,PL,PI



MX TP-2, B-1 @ 2.5

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

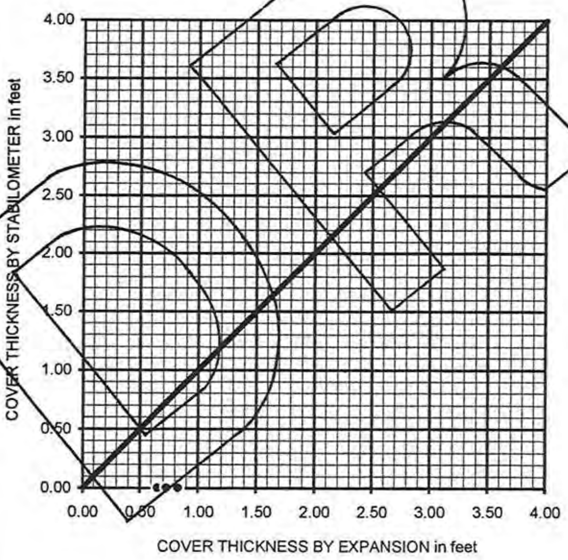
R-VALUE TEST RESULTS

PROJECT NAME:	DR Horton / Chen 74	PROJECT NUMBER:	021521-001
SAMPLE NUMBER:		SAMPLE LOCATION:	TP-9
SAMPLE DESCRIPTION:	Cl/Sa	TECHNICIAN:	SCF
		DATE SAMPLED	3/3/2005

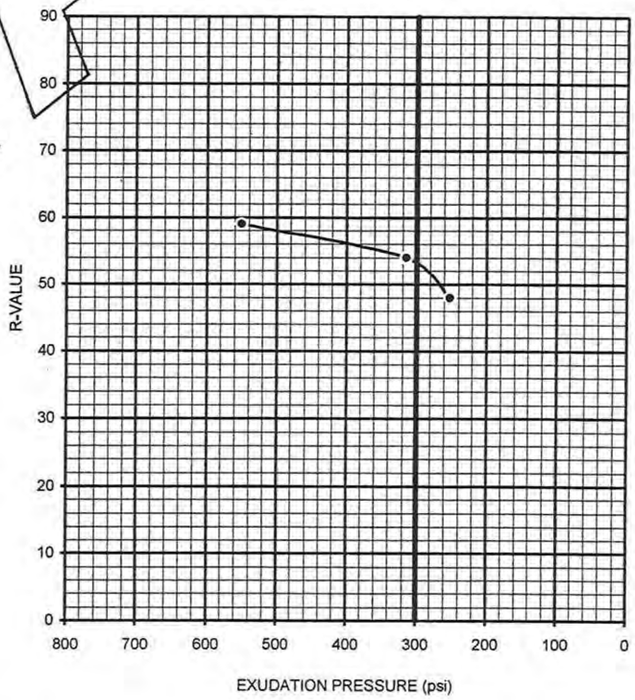
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	9.7	10.2	10.3
HEIGHT OF SAMPLE, Inches	2.45	2.60	2.53
DRY DENSITY, pcf	129.9	127.2	128.8
COMPACTOR AIR PRESSURE, psf	175	50	50
EXUDATION PRESSURE, psf	550	314	252
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	48	56	62
TURNS DISPLACEMENT	4.02	4.20	4.32
R-VALUE UNCORRECTED	59	53	48
R-VALUE CORRECTED	59	54	48

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.66	0.74	0.83
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION: 100

R-VALUE BY EXUDATION: 54

EQUILIBRIUM R-VALUE: 54

Leighton

SOIL RESISTIVITY TEST

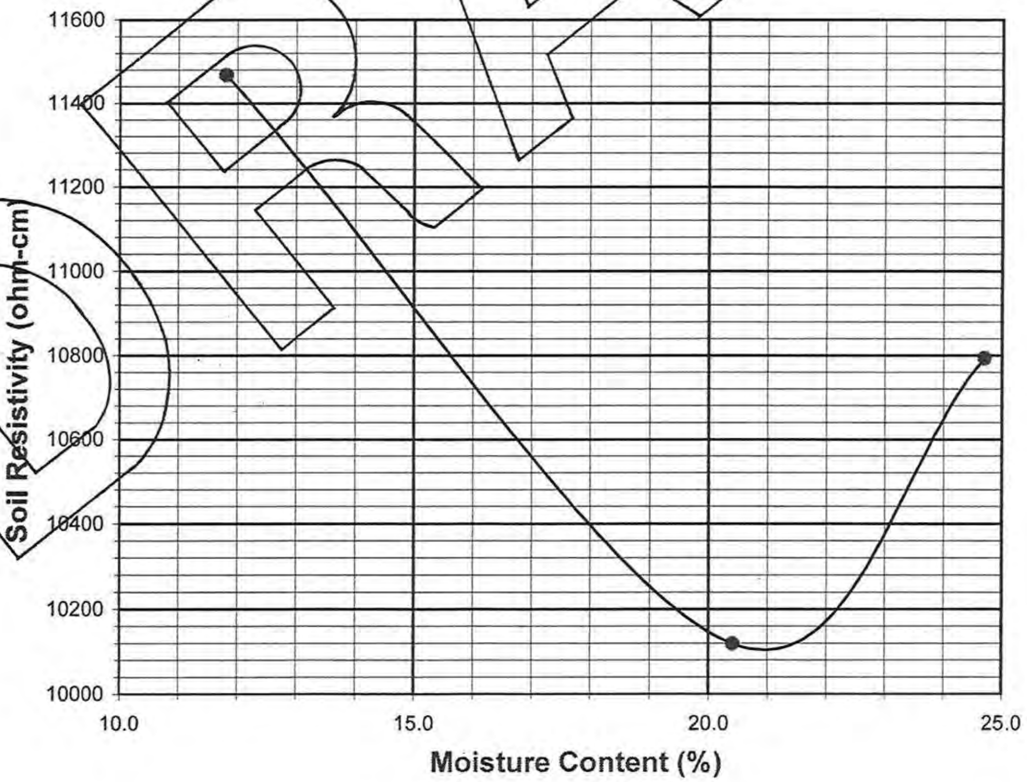
DOT CA TEST 532 / 643

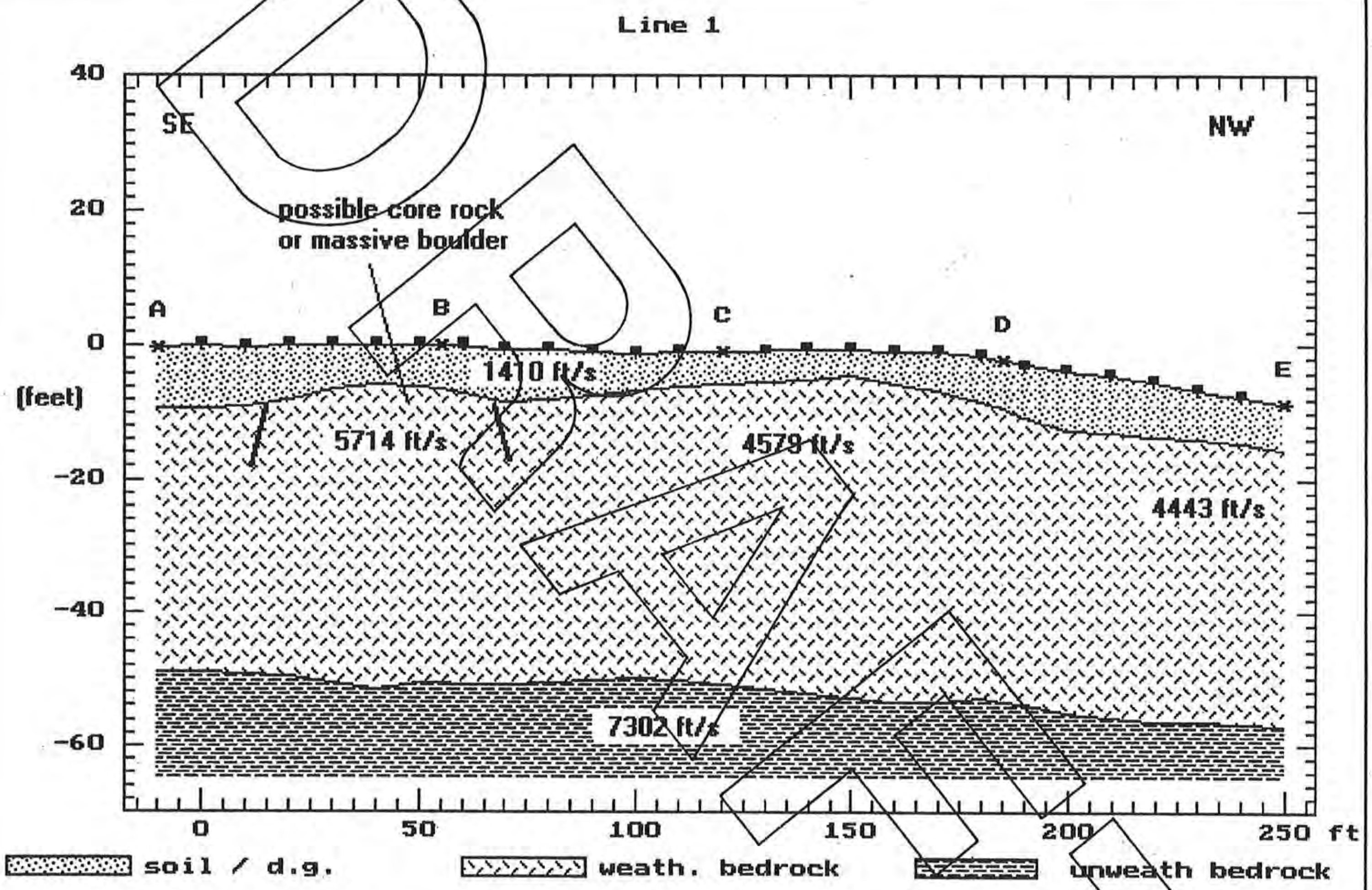
Project Name:	D. R. Horton / Chen 74	Tested By :	VJ	Date:	03/23/05
Project No. :	021521-001	Data Input By:	JHW	Date:	03/23/05
Boring No.:	TP-4	Depth (ft.) :	0-1.5		
Sample No. :	B-1				
Soil Identification:	Dk Yel Brn (SC-SM)				

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	0	11.81	1700	11468
2	100	20.41	1500	10119
3	150	24.71	1600	10794
4				
5				

Moisture Content (%) (MCi)	11.81
Wet Wt. of Soil + Cont. (g)	232.41
Dry Wt. of Soil + Cont. (g)	215.09
Wt. of Container (g)	68.41
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

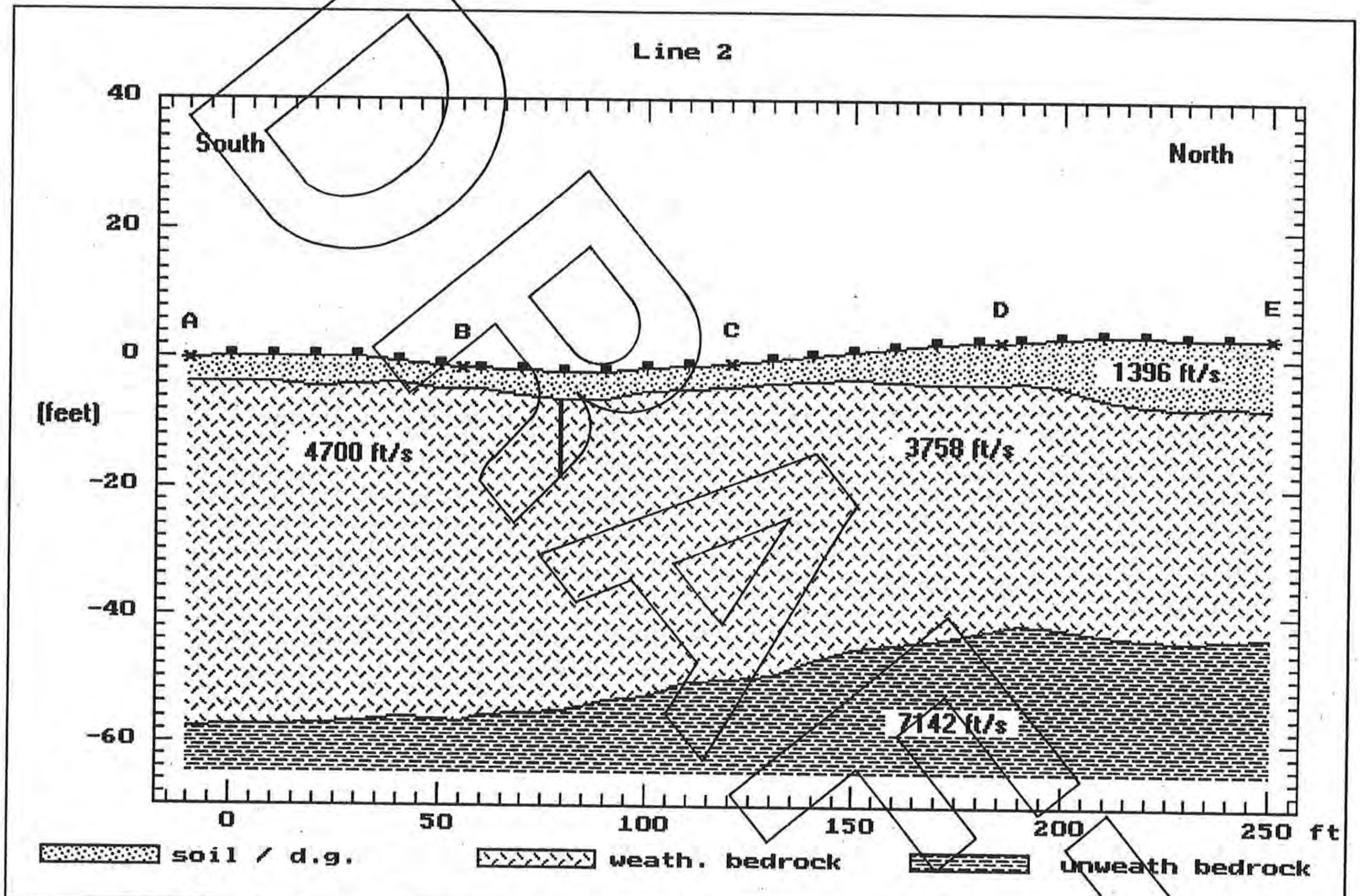
Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
10100	**21.0**	**131**	**1157**	**5.80**	**21.4**





Seismic Refraction Survey 3/4/05	DR Horton / Chen Property	FIGURE 5
Leighton Project No. P02000877	Moreno Valley, California	

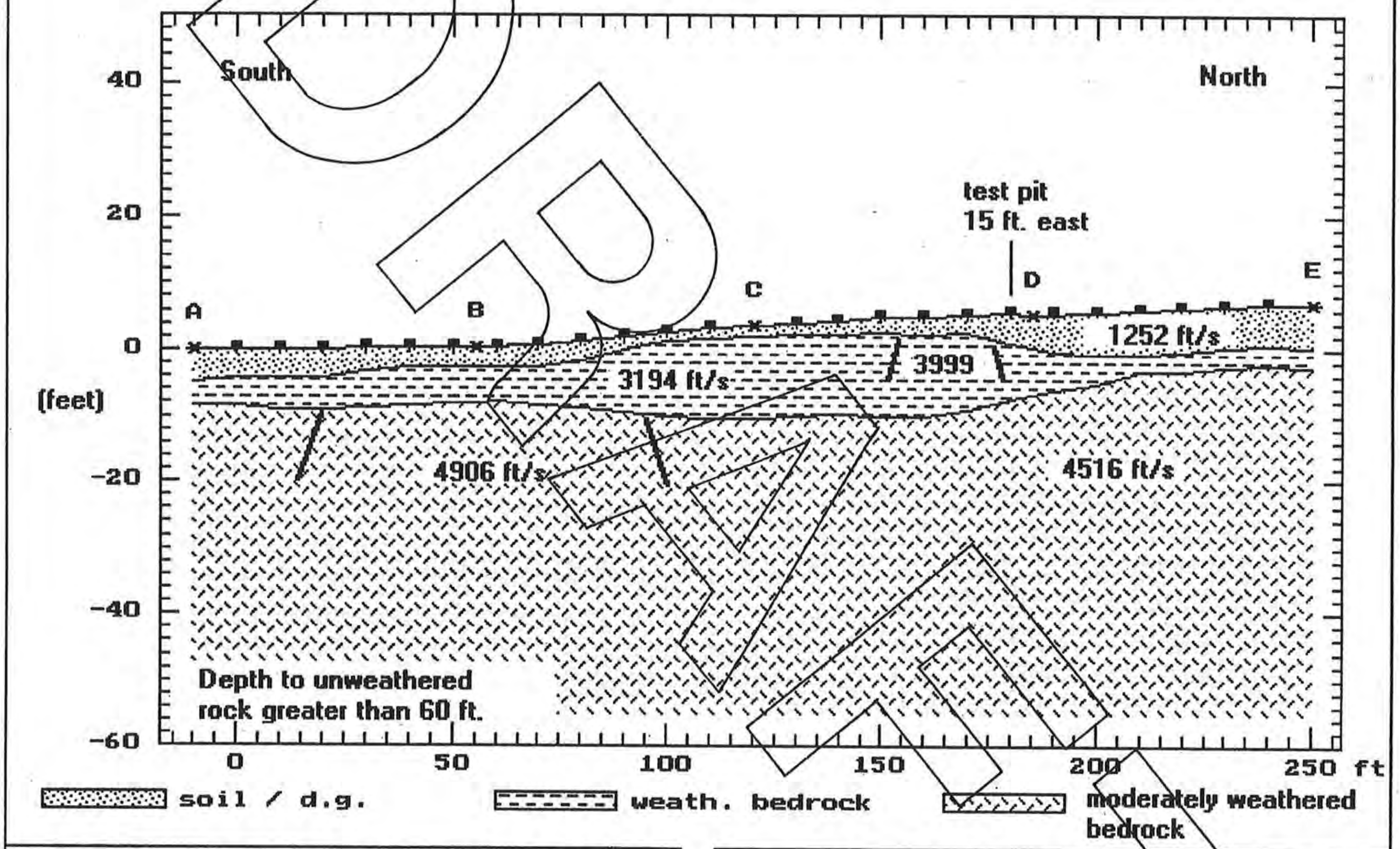
Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD



Seismic Refraction Survey 3/4/05
Leighton Project No. P02000877

DR Horton / Chen Property FIGURE 6
Moreno Valley, California

Line 3

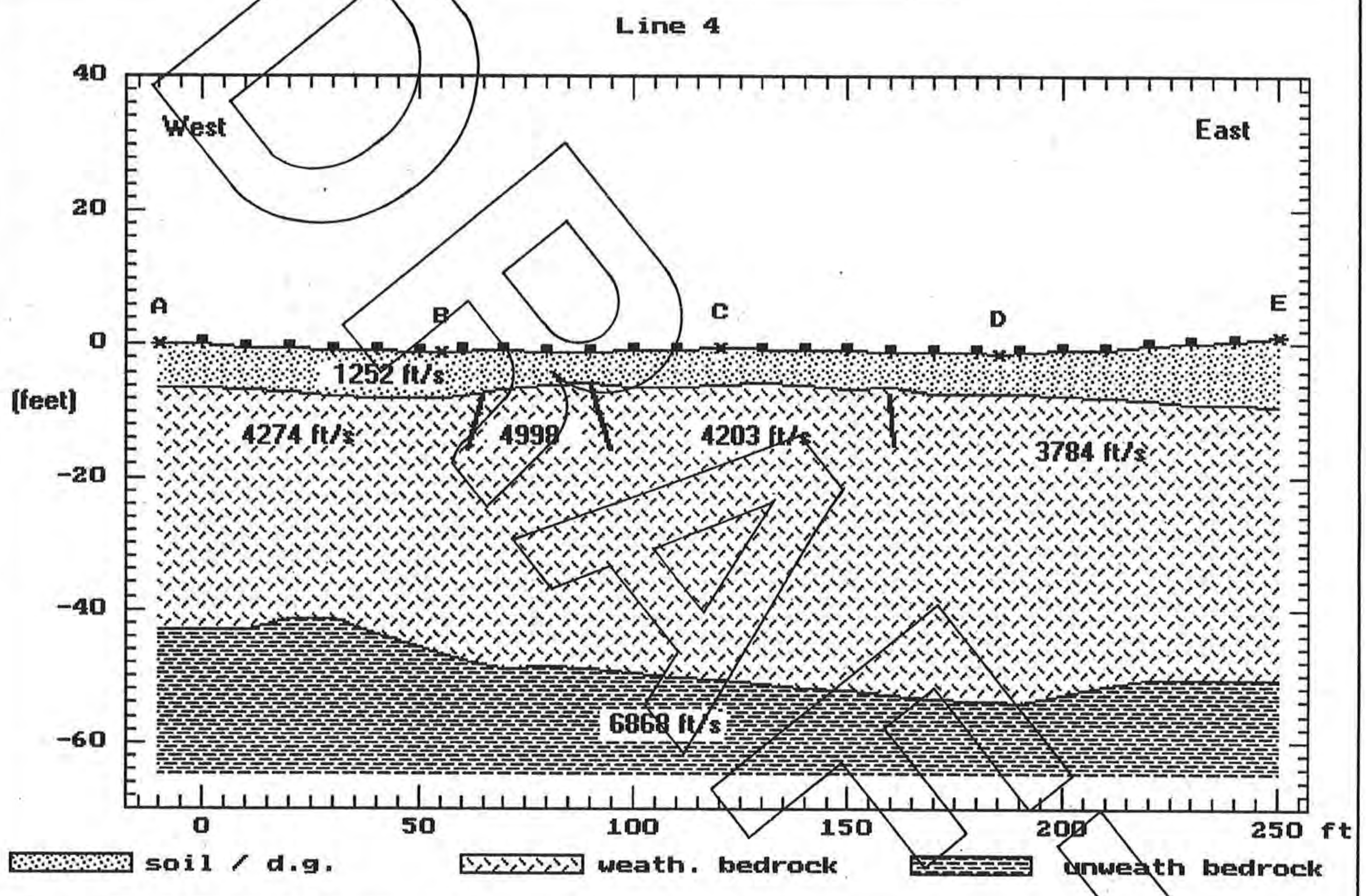


Seismic Refraction Survey 3/4/05

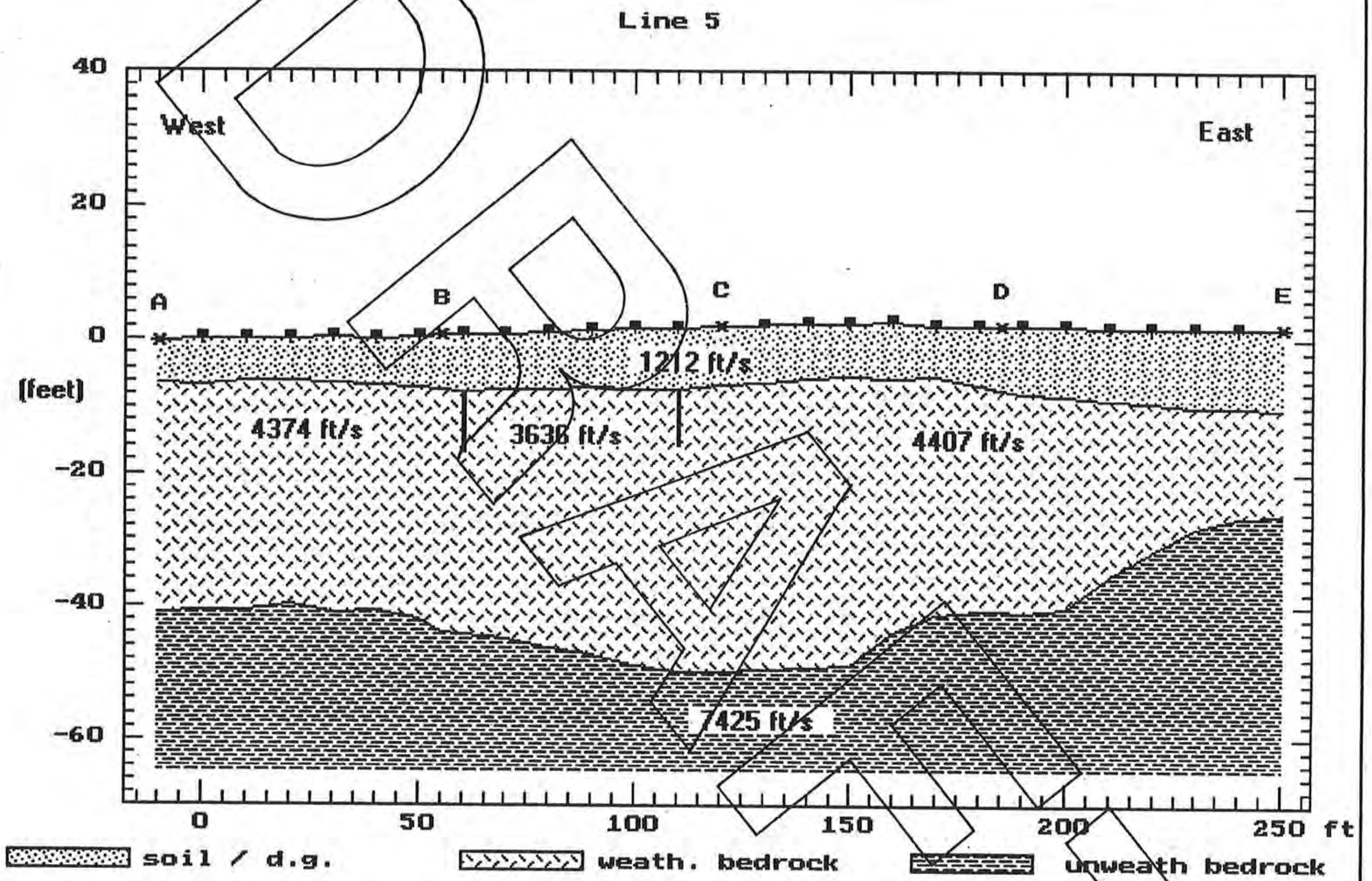
Leighton Project No. P02000877

DR Horton / Chen Property FIGURE 7

Moreno Valley, California



Seismic Refraction Survey 3/4/05	DR Horton / Chen Property FIGURE 8
Leighton Project No. P02000877	Moreno Valley, California



Seismic Refraction Survey 3/4/05

Leighton Project No. P02000877

DR Horton / Chen Property FIGURE 9

Moreno Valley, California

APPENDIX B

LOGS OF EXPLORATORY TRENCHES AND BORINGS
BY GEOTEK

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

Bulk Samples (Large)
These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)
These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – TRENCH/BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of trenches and borings:

SOILS	
USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium
GEOLOGIC	
B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
———	Thick solid line denotes end of the trench/boring

(Additional denotations and symbols are provided on the log of trench/boring)

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2437-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-1

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					Alluvium:			
	▨	10 17 27		SM	Silty clayey f-c SAND, brown, slightly moist, medium dense	5.7	112.4	HC
5	▨	14 28 50/5"			becomes reddish brown and dense.	6.4	126.9	HC
					Granitic Bedrock: Weathered granite, excavates as silty f-vc SAND, grayish brown, slightly moist			
10								
					Becomes more difficult to drill, material is still friable			
15								
					Same as above, still friable			
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 10 feet to 20 feet was 6:02			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2437-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-2

Depth (ft)	SAMPLES Sample Type	SAMPLES Blows/ 6 in	SAMPLES Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
	☒			SM	**Alluvium:** Silty clayey f-c SAND, brown, slightly moist			MD, EI
	■	5 10 12			same as above, medium dense	7.9	121.4	HC
5								
	■	17 50/6"			becomes very dense	6.0	114.5	HC
					Granitic Bedrock: Weathered granite, excavates as silty f-vc SAND, grayish brown, slightly moist			
10								
					Becomes harder to drill, material excavates as silty f-c SAND, gray, slightly moist			
15								
					Same as above, still friable, moderately easy to drill			
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 8 feet to 20 feet was 7:28			
25								
30								

LEGEND

Sample type: ■ ---Ring ▪ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Darwin 72
PROJECT NO.: 2437-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/13//2020

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-1	Laboratory Testing		
	Sample Type	Time for Excavation		MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
			SM	**Alluvium:** Silty f-c SAND, brown, dry			
		1:30		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, brownish gray, slightly moist			
				Becomes moderately hard to excavate, 3-4 scratches for 1/2 bucket			
		5:08		Becomes very hard to excavate, 5+ scratches for 1/4 to 1/2 bucket			
5							
		10:40		Same as above			
				Becomes light gray, 5+ scratches for 1/4 bucket			
		23:39		Same as above			
10		37:21		Same as above, appears friable, no "corestones" encountered			
				TRENCH TERMINATED AT 10.5 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Darwin 72
PROJECT NO.: 2437-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/13//2020

TRENCH NO.: T-2

	SAMPLES				Laboratory Testing		
Depth (ft)	Sample Type	Time for Excavation	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
				Alluvium:			
			SM	Silty f-c SAND, brown, slightly moist			
		1:16		Same as above			
		2:05	SC	Clayey silty f-c SAND, reddish brown, moist			
5							
		3:01		Same as above			
		4:12		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, grayish brown, slightly moist, easy to excavate			
10		8:08		Becomes moderately easy to excavate, 2-3 scratches for 1/2 to full bucket			
		14:26		Becomes very hard to excavate, 5+ scratches for 1/2 to full bucket			
		33:24		Material sounds to be more concreted and less friable, possibly a core stone.			
				TRENCH TERMINATED AT 14 FEET (REFUSAL)			
15				No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2437-CR	**DATE:**	7/13//2020
LOCATION:	See Exploration Location Map		

TRENCH NO.: T-3

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
				Alluvium:			
			SM	Silty clayey f-c SAND, reddish rown, slightly moist			
		0:47		Same as above, becomes moist			
		1:27		Same as above			
5				**Granitic bedrock:**			
				Weathered, excavates as silty f-vc SAND, grayish brown, slightly moist			
		2:56					
				Becomes moderately hard to excavate, 3-4 scratches for 1/2 to full bucket			
		11:13		Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
10		21:52		Same as above			
		35:27		Same as above, still friable but very tight			
				TRENCH TERMINATED AT 12 FEET (REFUSAL)			
				No groundwatered encountered			
				Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2437-CR	**DATE:**	7/13//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	TRENCH NO.: T-4 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			SM	Silty clayey f-c SAND, reddish brown, slightly moist			
		0:36		Same as above			
				Granitic bedrock:			
5		1:40		Slightly weathered bedrock, excavates as silty f-vc SAND, grayish brown, slightly moist, moderately easy to excavate 2-3 scratches for 1/2 to full bucket			
		5:01		Becomes moderately hard to excavate 3-4 scratches for 1/2 to full bucket, starts to excavate as gravelly f-vc SAND, gray, slightly moist			
		12:19		Same as above, becomes hard to excavate 4-5 scratches for 1-2 to full bucket			
10		18:02		Same as above			
				Becomes very hard to excavate 5+ for 1/4 to 1/2 bucket			
		29:17		Same as above			
		35:21		**Same as above**			
				TRENCH TERMINATED AT 13 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2437-CR	**DATE:**	7/13//2020
LOCATION:	See Exploration Location Map		

TRENCH NO.: T-5

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
			SM	**Alluvium:** Silty clayey f-c SAND, reddish brown, slightly moist			
		0:45		**Granitic bedrock:** Weathered granite, excavates as silty f-vc SAND, reddish brown, slightly moist, easy to excavate			
5		3:49		Becomes moderately hard, 3-4 scratches for 1/2 to full bucket, excavates as silty f-c SAND, grayish brown, slightly moist			
		6:43		Same as above			
				Becomes hard to excavate 4-5 scratches for 1/2 to full bucket			
		12:46		Same as above			
10		19:17		Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		28:51		Same as above			
		34:44					
				TRENCH TERMINATED AT 13 FEET (REFUSAL) No groundwatered encountered			
15				Trench backfilled with excavated materials			

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton

PROJECT NAME: Darwin 72

PROJECT NO.: 2437-CR

LOCATION: See Exploration Location Map

LOGGED BY: DRW

EQUIPMENT 100K Excavator

DATE: 7/13//2020

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-6** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
			SM	**Alluvium:** Silty f-c SAND, brown, dry			
		0:36		**Granitic bedrock:** Weathered granite, excavates as silty f-vc SAND, reddish brown, slightly moist, easy to excavate			
		2:25		Becomes moderately easy to excavate 2-3 scratches for 1/2 to full bucket			
5							
		4:21		Same as above			
				Becomes moderately hard to excavate 3-4 scratches for 1/2 to full bucket			
		9:57		Excavates as silty f-c SAND, brownish gray, slightly moist			
10		14:02		Same as above			
		18:52		Becomes hard to excavate 4/5 scratches for 1/2 to full bucket			
		24:00		Same as above			
15		31:23		Becomes very hard to excavate 5+ for 1/4 to 1/2 bucket, excavates as gravelly f-c SAND, gray, slightly moist			
				TRENCH TERMINATED AT 16 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:

AL = Atterberg Limits

EI = Expansion Index

SA = Sieve Analysis

RV = R-Value Test

SR = Sulfate/Resistivity Test

SH = Shear Test

HC= Consolidation

MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Darwin 72
PROJECT NO.: 2437-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/13//2020

TRENCH NO.: T-7

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			SM	Silty clayey f-c SAND, reddish brown, slightly moist			
		0:42	CL	Clayey f-c SAND, reddish brown, moist			
		1:57		Same as above			
5				**Granitic bedrock:**			
		4:17		Weathered granite, excavates as silty f-c SAND, grayish brown, slightly moist, easy to excavate			
				Becomes moderately hard 3-4 scratches for 1/2 to full bucket			
		8:19		Becomes hard to excavate 4-5 scratches for 1/2 to full bucket, excavates as silty f-vc SAND, brownish gray, slightly moist			
10		13:27		Becomes very hard to excavate 5+ for 1/4 to 1/2 bucket			
		20:27		Same as above			
		27:21		Same as above			
		32:31					
15				**TRENCH TERMINATED AT 15 FEET (REFUSAL)** No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Darwin 72	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2437-CR	**DATE:**	7/13//2020
LOCATION:	See Exploration Location Map		

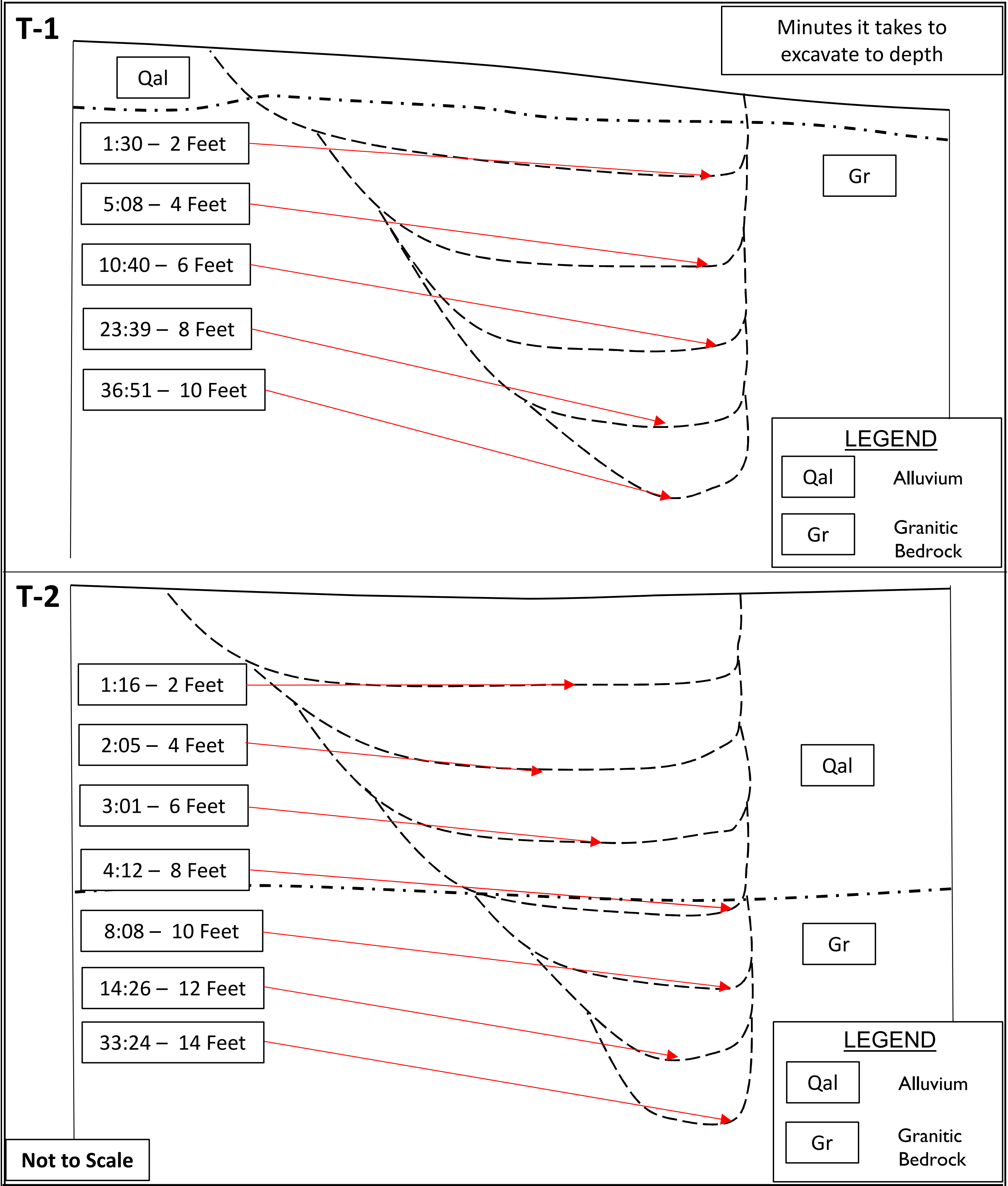
TRENCH NO.: T-8

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium: Silty clayey f-c SAND, reddish rown, slightly moist			
		1:32		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, grayish brown, dry, becomes moderately hard to excavate 3/4 scratches for 1/2 to full bucket			
		5:16		Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket, excavates as gravelly f-c SAND, gray, slightly moist			
5							
				Same as above			
		9:14					
		17:40					
10		24:42		Same as above			
		31:21					
				TRENCH TERMINATED AT 12 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▇ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density



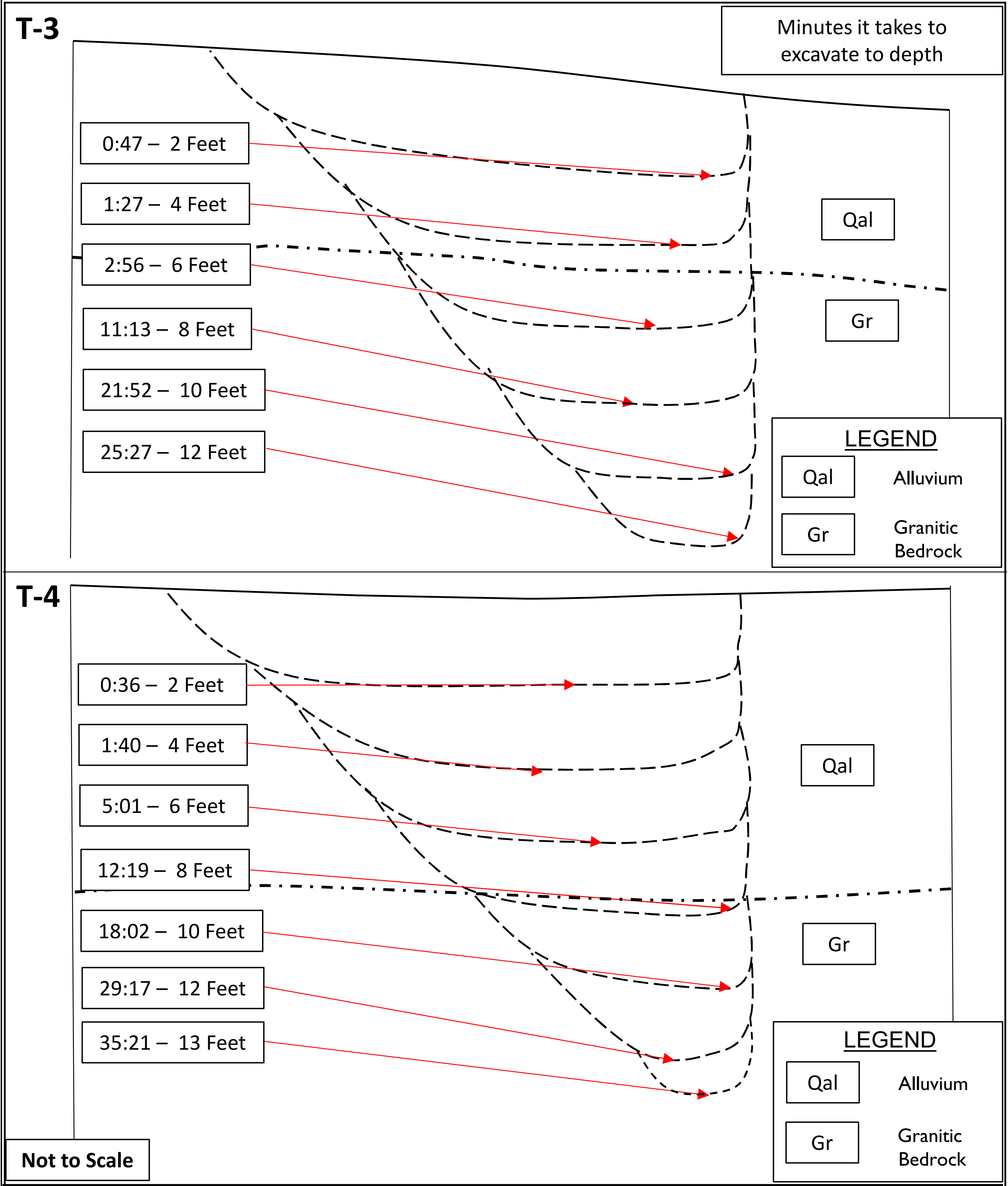
DR Horton
Tracts No. 31589 Darwin 72 Project
Moreno Valley, Riverside County,
California

GeoTek Project No. 2437-CR

Figure I

Graphic Trench Logs

GEOTEK



DR Horton
Tracts No. 31589 Darwin 72 Project
Moreno Valley, Riverside County,
California

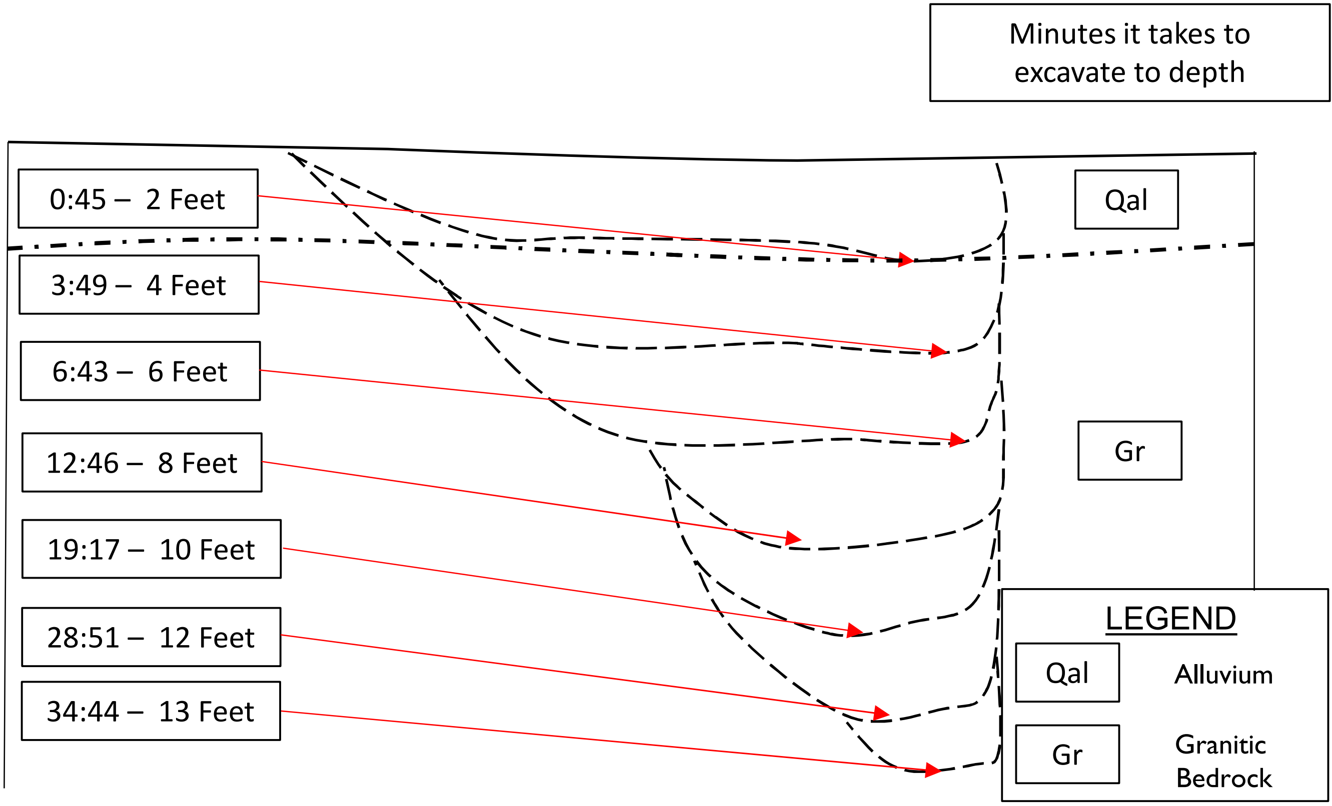
GeoTek Project No. 2437-CR

Figure 2

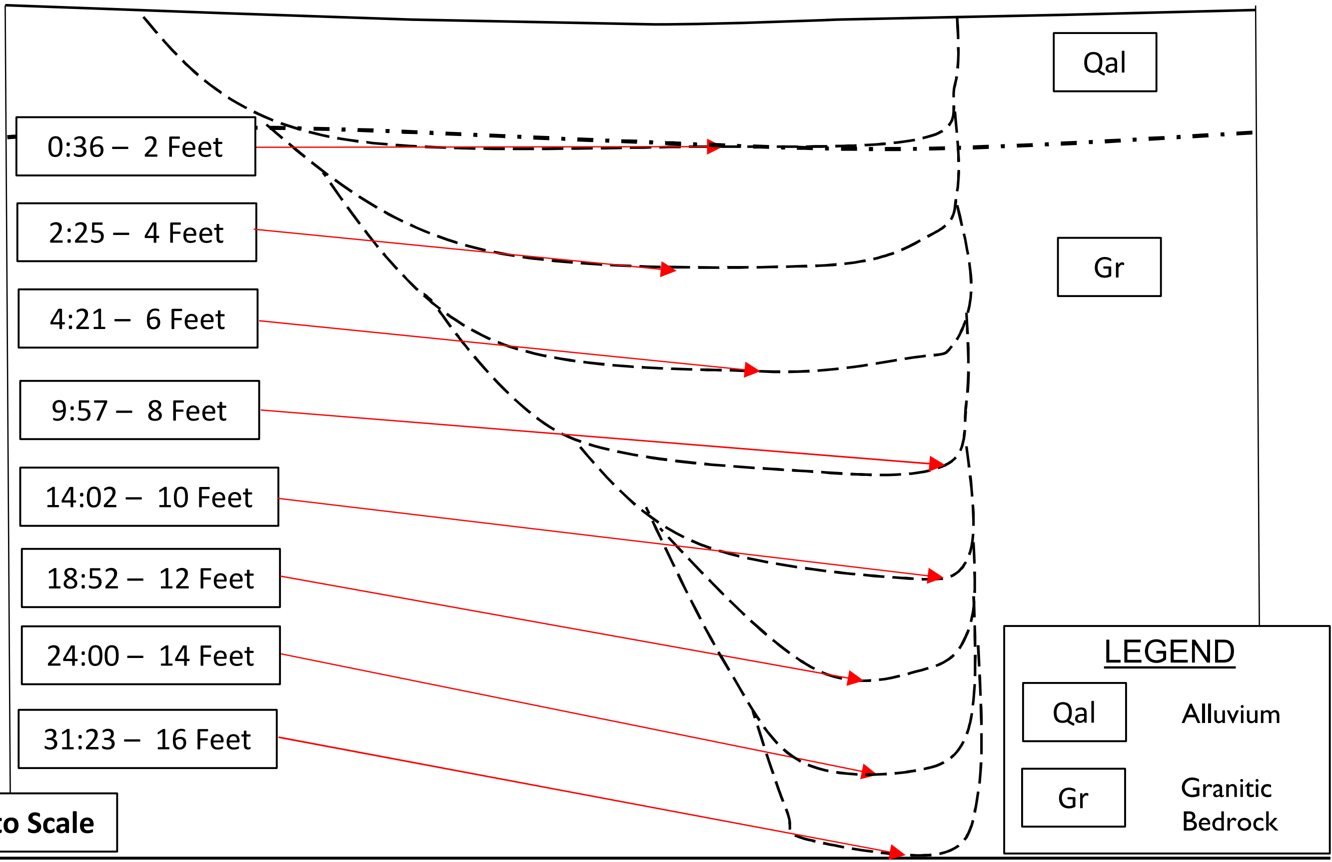
Graphic Trench Logs

GEOTEK

T-5



T-6



Not to Scale

DR Horton
Tracts No. 31589 Darwin 72 Project
Moreno Valley, Riverside County,
California

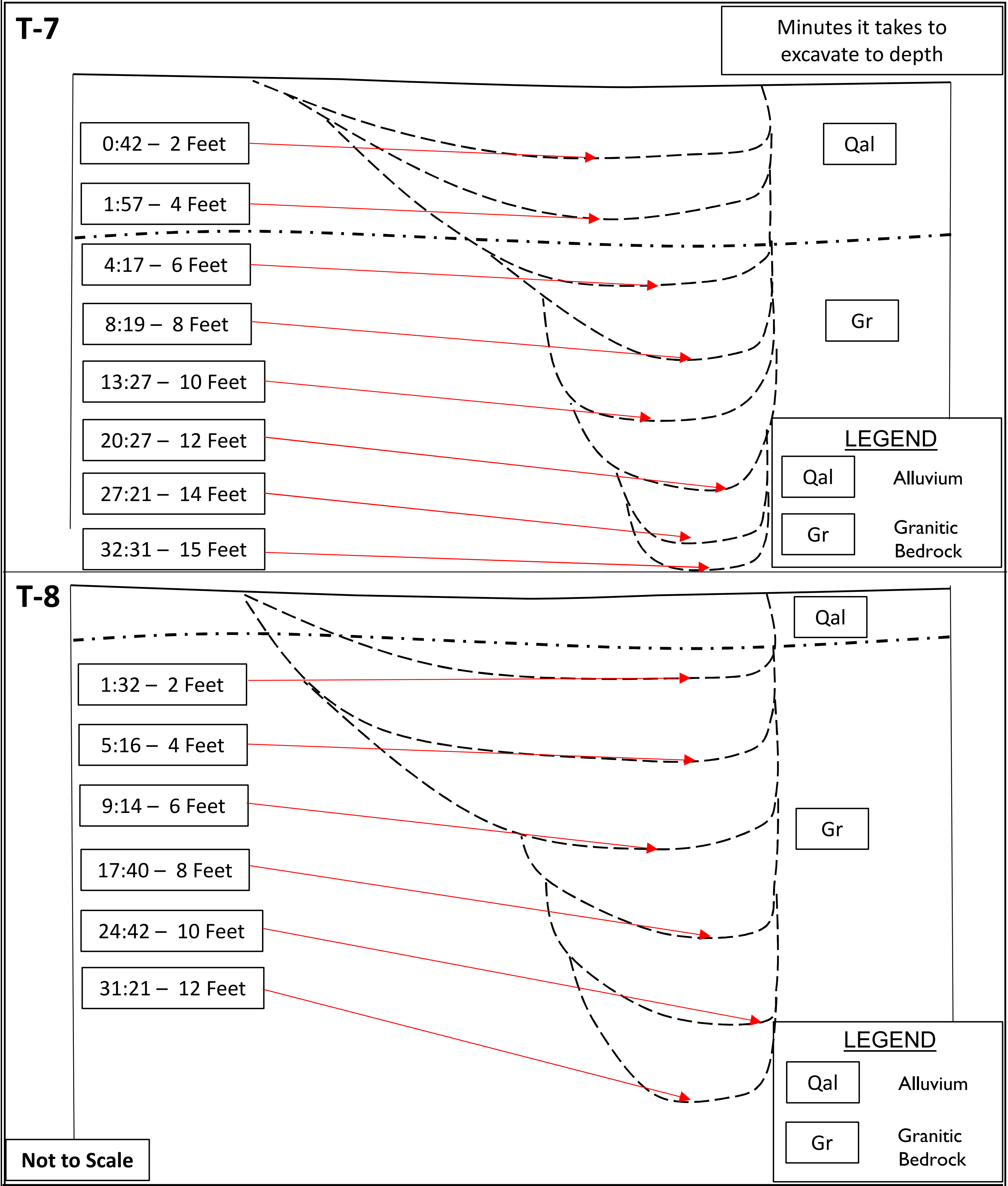
GeoTek Project No. 2437-CR

Figure 3

Graphic Trench Logs

GEOTEK

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



DR Horton
Tracts No. 31589 Darwin 72 Project
Moreno Valley, Riverside County,
California

GeoTek Project No. 2437-CR

Figure 4

Graphic Trench Logs

GEOTEK

APPENDIX C

SEISMIC REFRACTION SURVEY RESULTS BY GEOTEK

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

Subsurface Surveys & Associates, Inc.
2075 Corte Del Nogal, Suite W   Carlsbad, CA 92011
Phone: (760) 476-0492   Fax: (760) 476-0493

GeoTek. Inc.
1548 North Maple Street
Corona, CA 92880

August 19, 2020

Attn: Ed LaMont

Re: Seismic Survey Summary Report
Darwin 72 Project, Moreno Valley, CA

This report covers the results of a seismic refraction survey performed at the Darwin 72 Project site in Moreno Valley, California. The purpose of the survey was to measure the compressional wave velocity of bedrock for rippability assessment and to provide cross sections showing thickness of the weathered zone and depth to the unweathered interface. This should be useful for planning cuts, grading, and other earthwork.

The field work was conducted during July 27-28, 2020. Thirteen seismic lines were recorded at locations selected by GeoTek. A survey location map is provided on Figure 1 that shows the position and orientation of the traverses.

GEOLOGIC SETTING

A review of the “Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California ”, (USGS Open File Report 2006-1217, 2006) indicates the survey area is underlain by Cretaceous tonalite (Kt), undifferentiated.

Surface deposits are mapped as very old alluvial fan deposits (Qvof).

DATA ACQUISITION AND FIELD METHODS

Seismic refraction data were recorded with a Bison 9024 signal enhancement seismograph and 28 Hz geophones. The standard spread layout used 24 geophones with a 5 or 8-foot spacing which provided a line length of 120 and 192 feet, respectively. Each spread used five shotpoints, one off each end (5-foot offset) and three within the interior of the spread. Depth of investigation was approximately 20-45 feet

Compressional wave energy was created by sledge hammer impacts on a metal plate. The signal enhancement feature of the seismograph allowed returns from repeated hits to be stacked, thus improving the signal. Each record was stored digitally on an internal hard disk and printed copies of each seismogram were made in the field on thermal paper. Example field records are shown on Figure 2.

Relative elevations of all shotpoints and geophones were determined by differential leveling with a hand level. Geophone 1 (distance = 0 ft.) at the beginning of each line was assigned a elevation value of 0.0 feet. This datum point served as the reference elevation for all other measurements.

Labeled wooden stakes were placed at the beginning and end of each spread and a Garmin handheld GPS receiver was used to record the latitude and longitude coordinates of the stakes. The coordinates were used to make the location map shown on Figure 1.

SEISMIC REFRACTION METHOD

The refraction method involves measuring the total time for compressional waves to travel from a shotpoint through the subsurface to a set of geophones placed linearly along the ground. Based on Snell's Law, when two or more layers are present with increasingly higher acoustic velocity, waves become critically refracted across the layer boundaries and begin traveling at the speed of the underlying layer. The advancing waves then generate new wavefronts back to the ground surface. The first surge of energy hitting the geophone is termed the "first arrival" and is depicted on the seismogram as a high angle deflection along each trace.

Recognition of direct wave arrivals (non-refracted) verses refracted waves is a key element of refraction interpretation. To assist this process, the first arrival times measured from the seismic records are plotted on graphs of time verses distance called Time-Distance graphs. An example T-D graph from Line 3 is shown on Figure 3. Based on changes in slope on the graphs, a preliminary layer number (i.e. 1, 2, 3) is assigned to each segment of the graph. The layer assignments together with time, distance and elevation data are input to a computer for additional processing.

DATA REDUCTION AND VELOCITY DETERMINATION

Seismic data from this survey were processed using two methods. The first method uses “SIPT2", an interactive inversion modeling program developed by James Scott for the U.S. Bureau of Mines. This software applies a modified “delay-time” approach to calculate the average velocity across the refraction horizons and calculate the thickness of the layers.

The second modeling method uses what is referred to as tomographic inversion and produces velocity gradient cross sections in color. Tomography does not perform refraction layer calculations or attempt to measure discrete depths. Instead, the main objective is to create a velocity distribution grid in the subsurface. Each node of the grid has a specific velocity associated with it. The goal is to adjust or “iterate” the velocity matrix so that the computer derived travel-time curves match what was recorded in the field. The final velocity grid is then loaded into a contouring program that produces color filled cross sections. This method is typically used for imaging the shape and configuration of complex structures such as faults, landslides and intrusions, and areas where strong lateral velocity gradients are suspected within the weathered profile.

The tomographic modeling program used for this survey is SeisOpt Version 3.5 from Optim LLC. It uses a proprietary inversion algorithm that applies a non-linear optimization technique called generalized simulated annealing to adjust the velocity grid points for the best statistical match. It is referred to as an optimization because it attempts to find the model that has the least minimum travel-time error between the calculated and observed (field) measurements.

SUMMARY OF RESULTS

Prior to starting the fieldwork, Geotek provided information on the proposed cuts beneath each of the 13 traverses. Where planned cuts were 15 feet or less, data were recorded with a 5-foot geophone spacing to provide good resolution of the geologic units and a penetration depth of about 20-25 feet. This group included Lines 2, 5, 6, 8, 12, and 13. Proposed cuts beneath the other seven traverses ranged for 18 to 28 feet. An 8-foot geophone spacing was used for these lines to provide a greater exploration depth beneath of about 40 feet.

Seismic Refraction Layer Models

Results from refraction analysis show a three layer solution beneath all lines (see Figures 5-17). Velocities posted on the cross sections represent averages as described in the previous section. Therefore, minor localized changes in velocity may occur along any profile.

Four main geologic units are interpreted from the modeling results. The refraction software was used to determine the average velocity of each layer. A description of the layers is provided below and a velocity summary is shown in Table 1. Please note: only three of the four layers are displayed on the cross sections. This is the result of Layer 2 being very thin, generally less than five feet thick, and therefore was not resolved beneath lines with 8-foot spacing.

Layer 1 -	is mostly loose soil and colluvium with rock fragments. Thickness is generally less than 5 feet.
Layer 2 -	is interpreted to be highly weathered or decomposed bedrock.
Layer 3 -	is interpreted to be weathered bedrock. The velocity range is 3360-4887 ft/sec. Based on the Cat rippability chart shown on Figure 4, this range is considered easily rippable with a D-9 Cat.
Layer 4 -	represents moderately weathered to unweathered bedrock.

Table 1. Cross Section Summary Velocity in (ft/sec), Depth in (feet)

Line	Velocity Layer 1	Velocity Layer 2	Velocity Layer 3	Depth Range Moderately Weathered to Unweath. Bedrock Interface
1	1512	4617	6494	10 - 26
2	1471	3270	4793	ND
3	1750	4887	6134	19 - 29
4	1364	3900	5699	19 - 38
5	1166	2930	4020	ND
6	1104	3039	4594	ND
7	1395	3379	5838	11 - 24
8	1321	4131	7464	9 - 16
9	1613	4910	7925	6 - 17
10	1447	3663	6080	4 - 21
11	1667	4191	5705	10 - 22
12	1234	2630	4134	ND
13	1148	2691	3360	ND

ND - Not Detected

Weathering tends to be gradational for most granitic rock types and usually produces a gradual increase in velocity with depth. Consequently, variation of ± 10-15 % from the posted averages may occur between the top and bottom of Layer 2.

Tomographic Models

Following the end of fieldwork, Geotek requested tomographic modeling for Lines 1, 5, 6, 8-11, and 13. The main objective was to provided additional graphics to explore for evidence of possible core stones in the weathered rock matrix.

The five shotpoints per line recorded for refraction survey were to be used for modeling. This is less than the 7 to 9 shotpoints Subsurface Surveys typically uses for tomography because it limits ray-path coverage and localized shotpoint control.

Results are displayed on adjacent pages following the layer model cross sections for each traverse. Some short comings should be noted: 1) areas with poor ray-path density tend to produce low velocity anomalies compared to the surrounding contours and may disrupt the lateral continuity of the higher velocity data and 2) the relatively thin surface layers shown on the refraction models may pinch out or be missing on the tomographic models.

Based on a review of the modeling results and an inspection of all the time-distance graphs, there doesn’t appear to be any evidence of core stones with significant size, that would impact grading operations or the digging of utility trenches beneath the seismic lines.

Rippability

Figure 4 presents a rippability chart (courtesy of Caterpillar Tractor Co.) for a D9R Ripper. Bar graphs show the relationship between seismic compressional wave velocity and ripper performance for various rock types in three categories: rippable, marginal, and non-rippable. Granitic rocks are listed as marginally rippable at approximately 6800 ft/sec and are considered non-rippable above 8000 ft/sec. This chart is provided only as a guide and should not be considered absolute. Other geologic factors that may influence bedrock rippability at this site include changes in composition of the bedrock and the presence of fractures and joints.

All data acquired during this survey is considered confidential and is available for review by your staff at any time. We appreciate the opportunity to participate in this project.

Please call if there are any questions.

PAWalen

Phillip A. Walen
Senior Geophysicist
CA Registration No. GP917

Seismic Survey Location Map

Tract 31589, Darwin 72 Project -- Moreno Valley, California

Figure 1

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Example Seismic Field Records

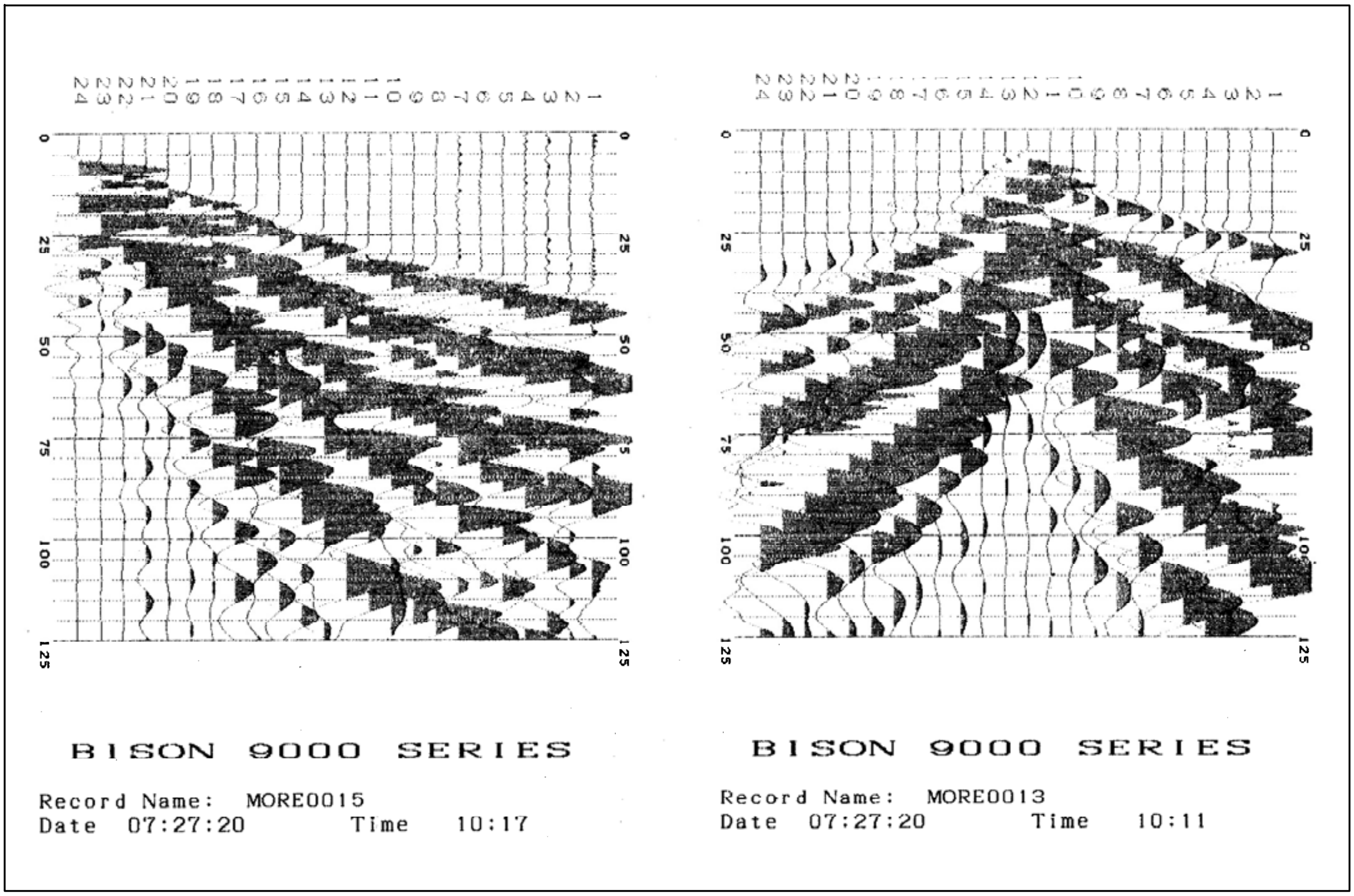
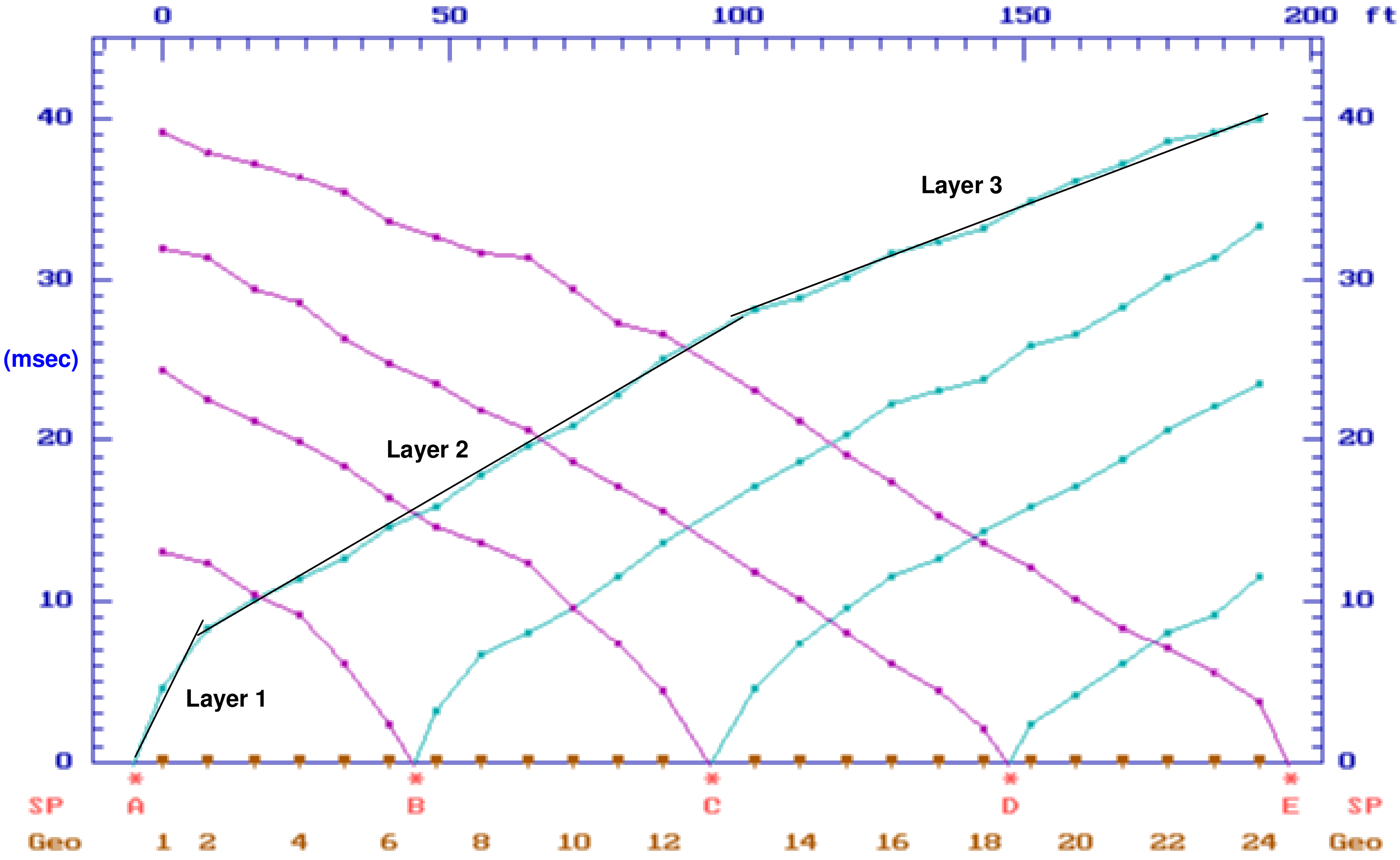


Figure 2

Example Time-Distance Graph -- Line 3



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 3

Rippers | Ripper Performance
- D9R/D9T

D9R/D9T
- **Multi or Single Shank No. 9 Ripper**
- **Estimated by Seismic Wave Velocities**

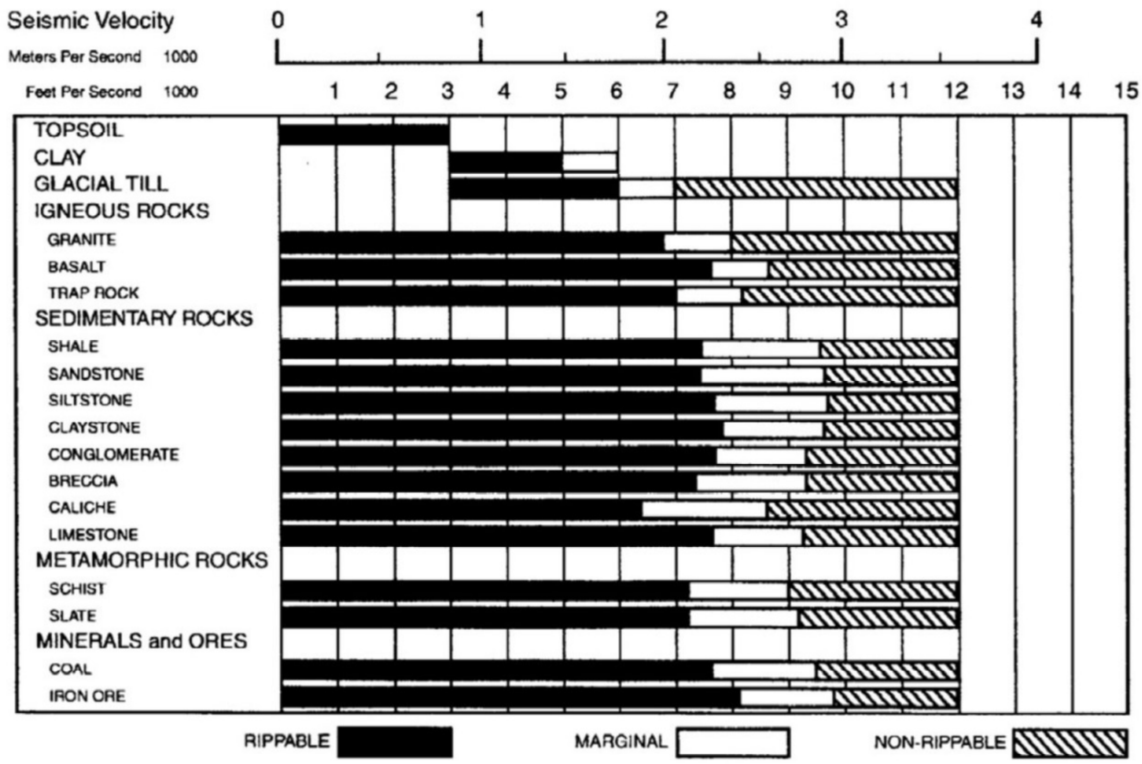
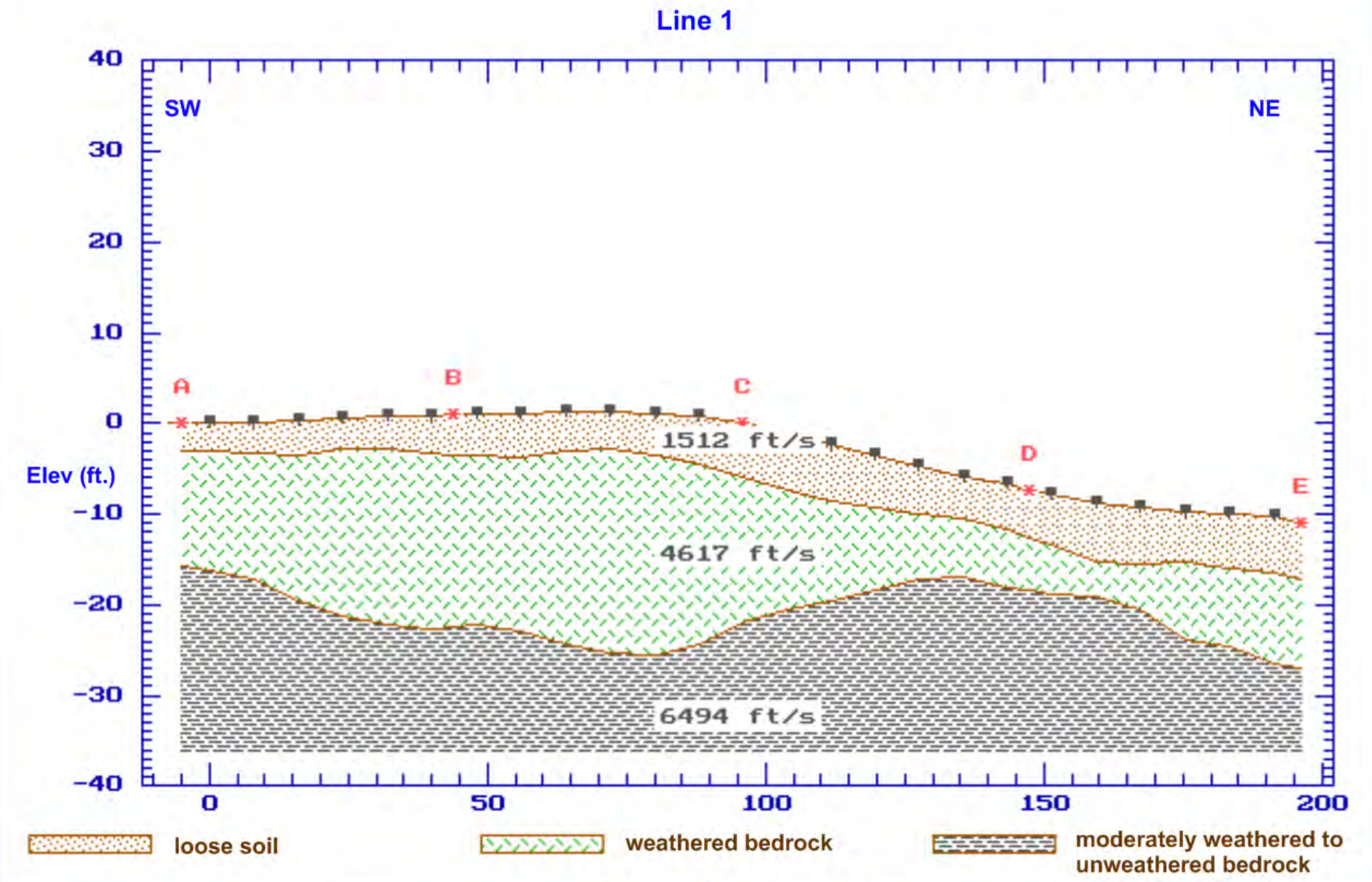


Figure 4



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 5

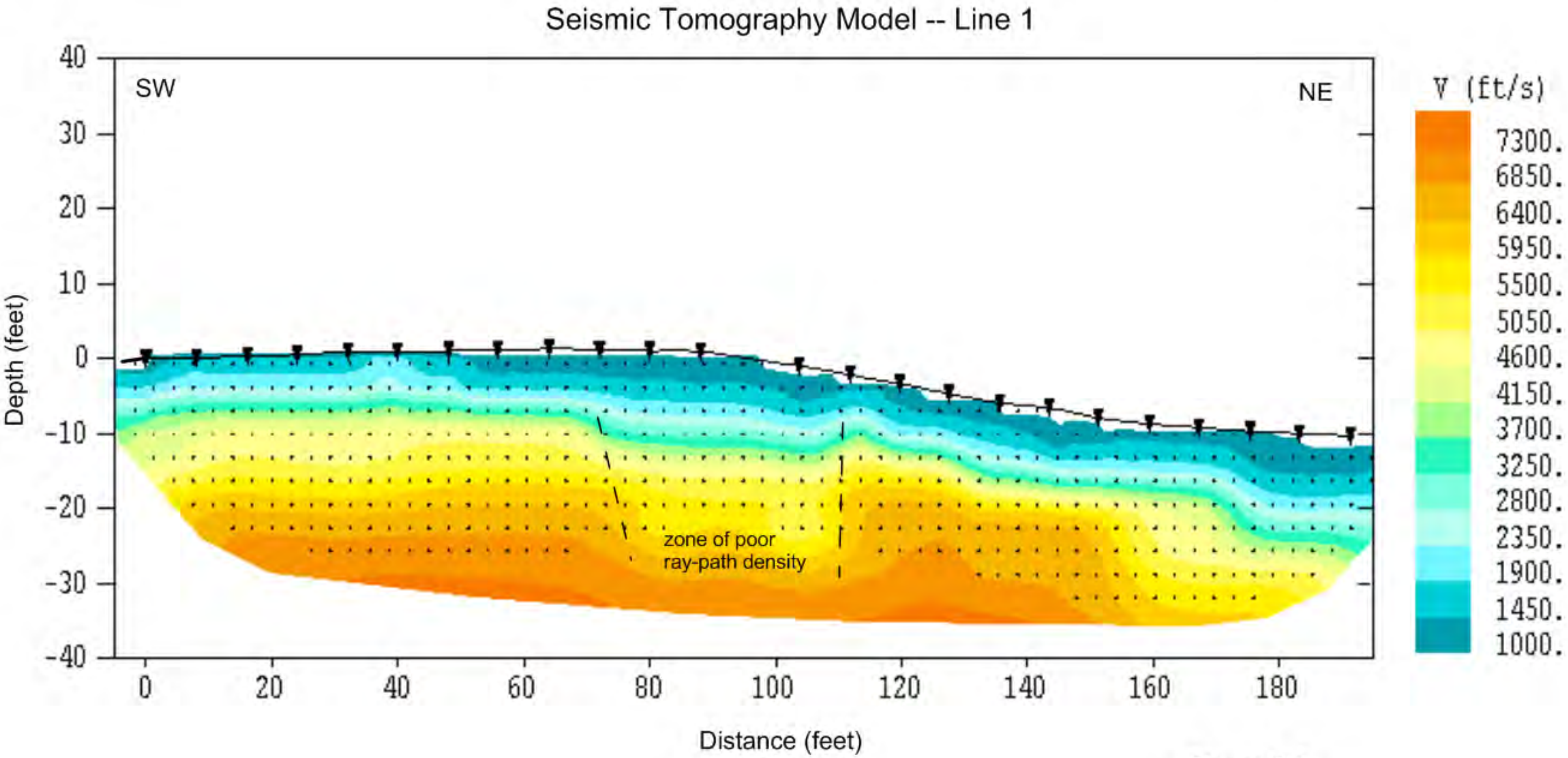
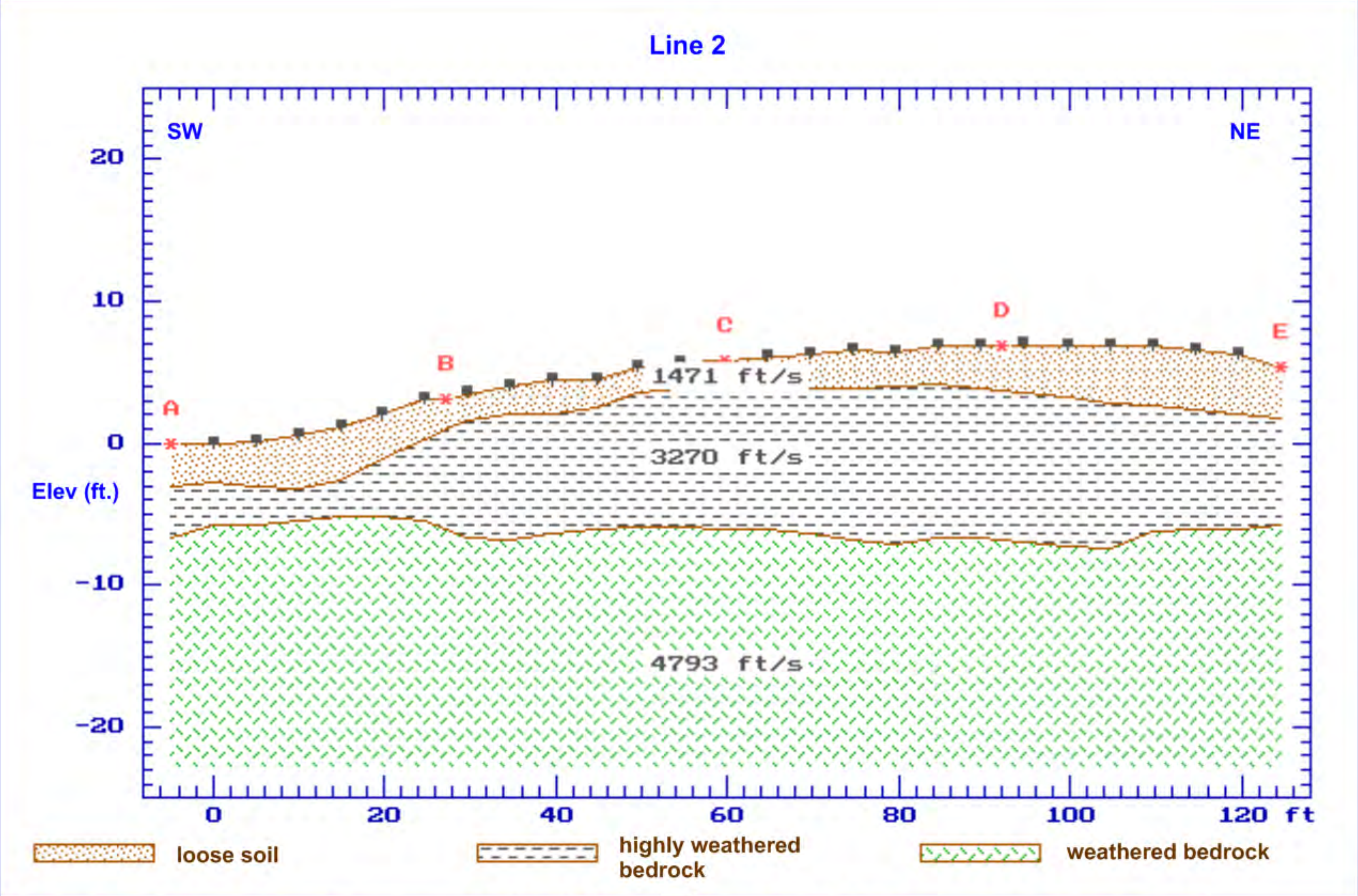
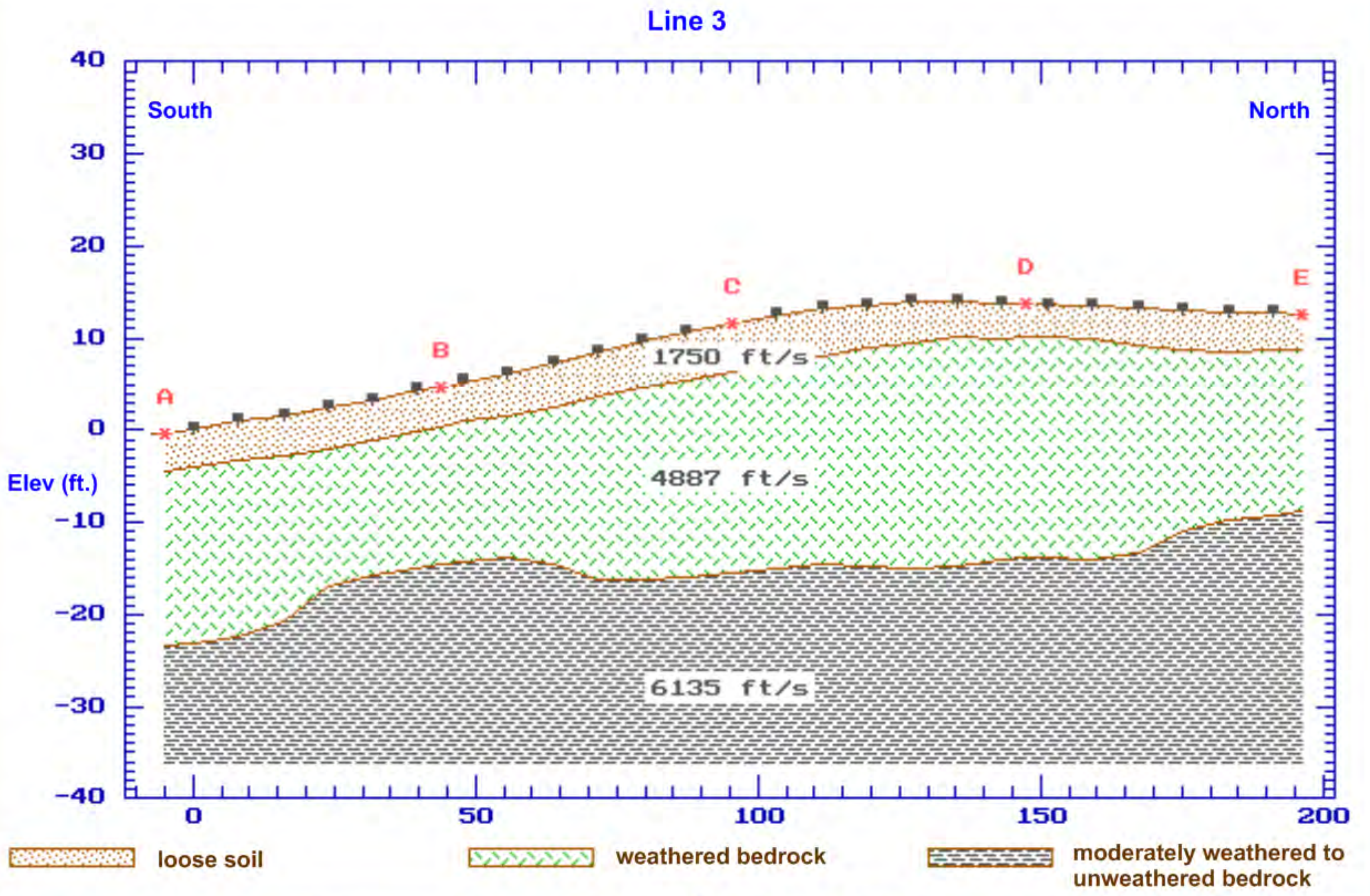

Seismic Tomography Model -- Line 1
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
zone of poor ray-path density
V (ft/s)
7300.
6850.
6400.
5950.
5500.
5050.
4600.
4150.
3700.
3250.
2800.
2350.
1900.
1450.
1000.

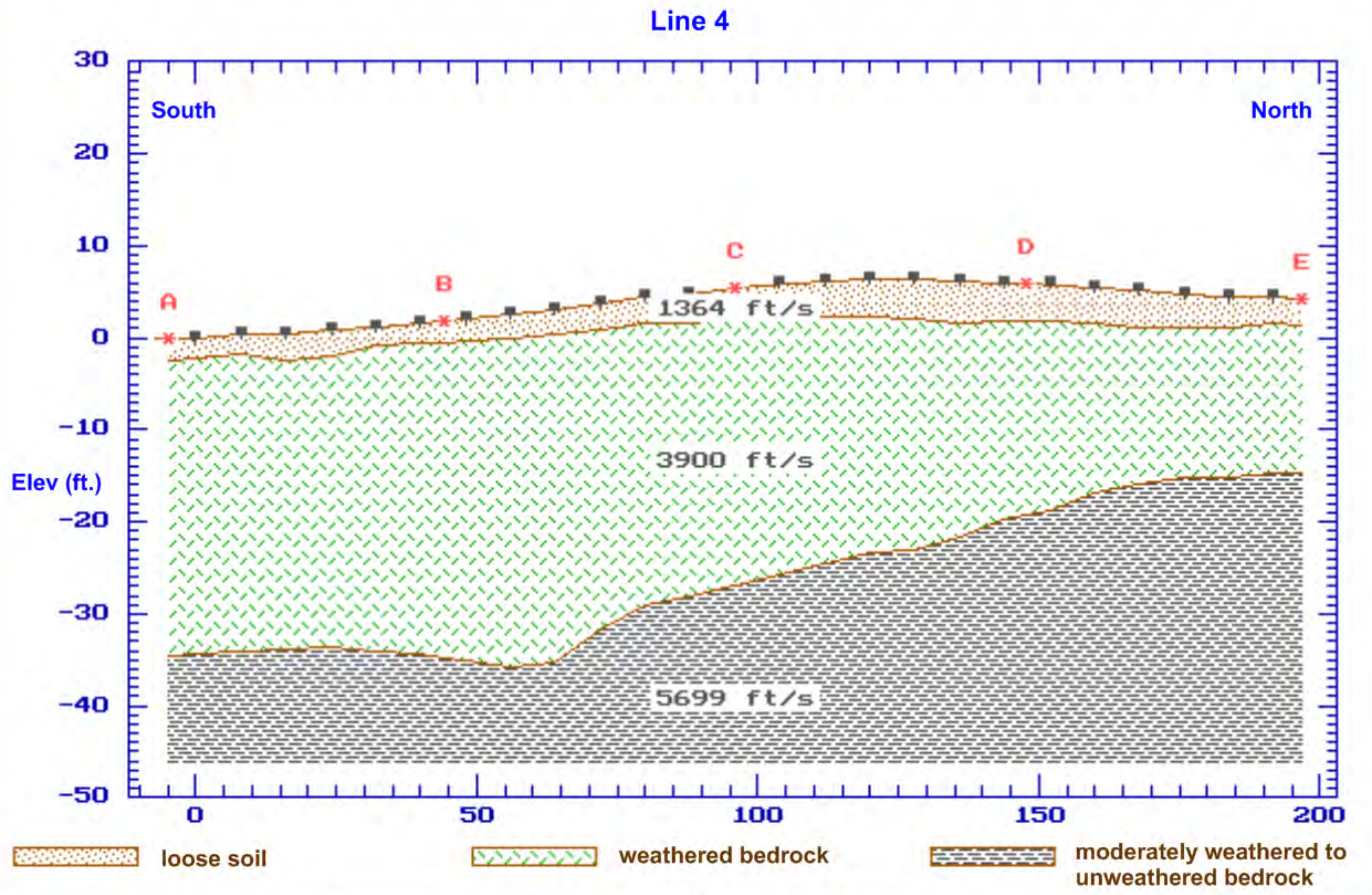
Figure 5-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 6



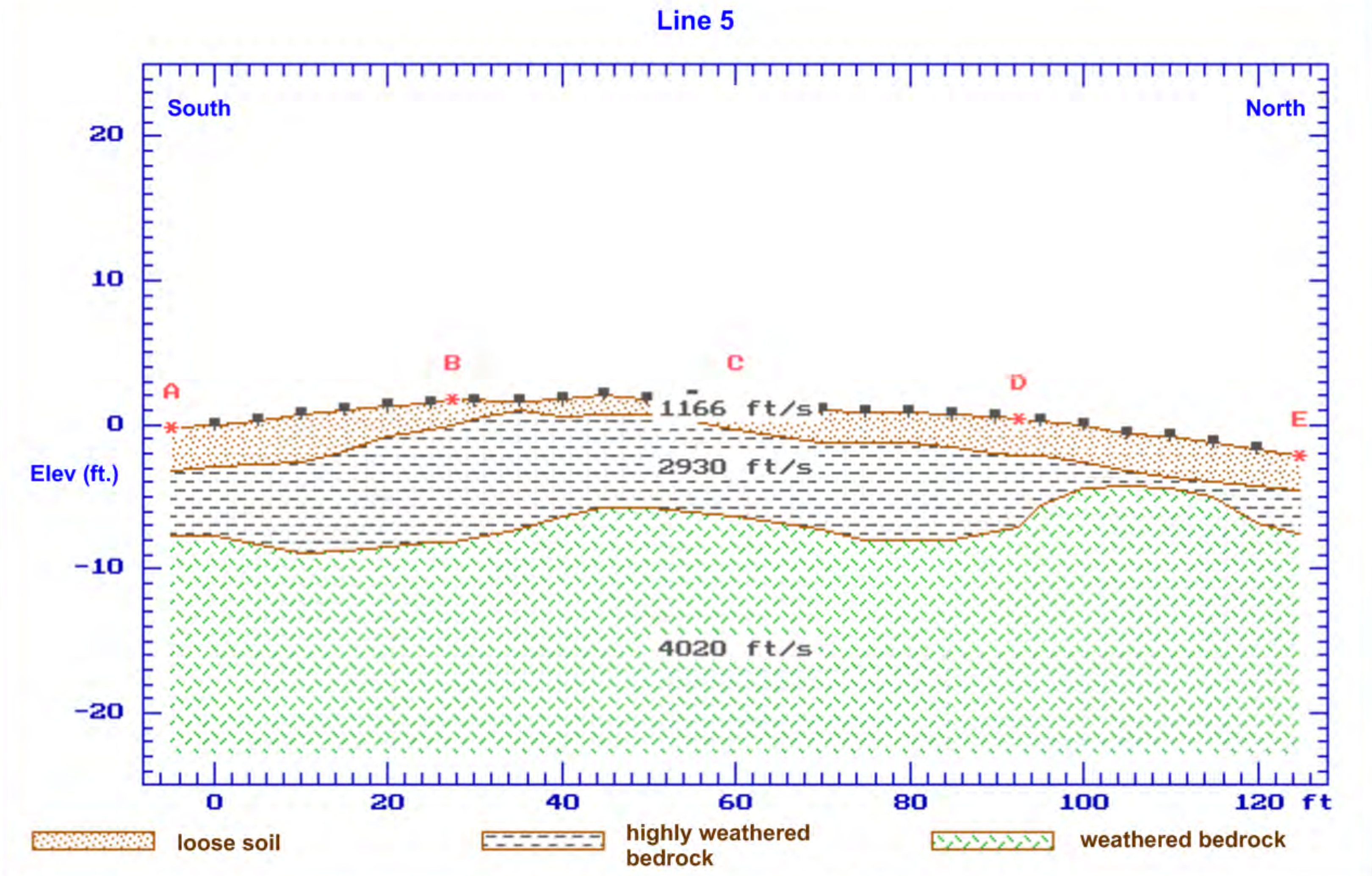
Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 7



Line 4

Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 8

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 9

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and

Seismic Tomography Model -- Line 5

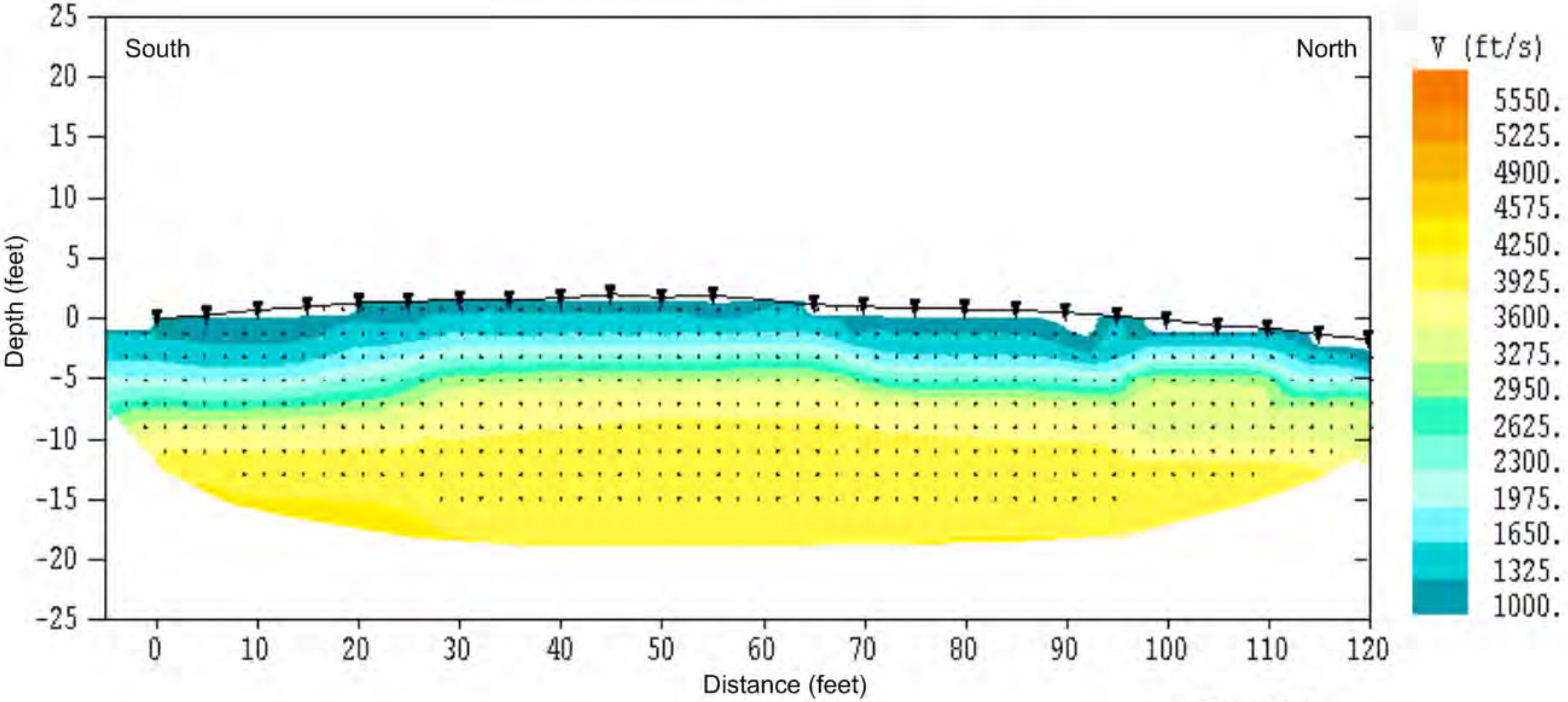
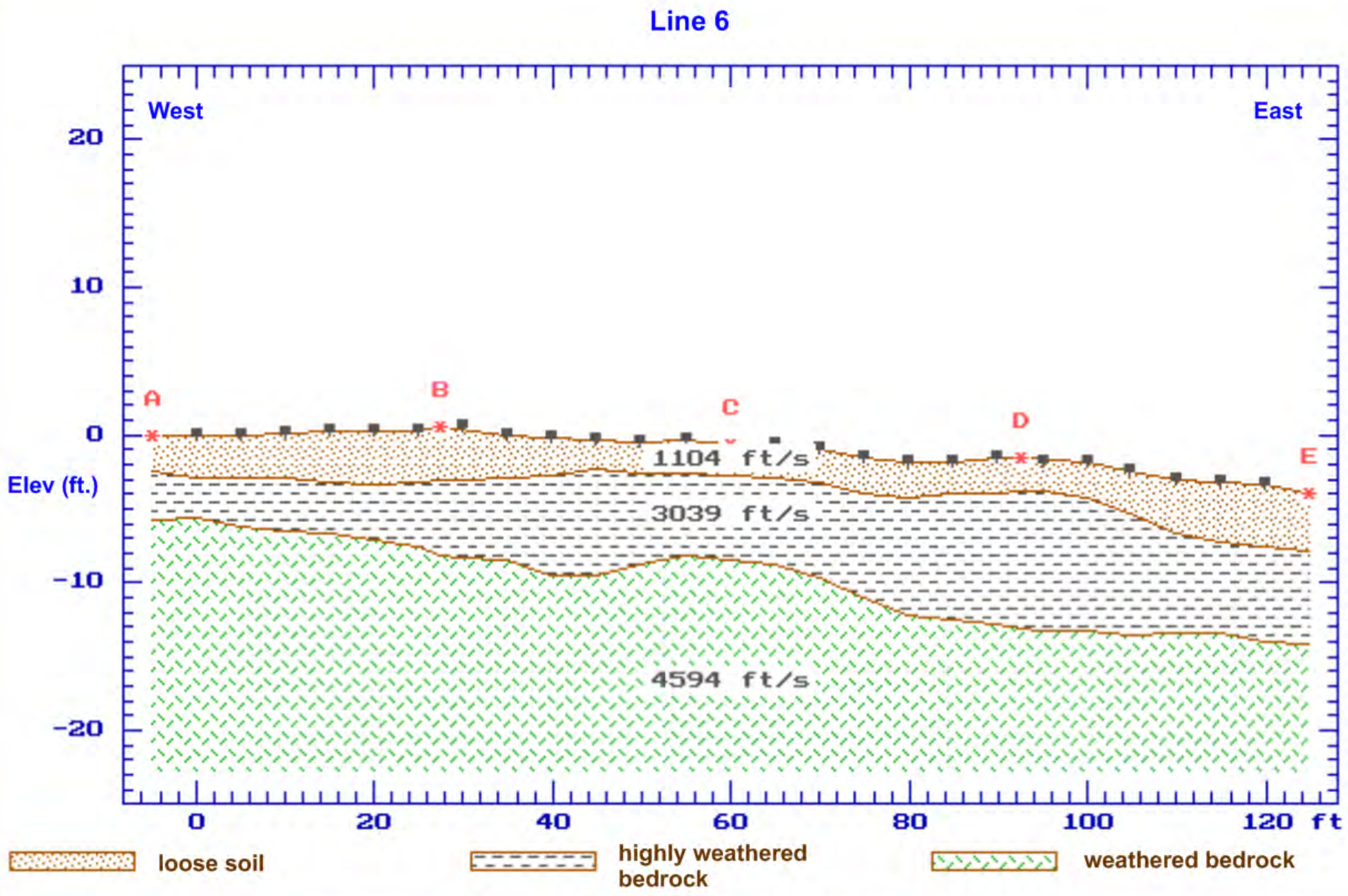


Figure 9-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 10

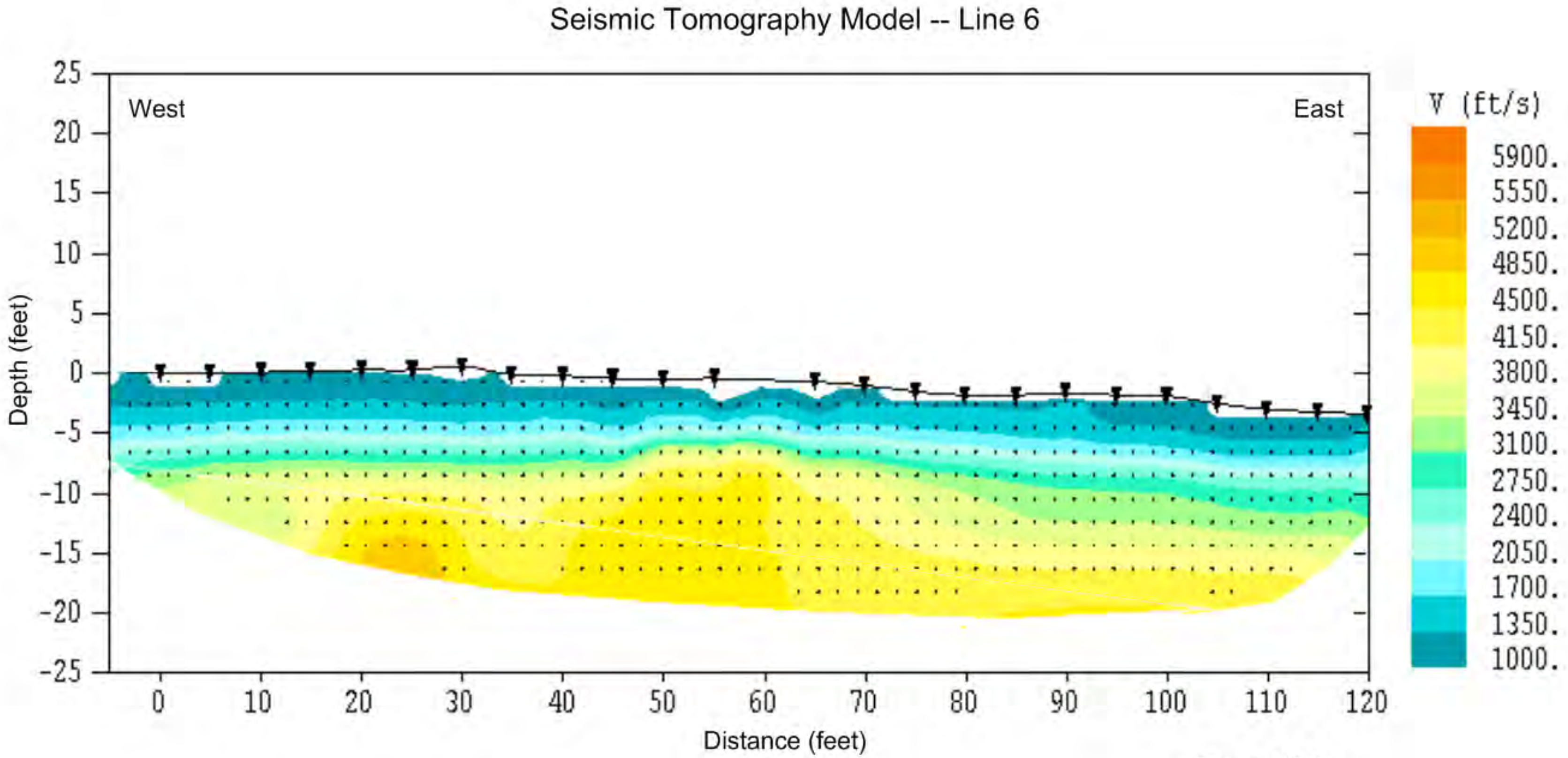
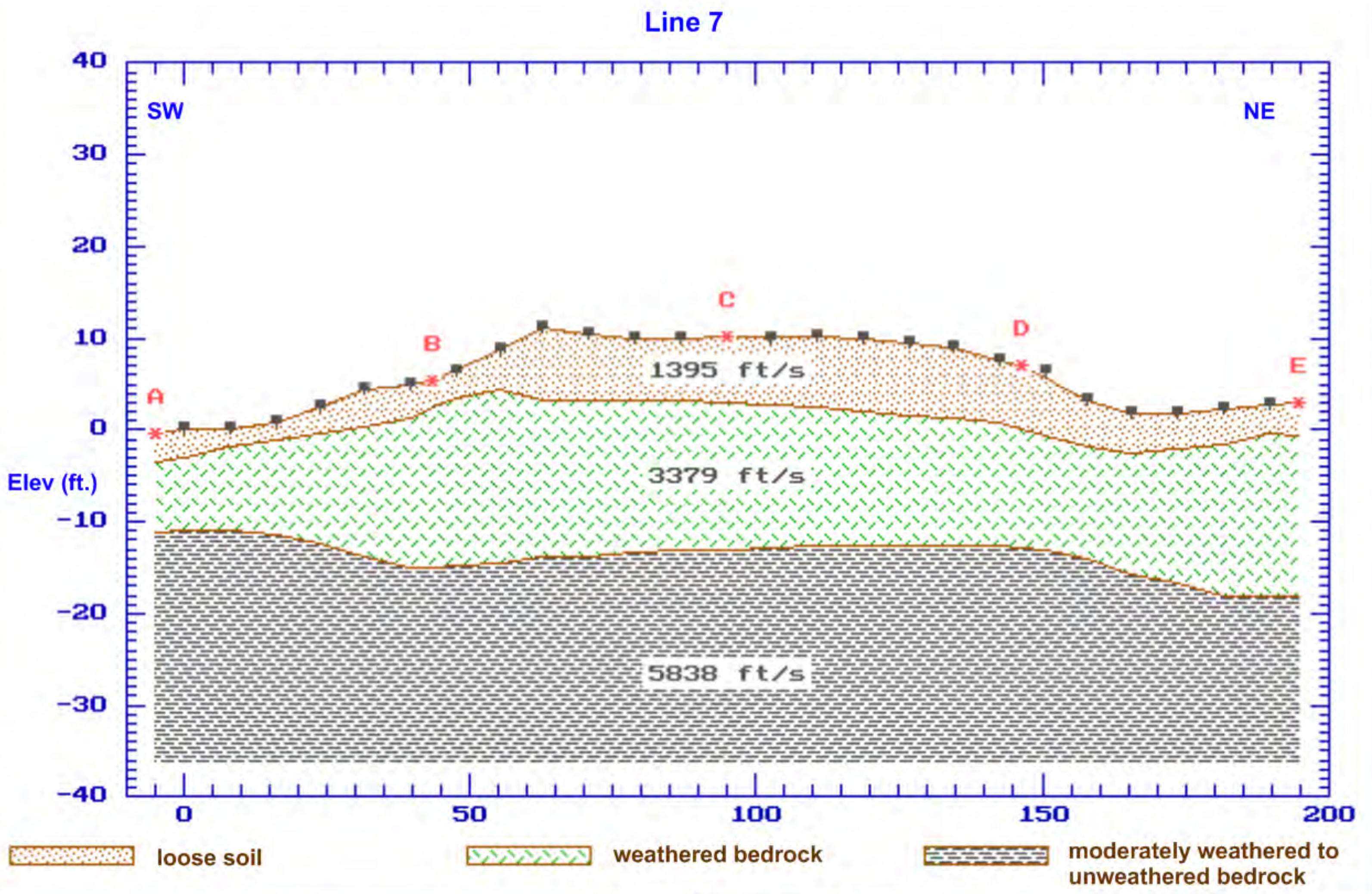

Seismic Tomography Model -- Line 6
West
East
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
110
120
Distance (feet)
V (ft/s)
5900.
5550.
5200.
4850.
4500.
4150.
3800.
3450.
3100.
2750.
2400.
2050.
1700.
1350.
1000.

Figure 10-1



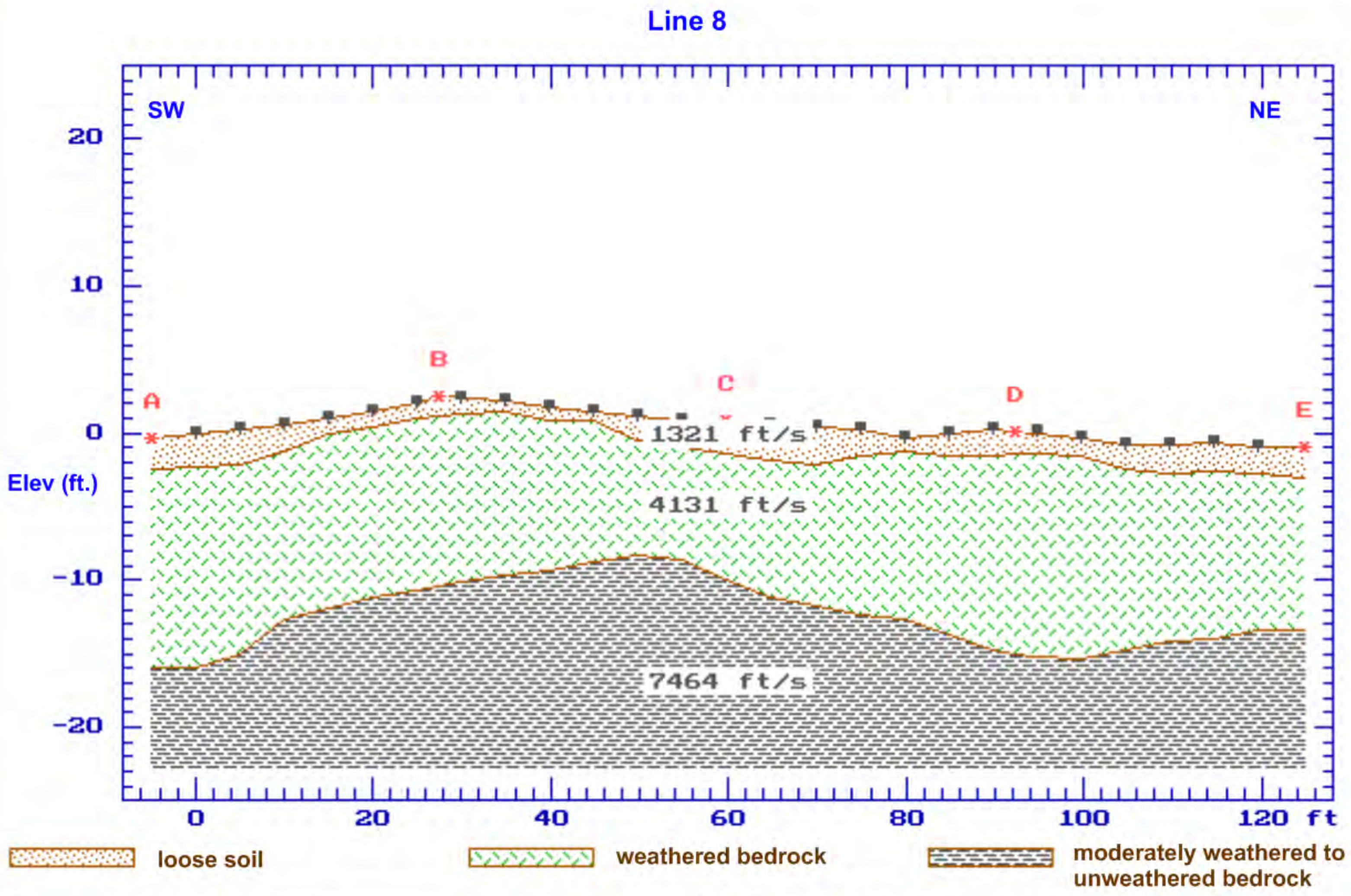
Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 11



Seismic Refraction Survey 7/28/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 12

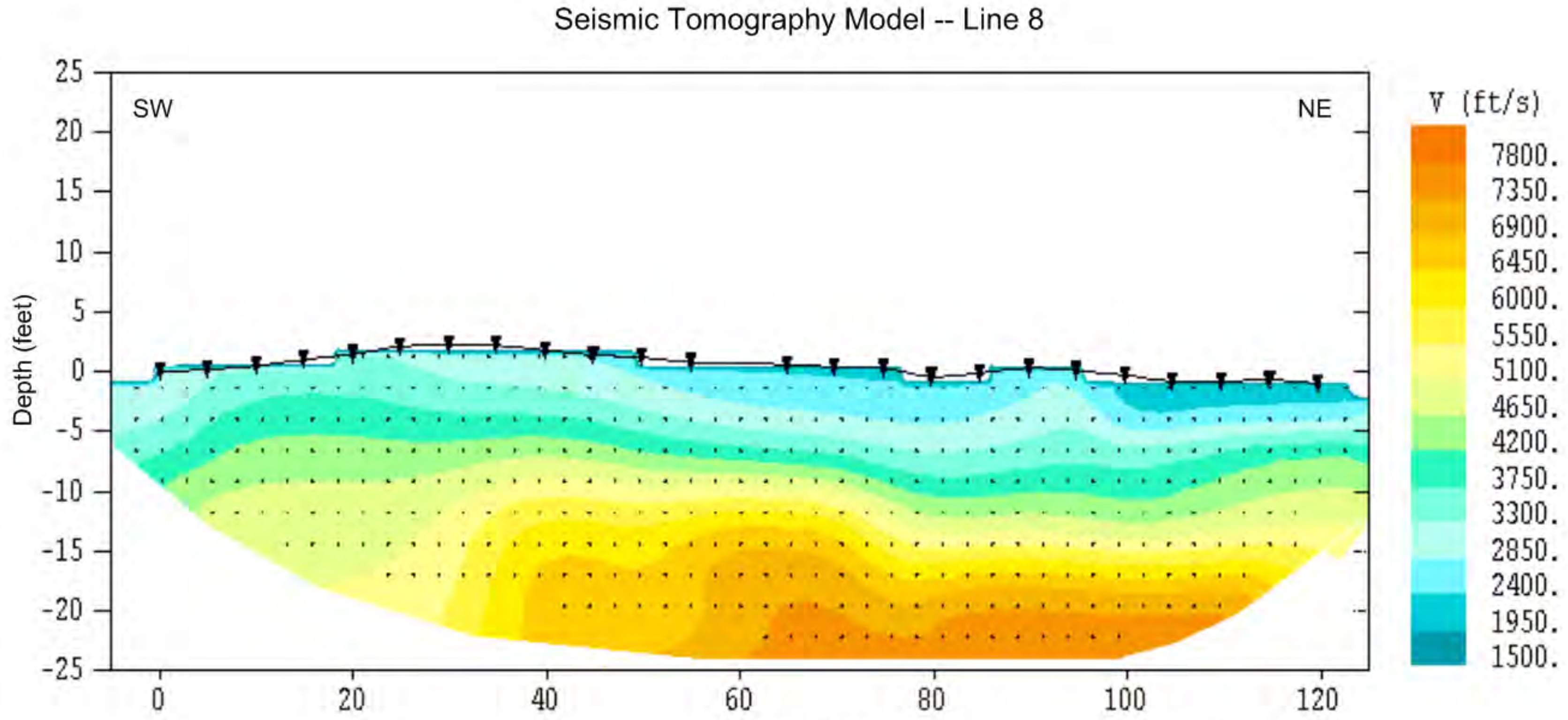
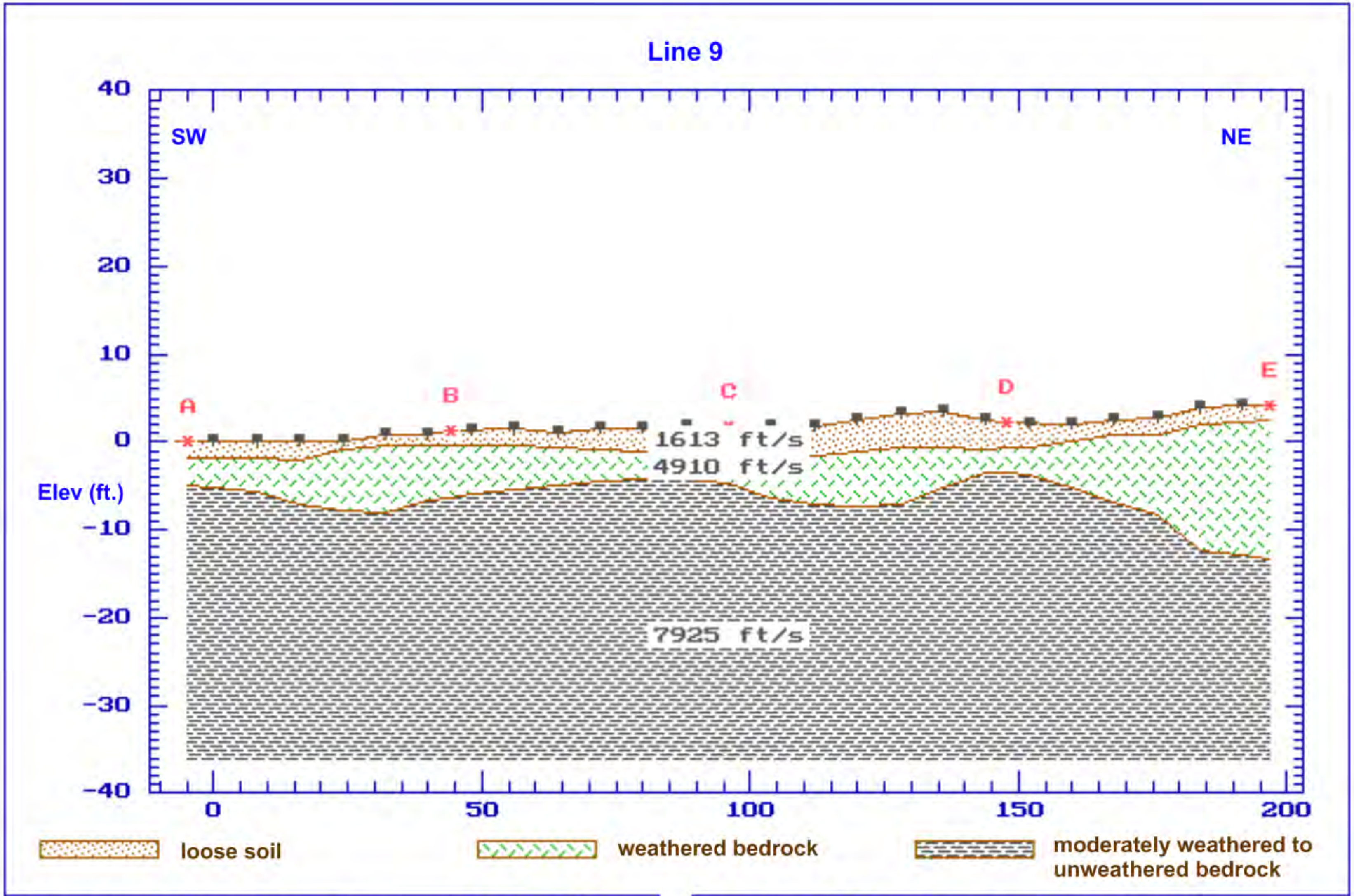

Seismic Tomography Model -- Line 8
SW
NE
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
Distance (feet)
V (ft/s)
7800.
7350.
6900.
6450.
6000.
5550.
5100.
4650.
4200.
3750.
3300.
2850.
2400.
1950.
1500.

Figure 12-1



Seismic Refraction Survey 7/28/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 13

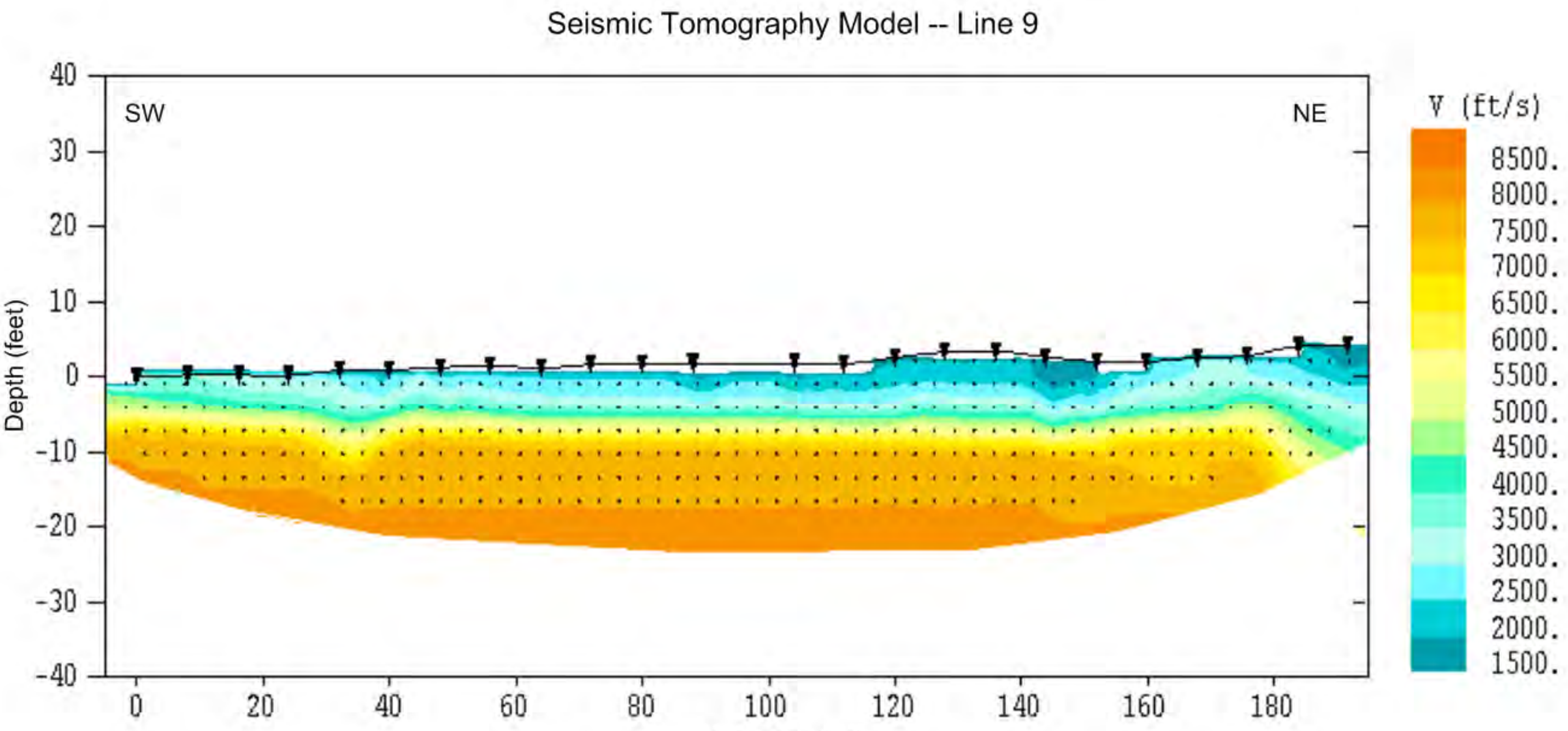
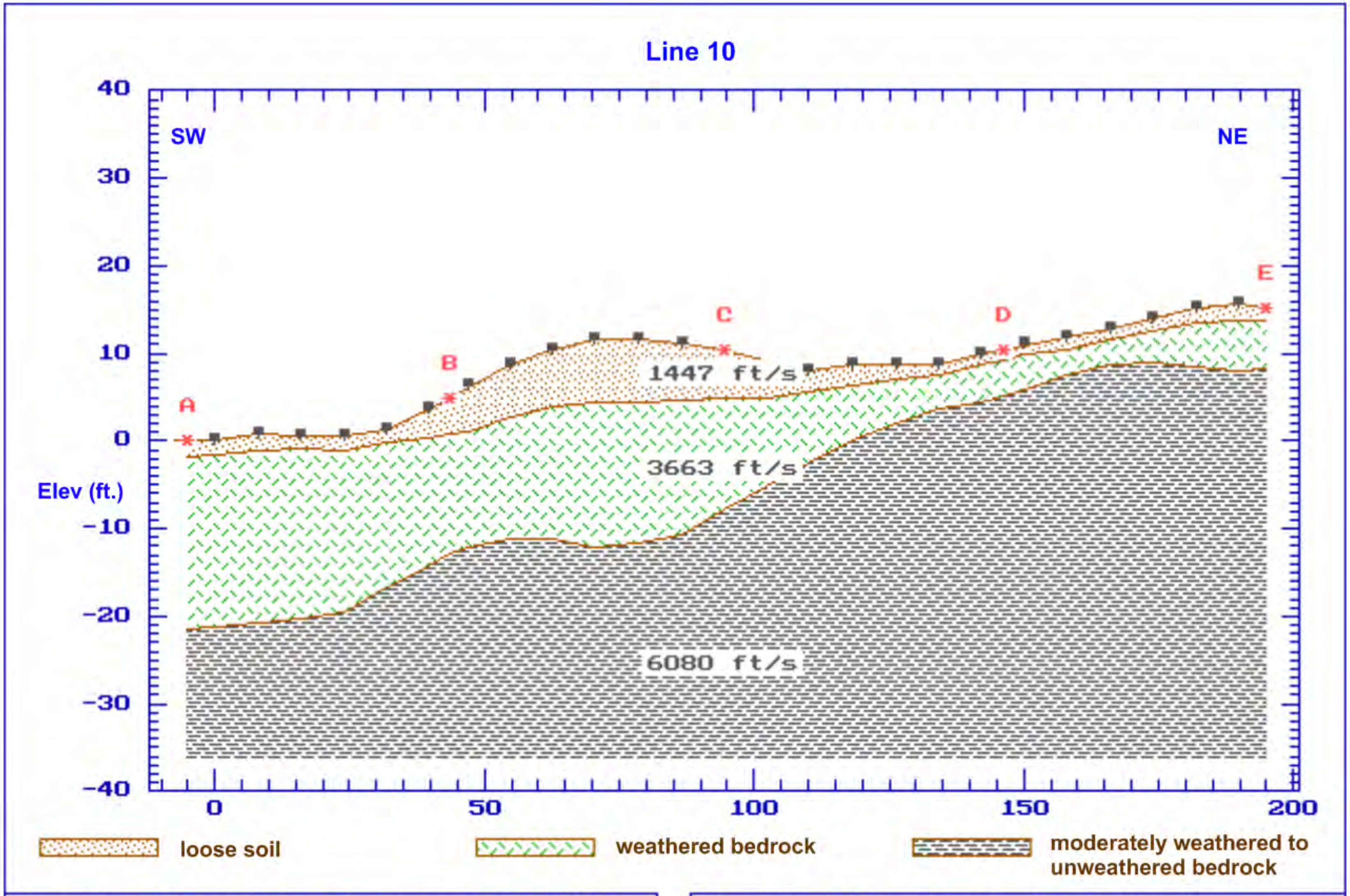

Seismic Tomography Model -- Line 9
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
8500.
8000.
7500.
7000.
6500.
6000.
5500.
5000.
4500.
4000.
3500.
3000.
2500.
2000.
1500.

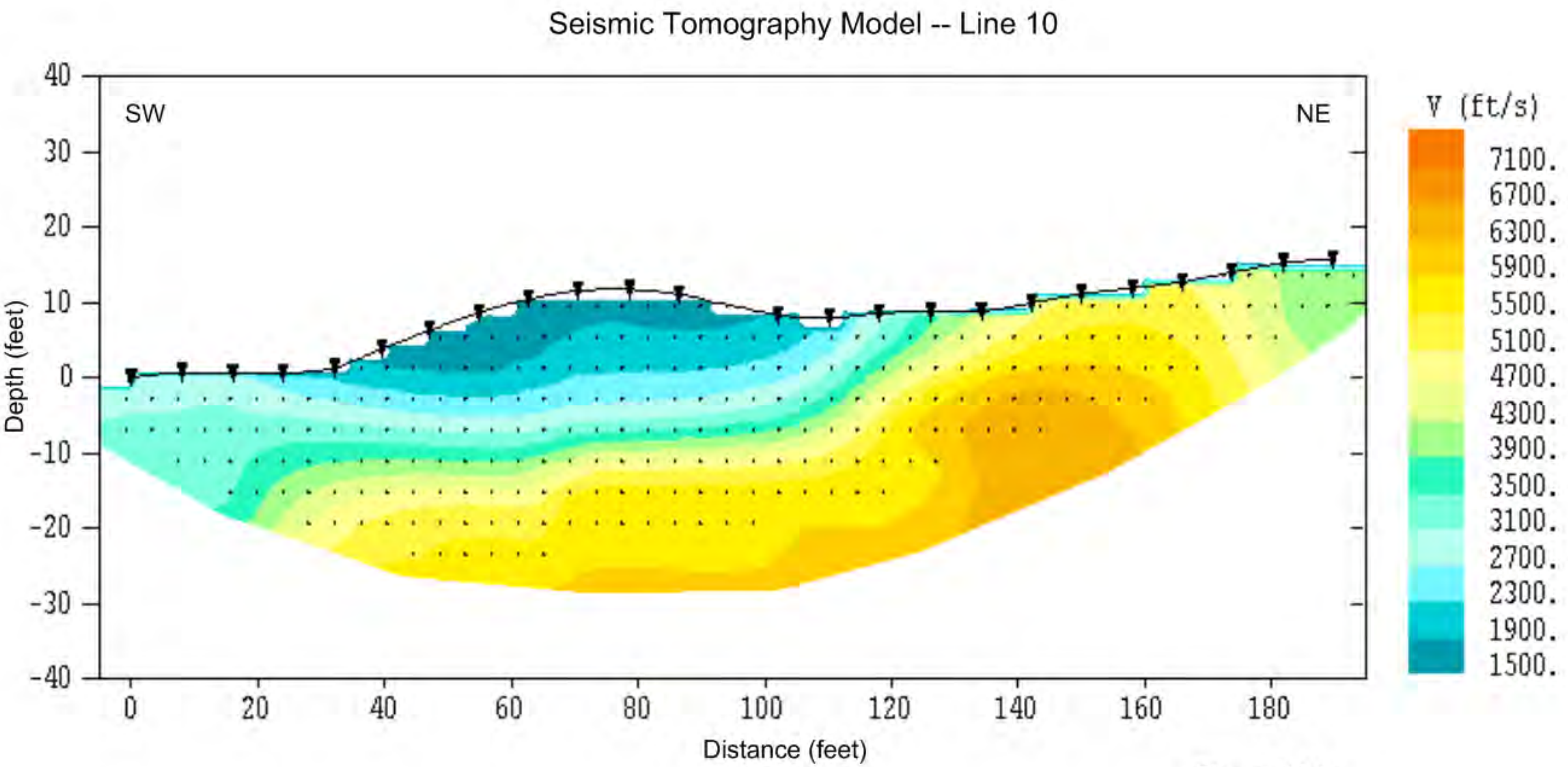
Figure 13-1



Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

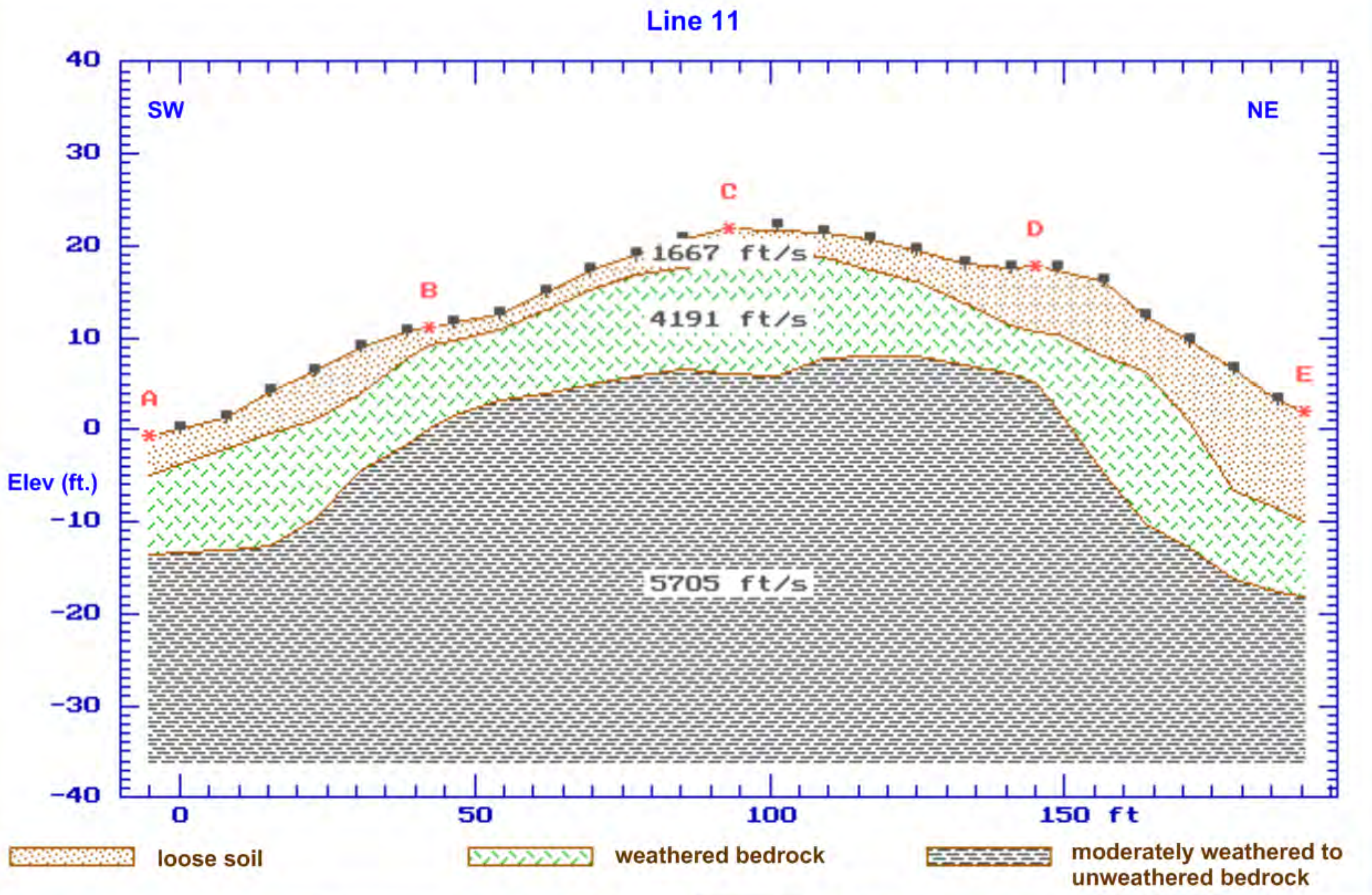
Tract 31589, Darwin 72 Project
Moreno Valley, California Figure 14

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and



Seismic Tomography Model -- Line 10

Figure 14-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 15

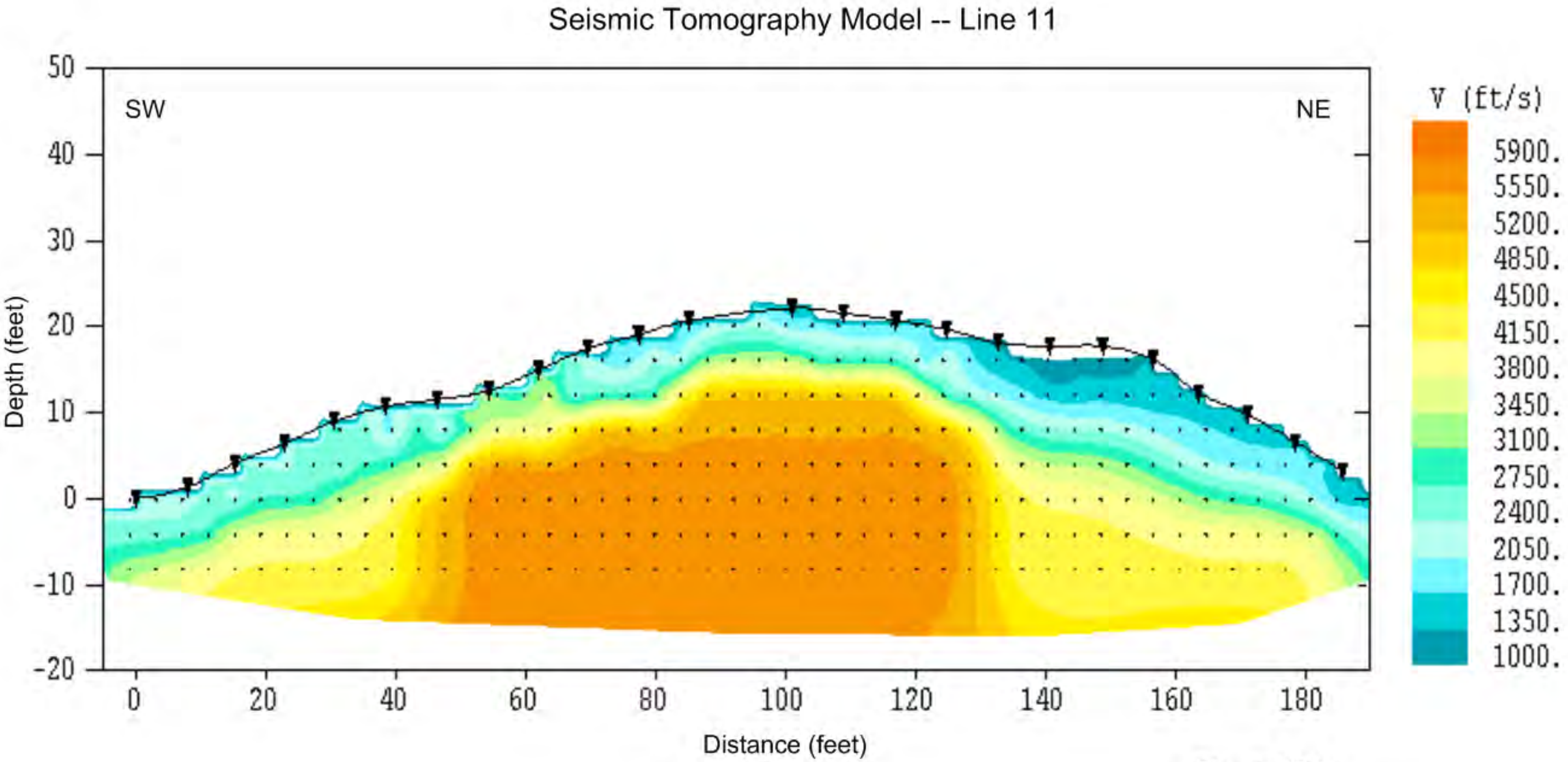
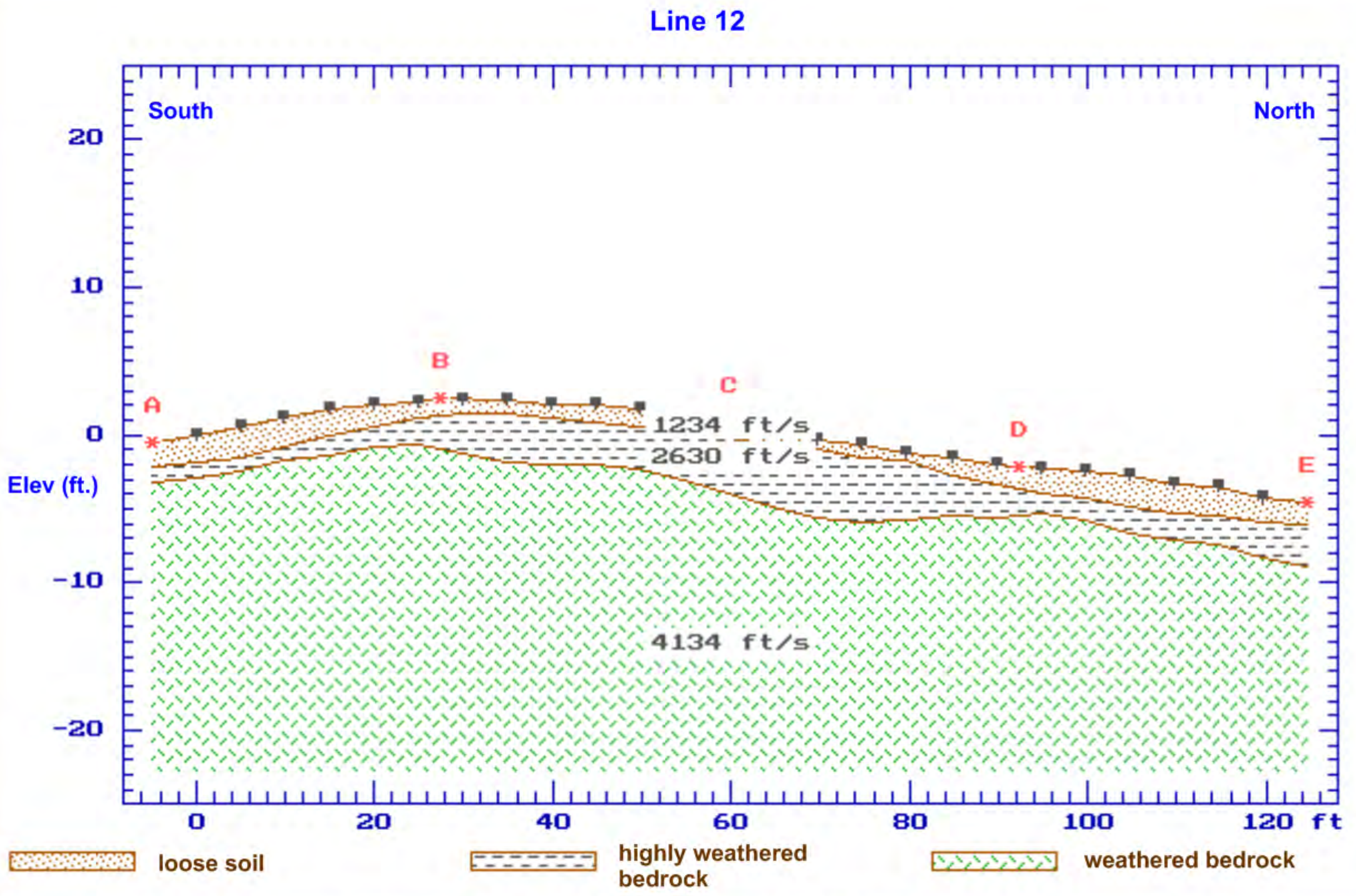
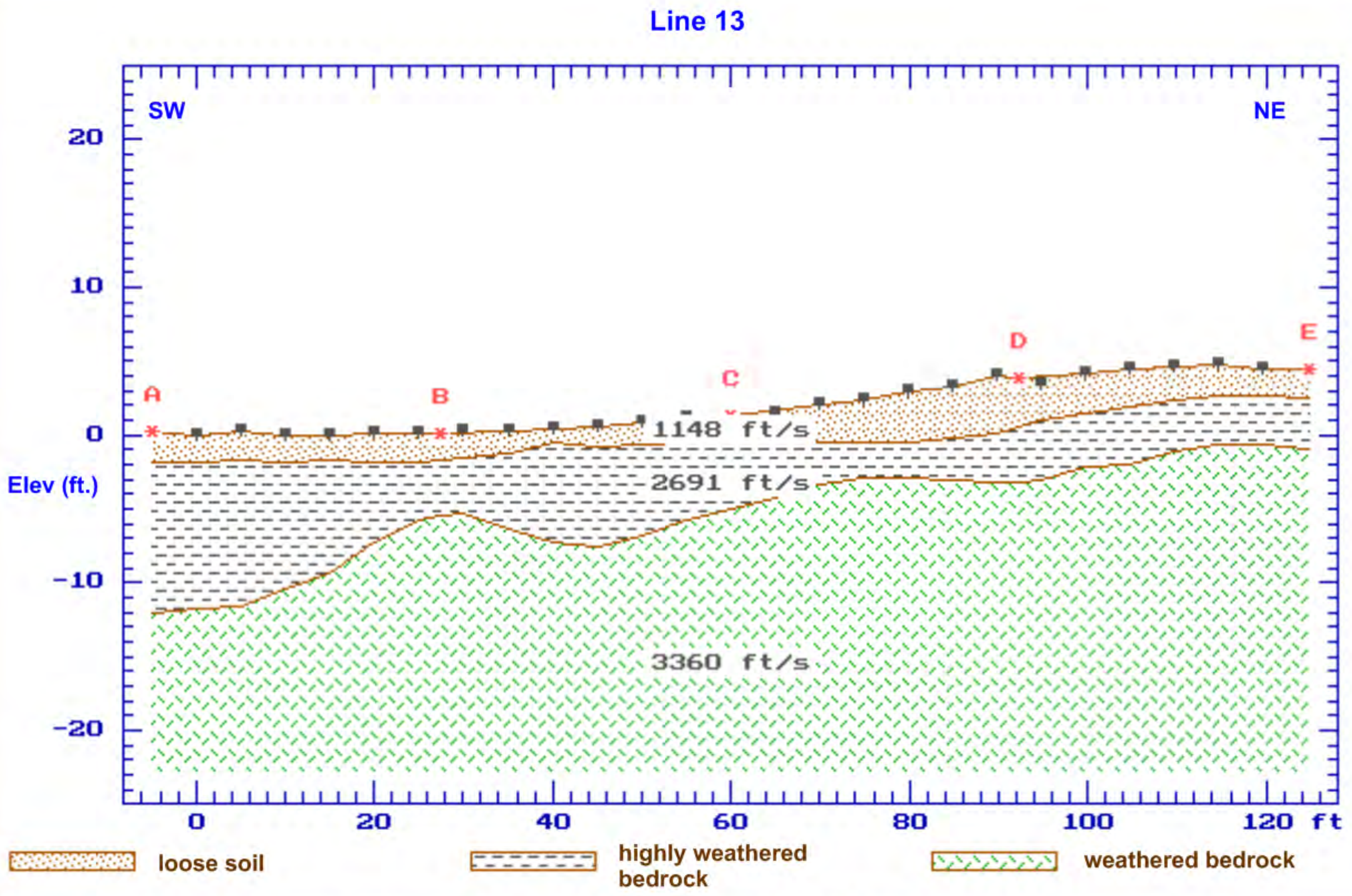

Seismic Tomography Model -- Line 11
SW
NE
Depth (feet)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
5900.
5550.
5200.
4850.
4500.
4150.
3800.
3450.
3100.
2750.
2400.
2050.
1700.
1350.
1000.

Figure 15-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 16



Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 17

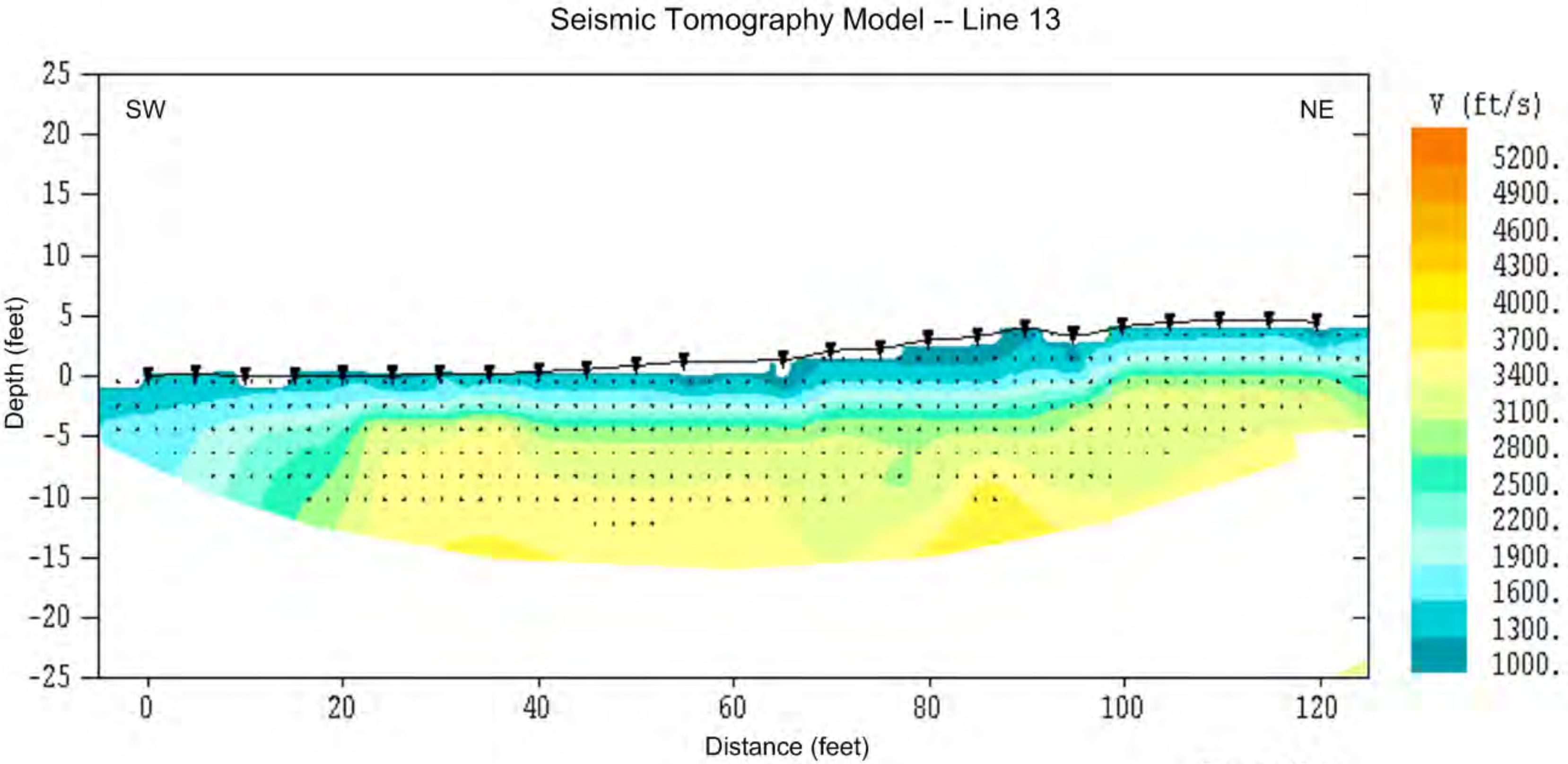

Seismic Tomography Model -- Line 13
SW
NE
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
Distance (feet)
V (ft/s)
5200.
4900.
4600.
4300.
4000.
3700.
3400.
3100.
2800.
2500.
2200.
1900.
1600.
1300.
1000.

Figure 17-1

APPENDIX D

RESULTS OF LABORATORY TESTING BY GEOTEK

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance with the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of trenches and borings in Appendix B.

Moisture-Density Relationship

Laboratory testing was performed on one sample obtained during the subsurface exploration. The laboratory maximum dry density and optimum moisture content was determined in general accordance with ASTM D 1557. The results of the testing are provided herein.

Expansion Index

Expansion Index testing was performed on one representative soil sample. Testing was performed in general accordance with ASTM Test Method D 4829. The results of the testing are provided herein.

Hydro-Collapse

Selected soil samples were tested in order to evaluate their potential for hydro-collapse. Testing was performed in general accordance with ASTM Test Method D 4546. The results of the testing are provided herein

GEOTEK

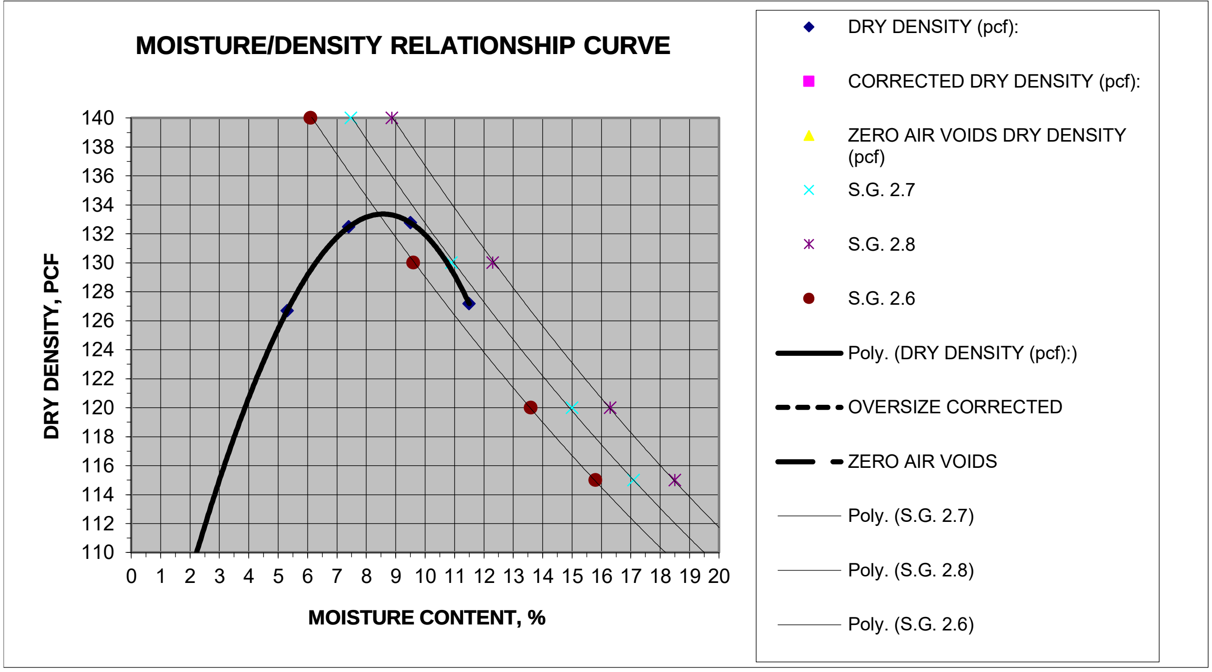
MOISTURE/DENSITY RELATIONSHIP

Client: D R Horton
Project: Darwin 72
Location: Moreno Valley
Material Type: Brown Silty F - C Sand
Material Supplier: -
Material Source: -
Sample Location: B-2 @ 1 - 5 ft
-
Sampled By: DRW
Received By: DLI
Tested By: DLI
Reviewed By: -

Job No.: 2437-CR
Lab No.: Corona

Date Sampled: 7/17/2020
Date Received: 7/20/2020
Date Tested: 7/26/2020
Date Reviewed: -

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 8.0 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	133.5	**@ Optimum Moisture, %**	8.5
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:
AASHTO Soils Classification:

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client: D R Horton
Project Number: 2437-CR
Project Location: Darwin 72, Moreno Valley

Tested/ Checked By: DA Lab No Corona
Date Tested: 7/30/2020
Sample Source: B-2 @ 1 - 5 ft
Sample Description:

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	774.5
B	Weight of ring (gm)	364.3
C	Net weight of sample (gm)	**410.2**
D	Wet Density, lb / ft3 (C*0.3016)	**123.7**
E	Dry Density, lb / ft3 (D/1.F)	**114.0**

SATURATION DETERMINATION

F	Moisture Content, %	8.5
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**48.1**

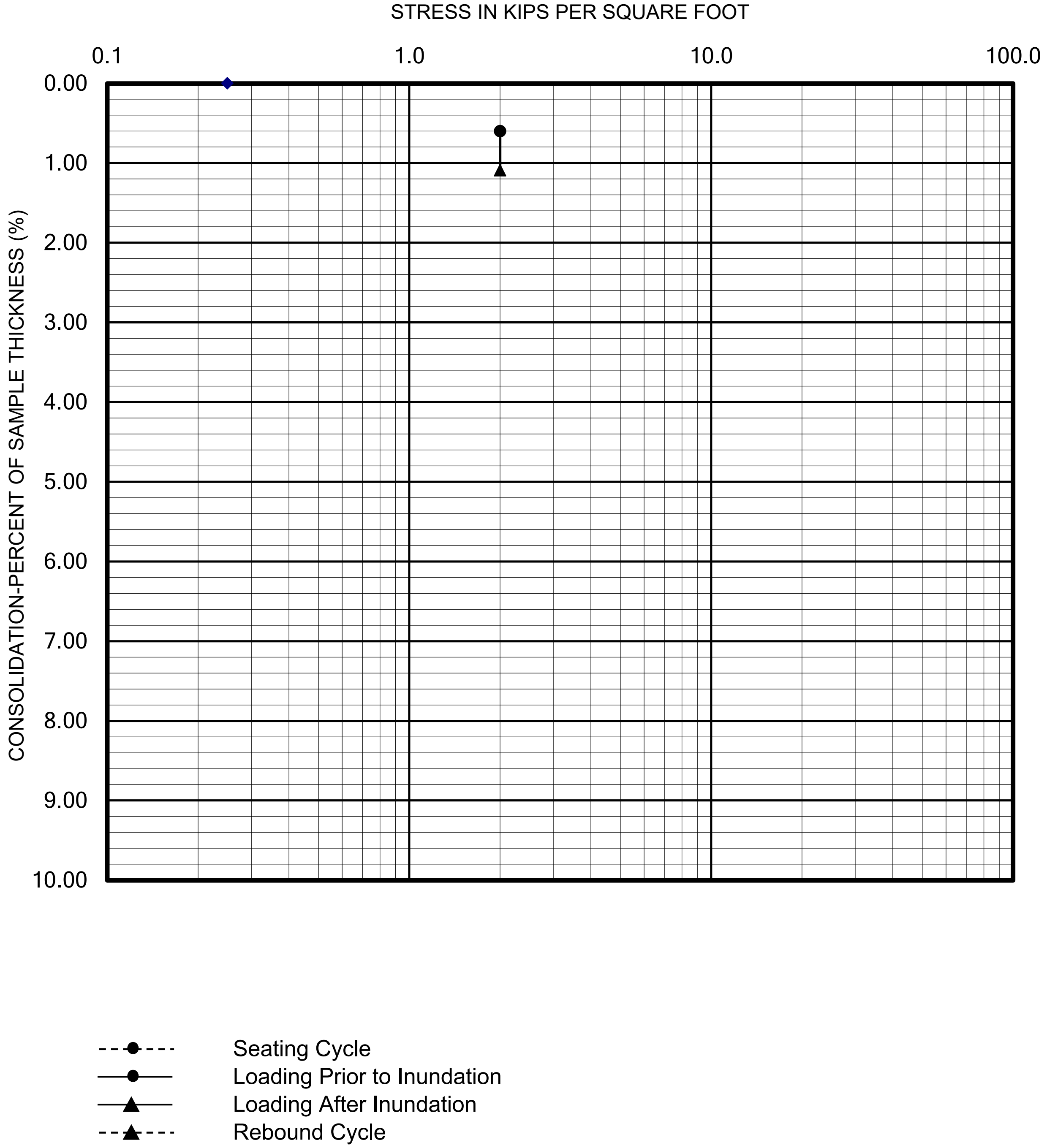
READINGS

DATE	TIME	READING	
7/30/2020	10:07	0.4360	Initial
	10:17	0.4360	10 min/Dry
7/31/2020	10:17	0.4440	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
802.3	**15.3**

EXPANSION INDEX = 8



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

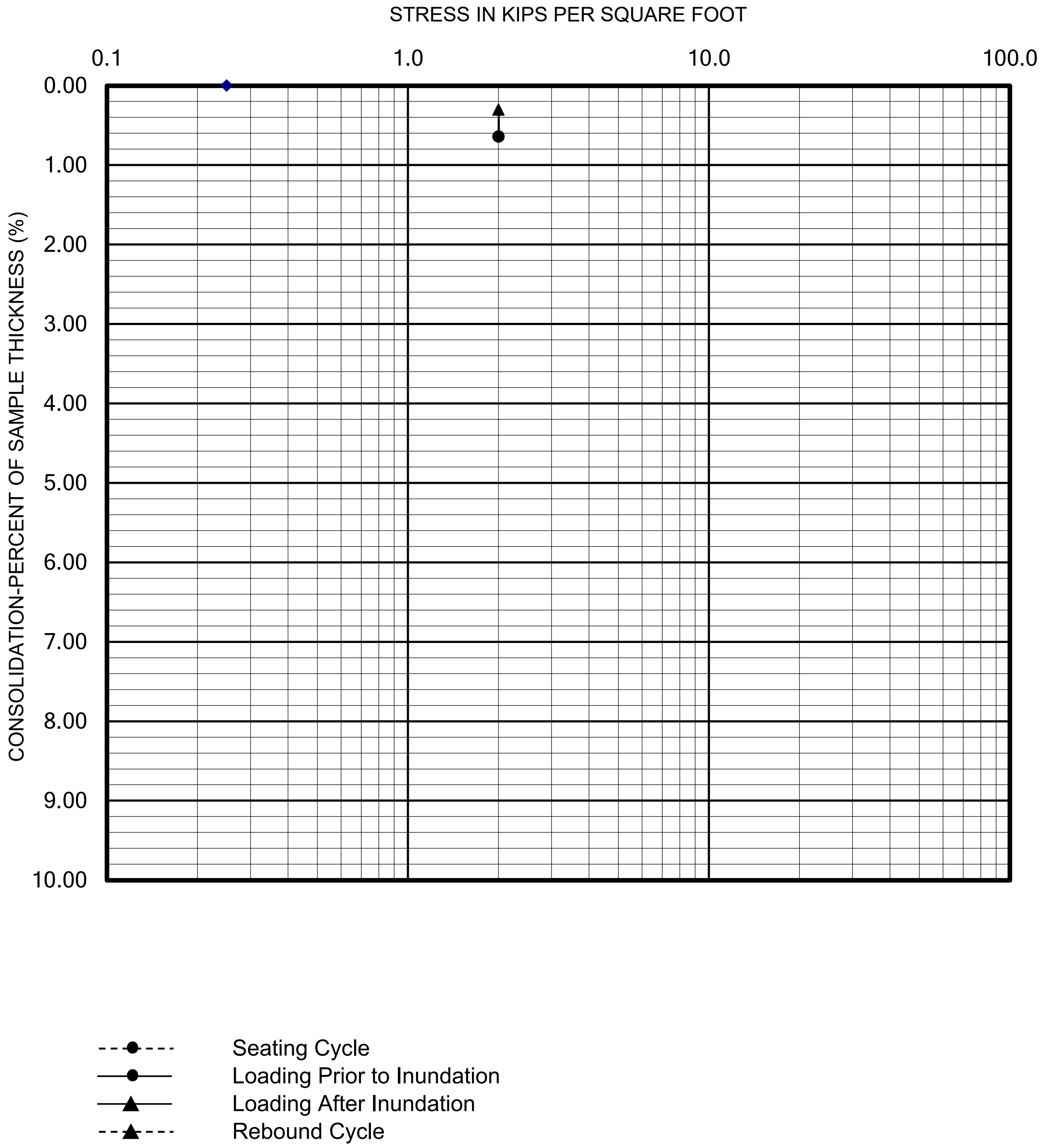
COLLAPSE REPORT

Sample:

B-1 @ 2 ft

CHECKED BY:	Lab: DI
PROJECT NO.: 2437-CR	Date:

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

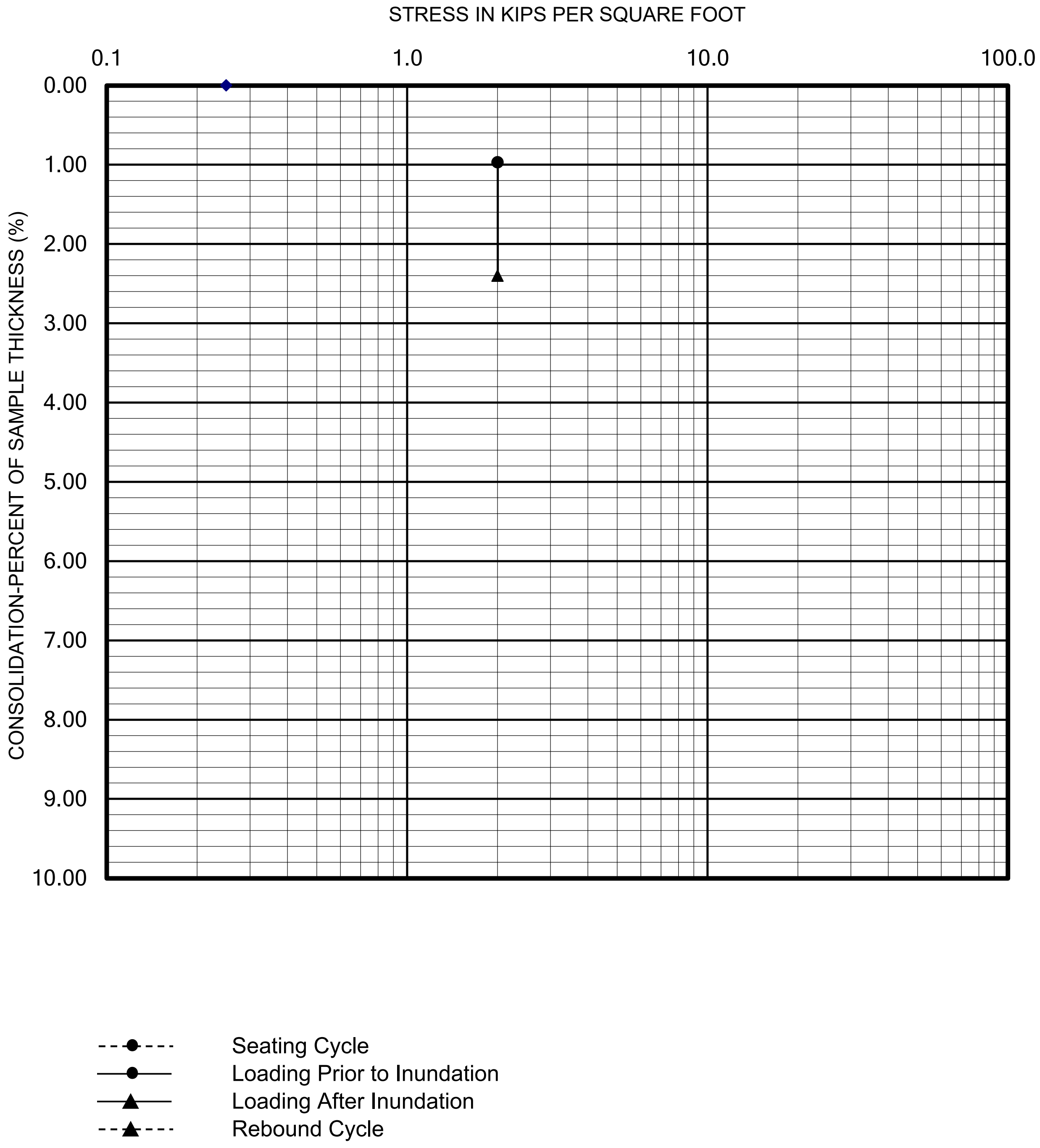
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2437-CR	Date:

COLLAPSE REPORT

Sample:

B-1 @ 5 ft



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

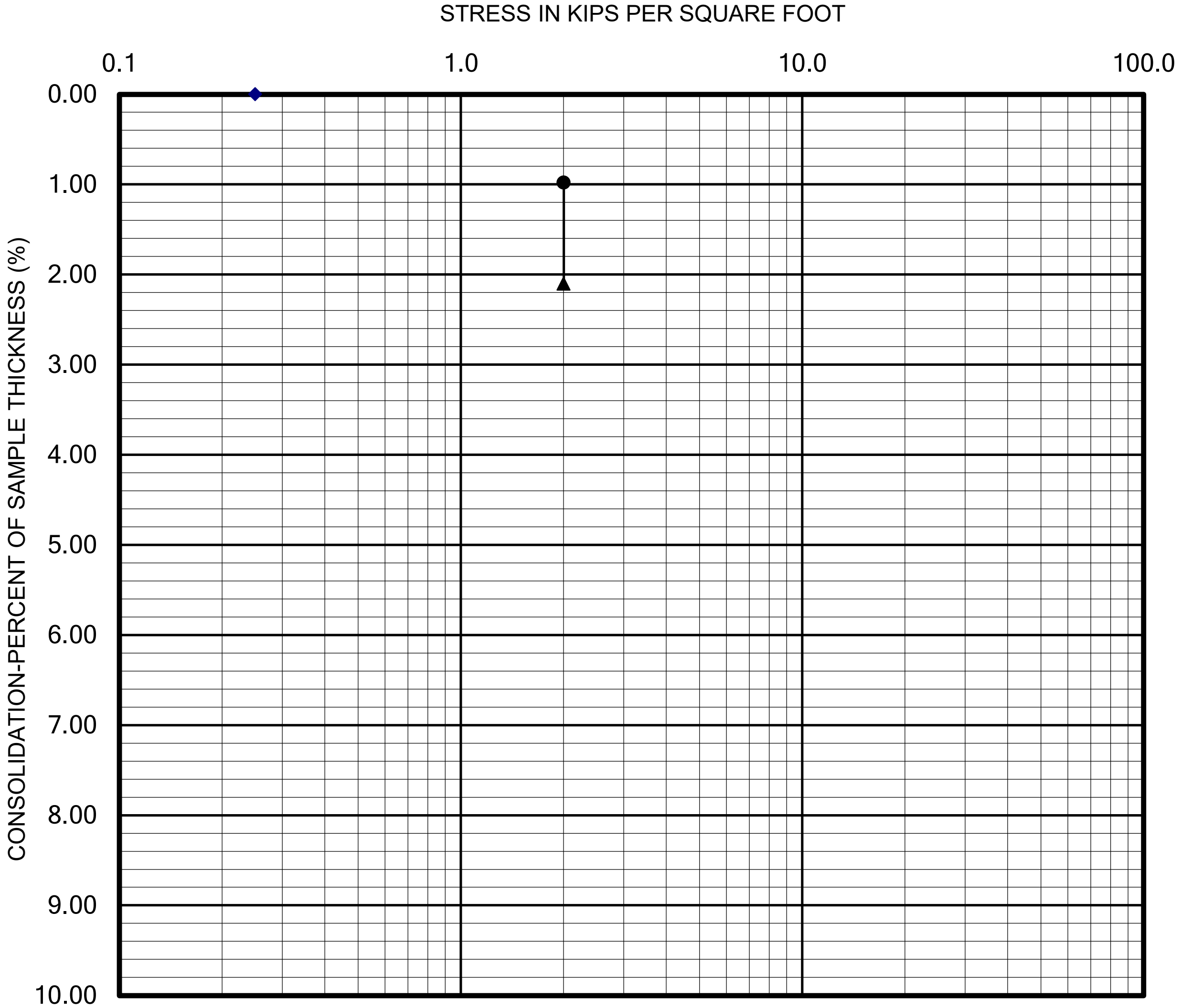
GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2437-CR	Date:

COLLAPSE REPORT

Sample:

B-2 @ 3 ft



- - -●- - - Seating Cycle
—●— Loading Prior to Inundation
—▲— Loading After Inundation
- - -▲- - - Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample:

B-2 @ 6 ft

CHECKED BY:	Lab: DI
PROJECT NO.: 2437-CR	Date:

APPENDIX E

SOIL CORROSIVITY STUDY

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

August 14, 2020 via email: gbogdanoff@geotekusa.com

GEOTEK, INC.
1548 N. Maple St.
Corona, CA 92880

Attention: Gaby Bogdanoff

Re: Soil Corrosivity Study
Single-Family Residential Tract
Development Project
Moreno Valley, CA
HDR #20-0485SCS, GI #2437-CR

Introduction

Laboratory tests have been completed for the Single-Family Residential Tract Development Project. Laboratory tests have been completed on 12 soil samples provided to HDR for the referenced project. The purpose of these tests was to determine if the soils might have deleterious effects on underground utility piping and concrete structures. HDR Engineering, Inc. (HDR) assumes that the samples provided are representative of the most corrosive soils at the site.

The proposed structures have one to two stories and no subterranean levels. The site is located northeast of Alessandro Boulevards and Lasselle Street intersection in Moreno Valley, California, and the water table is reportedly greater than 100 feet deep.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. HDR's recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, HDR will be happy to work with them as a separate phase of this project.

Laboratory Soil Corrosivity Tests

The electrical resistivity of each sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated samples was measured per ASTM G51. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327, ASTM D6919, and Standard Method 2320-B[1]. Total acidity was performed on sample #7 per NBS Circular 579. Laboratory test results are shown in the attached Table 1.

Soil Corrosivity

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:[2]

Soil Resistivity in ohm-centimeters	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,001 to 10,000	Moderately Corrosive
1,001 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

---

[1] *American Public Health Association (APHA). 2012. Standard Methods of Water and Wastewater. 22nd ed. American Public Health Association, American Water Works Association, Water Environment Federation publication. APHA, Washington D.C.*

[2] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.*

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

Electrical resistivities were in the mildly corrosive categories with as-received moisture. When saturated, the resistivities were in the moderately corrosive categories. The resistivities dropped considerably with added moisture because the samples were dry as-received.

Soil pH values varied from 5.4 to 6.7. This range is strongly acidic to neutral.[3] Total acidity was performed on sample #7. The results, less than 250 mmol H^{1+}/kg, is not high enough to warrant concern of acid attack to concrete. Soil with a pH less than 5.5 is considered aggressive to copper.

The soluble salt content of the samples was low. Chloride and sulfate were found at low concentrations.

Ammonium was not detected in any sample except sample #5 where it was detected in low concentration. The nitrate concentration was high enough to be aggressive to copper in samples #2 and #12.

Tests were not made for sulfide and oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

This soil is classified as moderately corrosive to ferrous metals and aggressive to copper.

Corrosion Control Recommendations

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

The following recommendations are based on the soil conditions discussed in the Soil Corrosivity section above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

---

[3] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.*

Steel Pipe

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and the possible future application of cathodic protection.

2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:

   a. At each end of the pipeline.

   b. At each end of all casings.

   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

3. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically isolate each buried steel pipeline per NACE SP0286 from:

   a. Dissimilar metals.

   b. Dissimilarly coated piping (cement-mortar vs. dielectric).

   c. Above ground steel pipe.

   d. All existing piping.

   Insulated joints should be placed above grade or in vaults where possible. Wrap all buried insulators with wax tape per AWWA C217.

4. Choose one of the following corrosion control options:

   OPTION 1

   a. Apply a suitable dielectric coating intended for underground use such as:

      i. Polyurethane per AWWA C222 *or*

      ii. Extruded polyethylene per AWWA C215 *or*

    iii. A tape coating system per AWWA C214 *or*
    iv. Hot applied coal tar enamel per AWWA C203 *or*
    v. Fusion bonded epoxy per AWWA C213.

  b. Although it is customary to cathodically protect bonded dielectrically coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

OPTION 2

As an alternative to dielectric coating and possible future cathodic protection, apply a ¾-inch cement mortar coating per AWWA C205 or encase in concrete three inches thick, using any type of ASTM C150 cement. Joint bonds, test stations, and insulated joints are still recommended for this alternative.

NOTE: Some steel piping systems, such as for oil, gas, and high-pressure piping systems, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Ductile Iron Pipe

1. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE SP0286.
2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and possible future application of cathodic protection.
3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:
    a. At each end of the pipeline.
    b. At each end of any casings.

c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

4. Choose one of the following corrosion control options:

OPTION 1

a. Apply a suitable coating intended for underground use such as:

   i. Polyethylene encasement per AWWA C105; *or*

   ii. Epoxy coating; *or*

   iii. Polyurethane; *or*

   iv. Wax tape.

   NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.

b. Although it is customary to cathodically protect coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

OPTION 2

As an alternative to the coating systems described in Option 1 and possible future cathodic protection, concrete encase all buried portions of metallic piping so that there is a minimum of three inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of ASTM C150 cement.

NOTE: Some iron piping systems, such as for fire water piping, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Cast Iron Soil Pipe

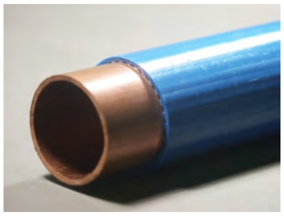
1. Protect cast iron soil pipe with either a double wrap 4-mil or single wrap 8-mil polyethylene encasement per AWWA C105.
2. It is not necessary to bond the pipe joints or apply cathodic protection.
3. Provide six inches of clean sand backfill all around the pipe.

Clean Sand Backfill

1. Clean sand backfill must have the following parameters:
    a. Minimum saturated resistivity of no less than 3,000 ohm-cm; *and*
    b. pH between 6.0 and 8.0.
2. All backfill testing should be performed by a corrosion engineering laboratory.

Copper Tubing

1. Electrically insulate underground copper pipe from dissimilar metals and from above ground copper pipe with insulating devices per NACE SP0286.
2. Electrically insulate cold water piping from hot water piping systems.
3. Protect buried copper tubing by one of the following measures:
    a. Prevention of soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing using PVC pipe with solvent-welded joints.
    b. Installation of a factory-coated copper pipe with a minimum 25-mil thickness such as Kamco's Aqua Shield™, Mueller's Streamline Protec™, or equal. The coating must be continuous with no cuts or defects.



    c. Installation of 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over a suitable primer. Protect wrapped copper tubing by applying cathodic protection per NACE SP0169.

Plastic and Vitrified Clay Pipe

1. No special corrosion control measures are required for plastic and vitrified clay piping placed underground.
2. Protect all metallic fittings and valves with wax tape per AWWA C217, or with epoxy and appropriately sized cathodic protection per NACE SP0169.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.
2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete Structures and Pipe

1. From a corrosion standpoint, any type of ASTM C150 cement may be used for concrete structures and pipe because the sulfate concentration is negligible, from 0 to 0.10 percent.[4,5,6]
2. Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils due to the low chloride concentrations[7] found onsite. Limit the water-soluble chloride ion content in the concrete mix design to less than 0.3 percent by weight of cement.

---

[4] *2015 International Building Code (IBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[5] *2015 International Residential Code (IRC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[6] *2016 California Building Code (CBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[7] *Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65*

Closure

The analysis and recommendations presented in this report are based upon data obtained from the laboratory samples. This report does not reflect variations that may occur across the site or due to the modifying effects of construction. If variations appear, HDR should be notified immediately so that further evaluation and supplemental recommendations can be provided.

HDR's services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
HDR Engineering, Inc.

REGISTERED PROFESSIONAL ENGINEER
MARC E. N. WEGNER
No. C73862
Exp. 06/30/21
CIVIL
STATE OF CALIFORNIA

Steven Pierce

Steven Pierce
Corrosion EIT

Marc E N Wegner, PE
Sr Corrosion Project Manager

Enc: Table 1

SCS Template

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single-Family Residential Tract Development Project
Your #2437-CR, HDR Lab #20-0485SCS
9-Aug-20

Sample ID			#1 (Lots 1-7, 5) @ 1'	#2 (Lots 8-14, 11) @ 1.5'	#3 (Lots 15-22, 18) @ 1'	#4 (Lots 23-30, 25) @ 2'	#5 (Lots 31-38, 31) @ 1.5'
Resistivity		**Units**					
as-received		ohm-cm	720,000	1,200,000	216,000	280,000	1,080,000
saturated		ohm-cm	8,000	6,000	8,400	10,000	8,800
pH			6.7	6.7	6.1	6.5	5.7
Electrical Conductivity		mS/cm	0.08	0.09	0.05	0.06	0.07
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	39	48	32	30	42
magnesium	Mg^{2+}	mg/kg	11	9.9	10	7.7	9.1
sodium	Na^{1+}	mg/kg	12	14	18	10	10
potassium	K^{1+}	mg/kg	31	22	8.1	18	18
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	165	146	165	125	140
fluoride	F^{1-}	mg/kg	10	12	13	9.3	12
chloride	Cl^{1-}	mg/kg	6.4	6.7	3.4	4.9	3.5
sulfate	SO_4^{2-}	mg/kg	17	19	12	13	16
phosphate	PO_4^{3-}	mg/kg	12	6.6	ND	14	32
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	ND	ND	1.0
nitrate	NO_3^{1-}	mg/kg	19	55	13	15	36
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single-Family Residential Tract Development Project
Your #2437-CR, HDR Lab #20-0485SCS
9-Aug-20

Sample ID			#6 (Lots 39-49, 40) @ 1.5'	#7 (Lots 50-58, 55) @ 1'	#8 (Lots 59-67, 66) @ 1'	#9 (Lots 68-76, 74) @ 1'	#10 (Lots 77-86, 86) @ 1'
Resistivity		**Units**					
as-received		ohm-cm	56,000	38,800	308,000	152,000	29,200
saturated		ohm-cm	6,400	5,600	13,200	10,000	6,400
pH			6.7	5.4	5.6	5.7	6.0
Electrical Conductivity		mS/cm	0.05	0.08	0.06	0.06	0.07
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	33	27	19	20	41
magnesium	Mg^{2+}	mg/kg	8.0	7.8	6.5	6.3	10
sodium	Na^{1+}	mg/kg	21	11	12	9.0	11
potassium	K^{1+}	mg/kg	11	60	21	31	18
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	134	159	110	156	125
fluoride	F^{1-}	mg/kg	4.6	4.6	5.4	4.6	7.9
chloride	Cl^{1-}	mg/kg	4.5	6.3	4.2	5.0	5.1
sulfate	SO_4^{2-}	mg/kg	13	17	13	13	16
phosphate	PO_4^{3-}	mg/kg	6.4	18	9.8	13	7.9
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	ND	ND	ND
nitrate	NO_3^{1-}	mg/kg	18	44	16	22	28
total acidity	H^{1+}	mmol/kg	na	32	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single-Family Residential Tract Development Project
Your #2437-CR, HDR Lab #20-0485SCS
9-Aug-20

Sample ID			#11 (Lots 87-96, 89) @ 1.5'	#12 (Lots 97-106, 99) @ 1.5'
Resistivity		**Units**		
as-received		ohm-cm	23,600	204,000
saturated		ohm-cm	8,400	3,920
pH			5.9	6.0
Electrical Conductivity		mS/cm	0.05	0.12
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	28	55
magnesium	Mg^{2+}	mg/kg	7.4	14
sodium	Na^{1+}	mg/kg	8.4	30
potassium	K^{1+}	mg/kg	23	25
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	134	143
fluoride	F^{1-}	mg/kg	4.5	3.8
chloride	Cl^{1-}	mg/kg	3.7	13
sulfate	SO_4^{2-}	mg/kg	10	26
phosphate	PO_4^{3-}	mg/kg	12	30
Other Tests				
ammonium	NH_4^{1+}	mg/kg	ND	ND
nitrate	NO_3^{1-}	mg/kg	27	120
sulfide	S^{2-}	qual	na	na
Redox		mV	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

APPENDIX F

GENERAL GRADING GUIDELINES

Updated Geotechnical Evaluation
Darwin Site, Moreno Valley, Riverside County, California
Project No. 2437-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor’s overall level of efforts during grading. The contractor’s personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor’s responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will

be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.

7. Procedures for testing of fill slopes are as follows:
   a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
   b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative. Typical procedures are similar to those indicated on Plate F-4.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed (see Plates F-1, F-2 and F-3) unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Subdrainage

1. Subdrainage systems should be provided in canyon bottoms prior to placing fill, and behind buttress and stabilization fills and in other areas indicated in the report. Subdrains should conform to schematic diagrams F-1 and F-5, and be acceptable to our representative.

2. For canyon subdrains, runs less than 500 feet may use six-inch pipe. Typically, runs in excess of 500 feet should have the lower end as eight-inch minimum.
3. Filter material should be clean, 1/2 to 1-inch gravel wrapped in a suitable filter fabric. Class 2 permeable filter material per California Department of Transportation Standards tested by this office to verify its suitability, may be used without filter fabric. A sample of the material should be provided to the Soils Engineer by the contractor at least two working days before it is delivered to the site. The filter should be clean with a wide range of sizes.
4. Approximate delineation of anticipated subdrain locations may be offered at 40-scale plan review stage. During grading, this office would evaluate the necessity of placing additional drains.
5. All subdrainage systems should be observed by our representative during construction and prior to covering with compacted fill.
6. Subdrains should outlet into storm drains where possible. Outlets should be located and protected. The need for backflow preventers should be assessed during construction.
7. Consideration should be given to having subdrains located by the project surveyors.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal (see Plate G-4). On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

Keyways, Buttress and Stabilization Fills

Keyways are needed to provide support for fill slope and various corrective procedures.

1. Side-hill fills should have an equipment-width key at their toe excavated through all surficial soil and into competent material and tilted back into the hill (Plates F-2, F-3). As the fill is elevated, it should be benched through surficial soil and slopewash, and into competent bedrock or other material deemed suitable by our representatives (See Plates F-1, F-2, and F-3).
2. Fill over cut slopes should be constructed in the following manner:
    a) All surficial soils and weathered rock materials should be removed at the cut-fill interface.
    b) A key at least one and one-half (1.5) equipment width wide (or as needed for compaction), and tipped at least one (1) foot into slope, should be excavated into competent materials and observed by our representative.
    c) The cut portion of the slope should be excavated prior to fill placement to evaluate if stabilization is necessary. The contractor should be responsible for any additional earthwork created by placing fill prior to cut excavation. (see Plate F-3 for schematic details.)
3. Daylight cut lots above descending natural slopes may require removal and replacement of the outer portion of the lot. A schematic diagram for this condition is presented on Plate F-2.
4. A basal key is needed for fill slopes extending over natural slopes. A schematic diagram for this condition is presented on Plate F-2.
5. All fill slopes should be provided with a key unless within the body of a larger overall fill mass. Please refer to Plate F-3 for specific guidelines.

Anticipated buttress and stabilization fills are discussed in the text of the report. The need to stabilize other proposed cut slopes will be evaluated during construction. Plate F-5 shows a schematic of buttress construction.

1. All backcuts should be excavated at gradients of 1:1 or flatter. The backcut configuration should be determined based on the design, exposed conditions, and need to maintain a minimum fill width and provide working room for the equipment.

2. On longer slopes, backcuts and keyways should be excavated in maximum 250 feet long segments. The specific configurations will be determined during construction.
3. All keys should be a minimum of two (2) feet deep at the toe and slope toward the heel at least one foot or two (2%) percent, whichever is greater.
4. Subdrains are to be placed for all stabilization slopes exceeding 10 feet in height. Lower slopes are subject to review. Drains may be required. Guidelines for subdrains are presented on Plate F-5.
5. Benching of backcuts during fill placement is required.

Lot Capping

1. When practical, the upper three (3) feet of material placed below finish grade should be comprised of the least expansive material available. Preferably, highly and very highly expansive materials should not be used. We will attempt to offer advice based on visual evaluations of the materials during grading, but it must be realized that laboratory testing is needed to evaluate the expansive potential of soil. Minimally, this testing takes two (2) to four (4) days to complete.
2. Transition lots (cut and fill) both per plan and those created by remedial grading (e.g. lots above stabilization fills, along daylight lines, above natural slopes, etc.) should be capped with a minimum three foot thick compacted fill blanket.
3. Cut pads should be observed by our representative(s) to evaluate the need for overexcavation and replacement with fill. This may be necessary to reduce water infiltration into highly fractured bedrock or other permeable zones, and/or due to differing expansive potential of materials beneath a structure. The overexcavation should be at least three feet. Deeper overexcavation may be recommended in some cases.

ROCK PLACEMENT AND ROCK FILL GUIDELINES

It is anticipated that large quantities of oversize material would be generated during grading. It's likely that such materials may require special handling for burial. Although alternatives may be developed in the field, the following methods of rock disposal are recommended on a preliminary basis.

Limited Larger Rock

When materials encountered are principally soil with limited quantities of larger rock fragments or boulders, placement in windrows is recommended. The following procedures should be applied:

1. Oversize rock (greater than 8 inches) should be placed in windrows.
    a) Windrows are rows of single file rocks placed to avoid nesting or clusters of rock.
    b) Each adjacent rock should be approximately the same size (within ~one foot in diameter).
    c) The maximum rock size allowed in windrows is four feet
2. A minimum vertical distance of three feet between lifts should be maintained. Also, the windrows should be offset from lift to lift. Rock windrows should not be closer than 15 feet to the face of fill slopes and sufficient space must be maintained for proper slope construction (see Plate F-4).
3. Rocks greater than eight inches in diameter should not be placed within seven feet of the finished subgrade for a roadway or pads and should be held below the depth of the lowest utility. This will allow easier trenching for utility lines.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

4. Rocks greater than four feet in diameter should be broken down, if possible, or they may be placed in a dozer trench. Each trench should be excavated into the compacted fill a minimum of one foot deeper than the largest diameter of rock.
    a) The rock should be placed in the trench and granular fill materials (SE>30) should be flooded into the trench to fill voids around the rock.
    b) The over size rock trenches should be no closer together than 15 feet from any slope face.
    c) Trenches at higher elevation should be staggered and there should be a minimum of four feet of compacted fill between the top of the one trench and the bottom of the next higher trench.
    d) It would be necessary to verify 90 percent relative compaction in these pits. A 24 to 72 hour delay to allow for water dissipation should be anticipated prior to additional fill placement.

Structural Rock Fills

If the materials generated for placement in structural fills contains a significant percentage of material more than six (6) inches in one dimension, then placement using conventional soil fill methods with isolated windrows would not be feasible. In such cases the following could be considered:

1. Mixes of large rock or boulders may be placed as rock fill. They should be below the depth of all utilities both on pads and in roadways and below any proposed swimming pools or other excavations. If these fills are placed within seven (7) feet of finished grade, they may affect foundation design.
2. Rock fills are required to be placed in horizontal layers that should **not exceed two feet in thickness, or the maximum rock size present, which ever is less**. All rocks exceeding two feet should be broken down to a smaller size, windrowed (see above), or disposed of in non-structural fill areas. Localized larger rock up to 3 feet in largest dimension may be placed in rock fill as follows:
    a) individual rocks are placed in a given lift so as to be roughly 50% exposed above the typical surface of the fill ,
    b) loaded rock trucks or alternate compactors are worked around the rock on all sides to the satisfaction of the soil engineer,
    c) the portion of the rock above grade is covered with a second lift.
3. Material placed in each lift should be well graded. No unfilled spaces (voids) should be permitted in the rock fill.

Compaction Procedures

Compaction of rock fills is largely procedural. The following procedures have been found to generally produce satisfactory compaction.

1. Provisions for routing of construction traffic over the fill should be implemented.
    a) Placement should be by rock trucks crossing the lift being placed and dumping at its edge.
    b) The trucks should be routed so that each pass across the fill is via a different path and that all areas are uniformly traversed.
    c) The dumped piles should be knocked down and spread by a large dozer (D-8 or larger suggested). (Water should be applied before and during spreading.)
2. Rock fill should be generously watered (sluiced)
    a) Water should be applied by water trucks to the:

        - i) dump piles,
        - ii) front face of the lift being placed and,
        - iii) surface of the fill prior to compaction.
    - b) No material should be placed without adequate water.
    - c) The number of water trucks and water supply should be sufficient to provide constant water.
    - d) Rock fill placement should be suspended when water trucks are unavailable:
        - i) for more than 5 minutes straight, or,
        - ii) for more than 10 minutes/hour.

3. In addition to the truck pattern and at the discretion of the soil engineer, large, rubber tired compactors may be required.
    - a) The need for this equipment will depend largely on the ability of the operators to provide complete and uniform coverage by wheel rolling with the trucks.
    - b) Other large compactors will also be considered by the soil engineer provided that required compaction is achieved.

4. Placement and compaction of the rock fill is largely procedural. Observation by trenching should be made to check:
    - a) the general segregation of rock size,
    - b) for any unfilled spaces between the large blocks, and
    - c) the matrix compaction and moisture content.

5. Test fills may be required to evaluate relative compaction of finer grained zones or as deemed appropriate by the soil engineer.
    - a) A lift should be constructed by the methods proposed, as proposed

6. Frequency of the test trenching is to be at the discretion of the soil engineer. Control areas may be used to evaluate the contractor's procedures.

7. A minimum horizontal distance of 15 feet should be maintained from the face of the rock fill and any finish slope face. At least the outer 15 feet should be built of conventional fill materials.

Piping Potential and Filter Blankets

Where conventional fill is placed over rock fill, the potential for piping (migration) of the fine grained material from the conventional fill into rock fills will need to be addressed.

The potential for particle migration is related to the grain size comparisons of the materials present and in contact with each other. Provided that 15 percent of the finer soil is larger than the effective pore size of the coarse soil, then particle migration is substantially mitigated. This can be accomplished with a well-graded matrix material for the rock fill and a zone of fill similar to the matrix above it. The specific gradation of the fill materials placed during grading must be known to evaluate the need for any type of filter that may be necessary to cap the rock fills. This, unfortunately, can only be accurately determined during construction.

In the event that poorly graded matrix is used in the rock fills, properly graded filter blankets 2 to 3 feet thick separating rock fills and conventional fill may be needed. As an alternative, use of two layers of filter fabric (Mirafi 700 x or equivalent) could be employed on top of the rock fill. In order to mitigate excess puncturing, the surface of the rock fill should be well broken down and smoothed prior to placing the filter fabric. The first layer of the fabric may then be placed and covered with relatively permeable fill material (with respect to overlying material) 1 to 2 feet thick. The relative permeable material should be compacted to fill standards. The second layer of fabric should be placed and conventional fill placement continued.

Subdrainage

Rock fill areas should be tied to a subdrainage system. If conventional fill is placed that separates the rock from the main canyon subdrain, then a secondary system should be installed. A system consisting of an adequately graded base (3 to 4 percent to the lower side) with a collector system and outlets may suffice.

Additionally, at approximately every 25 foot vertical interval, a collector system with outlets should be placed at the interface of the rock fill and the conventional fill blanketing a fill slope

Monitoring

Depending upon the depth of the rock fill and other factors, monitoring for settlement of the fill areas may be needed following completion of grading. Typically, if rock fill depths exceed 40 feet, monitoring would be recommend prior to construction of any settlement sensitive improvements. Delays of 3 to 6 months or longer can be expected prior to the start of construction.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractor's responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractor's procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If

zones are found that are considered less compact than other areas, this would be brought to the contractor’s attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

Test Pits Location, Orientation and Clearance

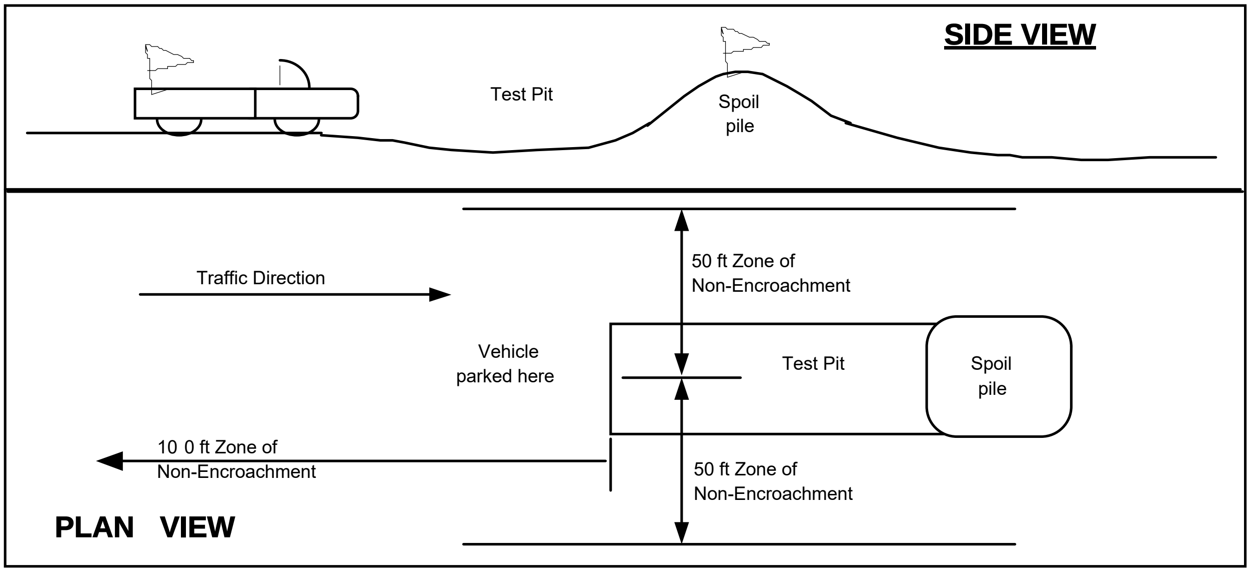
The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;
1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Attachment: Appendix D - Geotechnical Evaluation Darwin Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Procedures

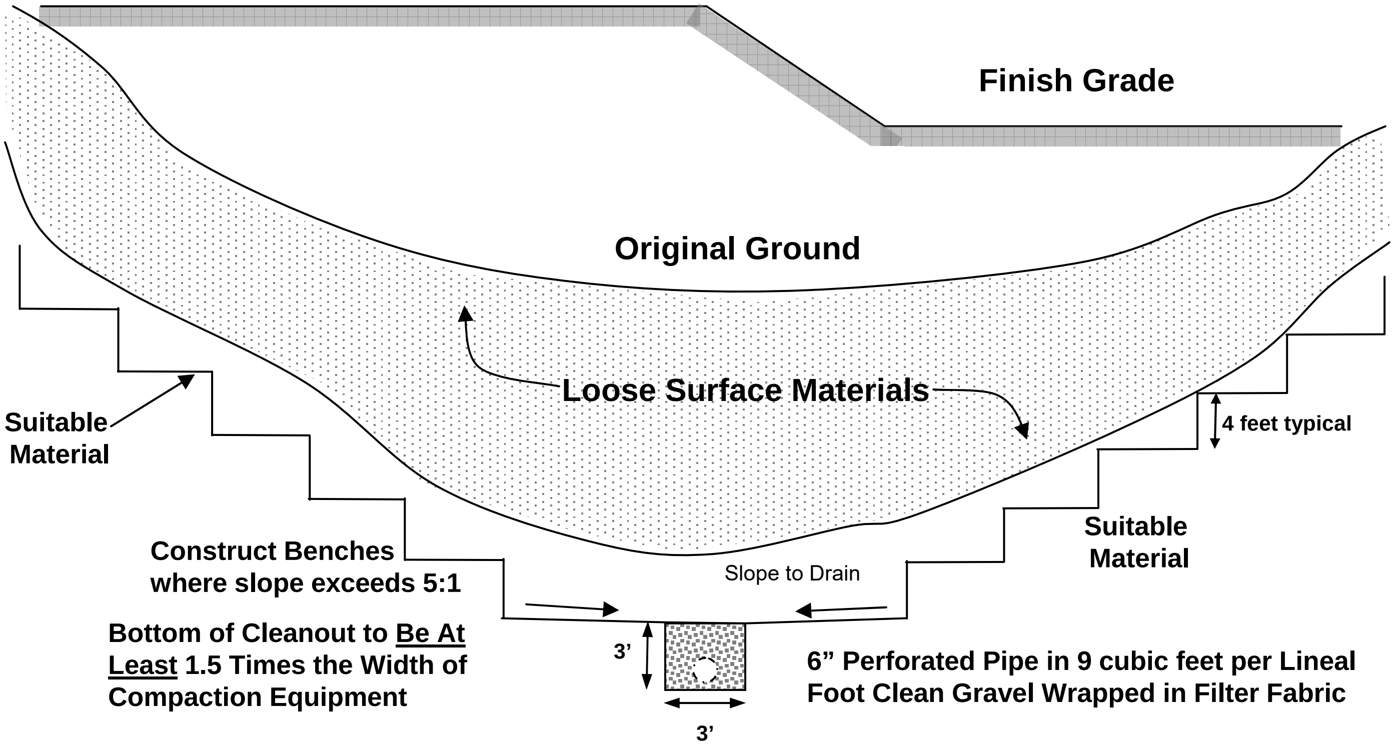
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

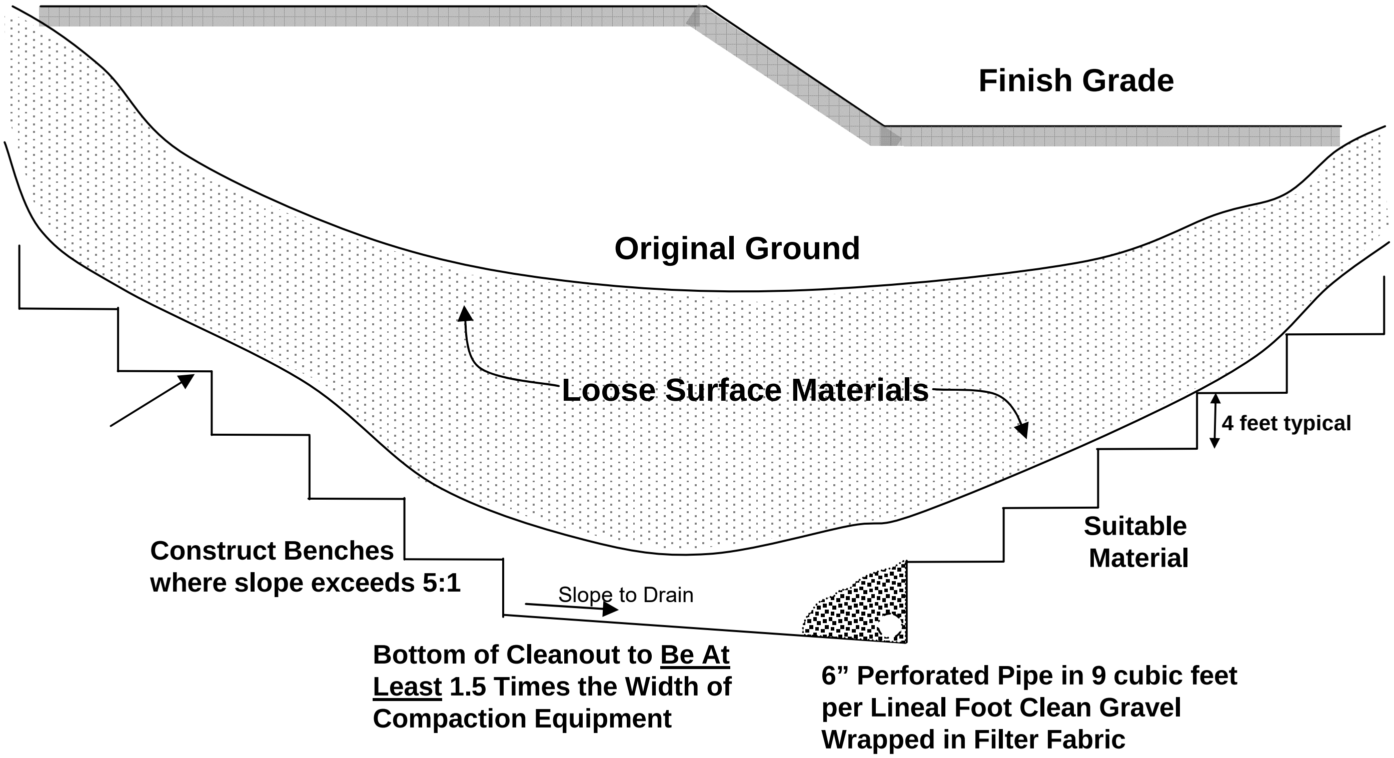
In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technician's attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

ALTERNATES





GEOTEK

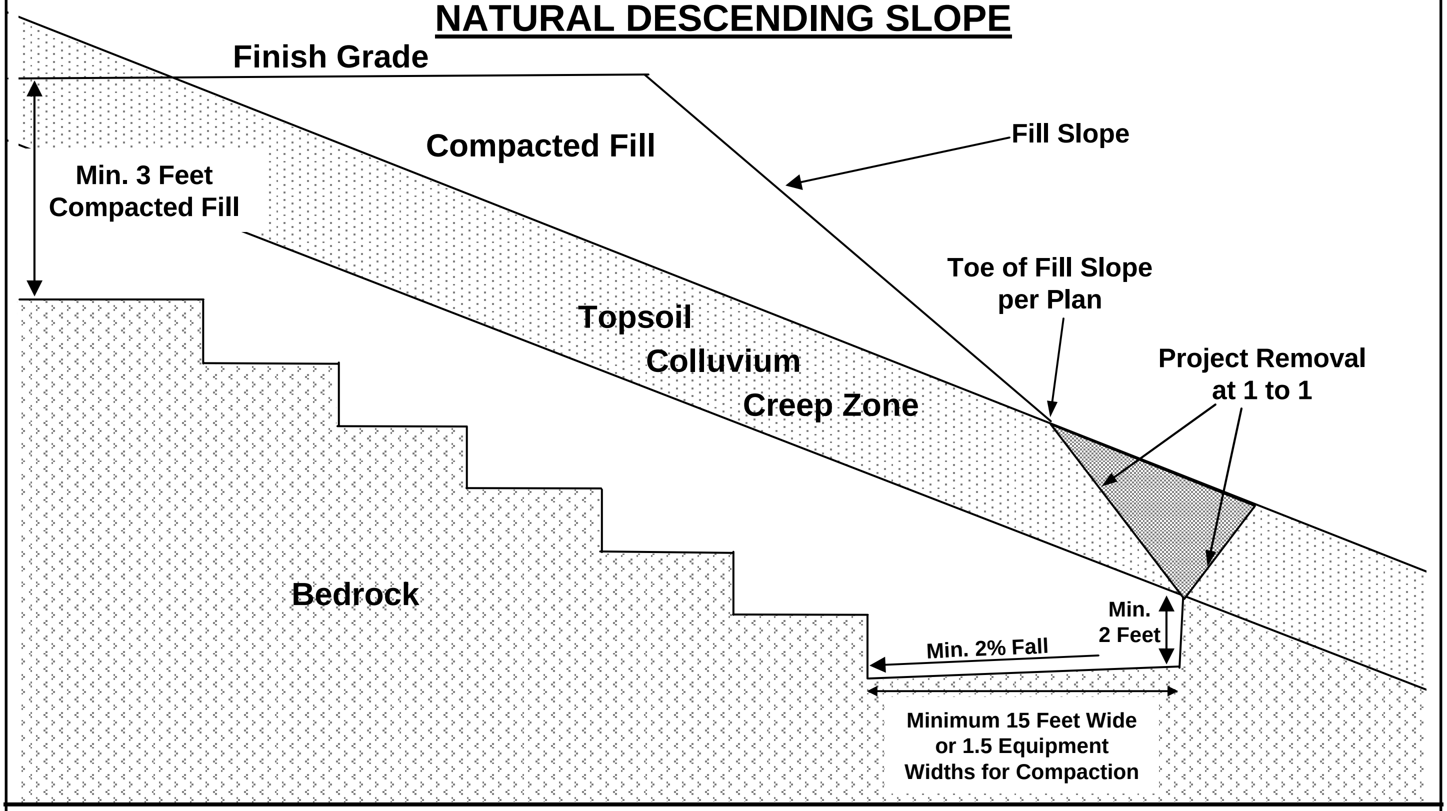
1548 North Maple Street
Corona, California 92880

TYPICAL CANYON CLEANOUT

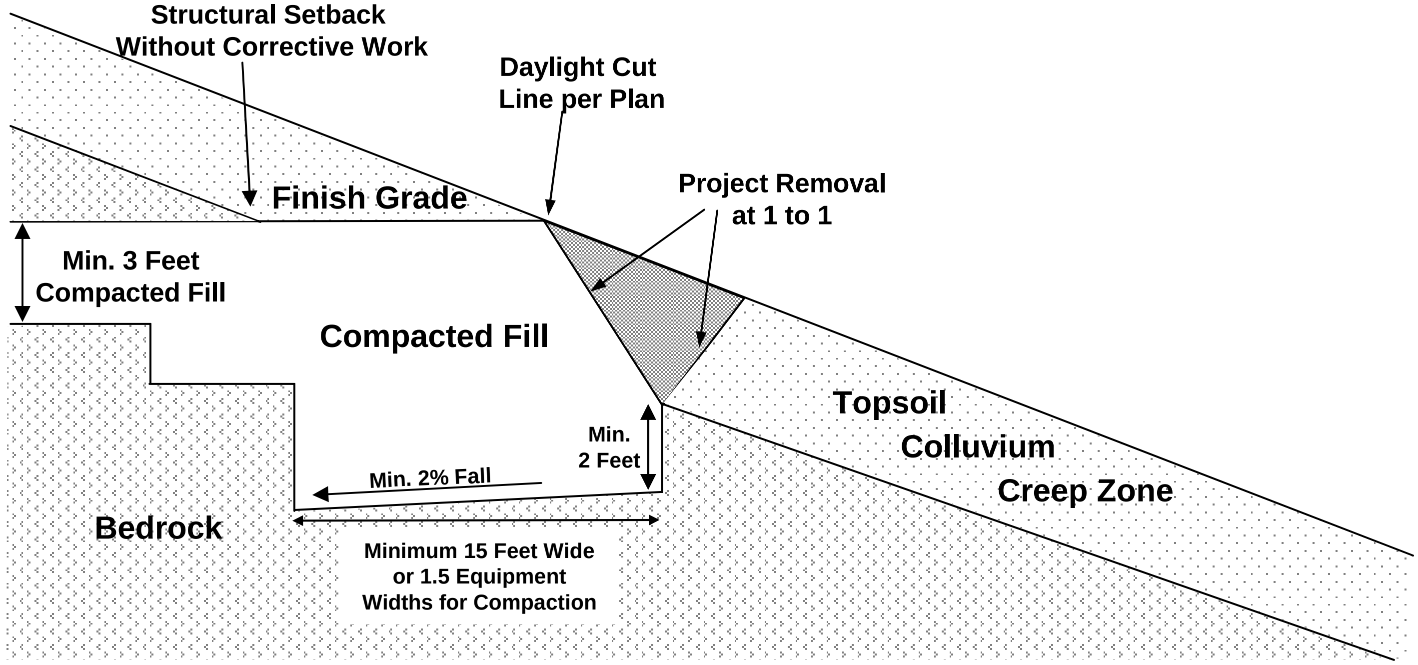
STANDARD GRADING GUIDELINES

PLATE F-1

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



GEOTEK

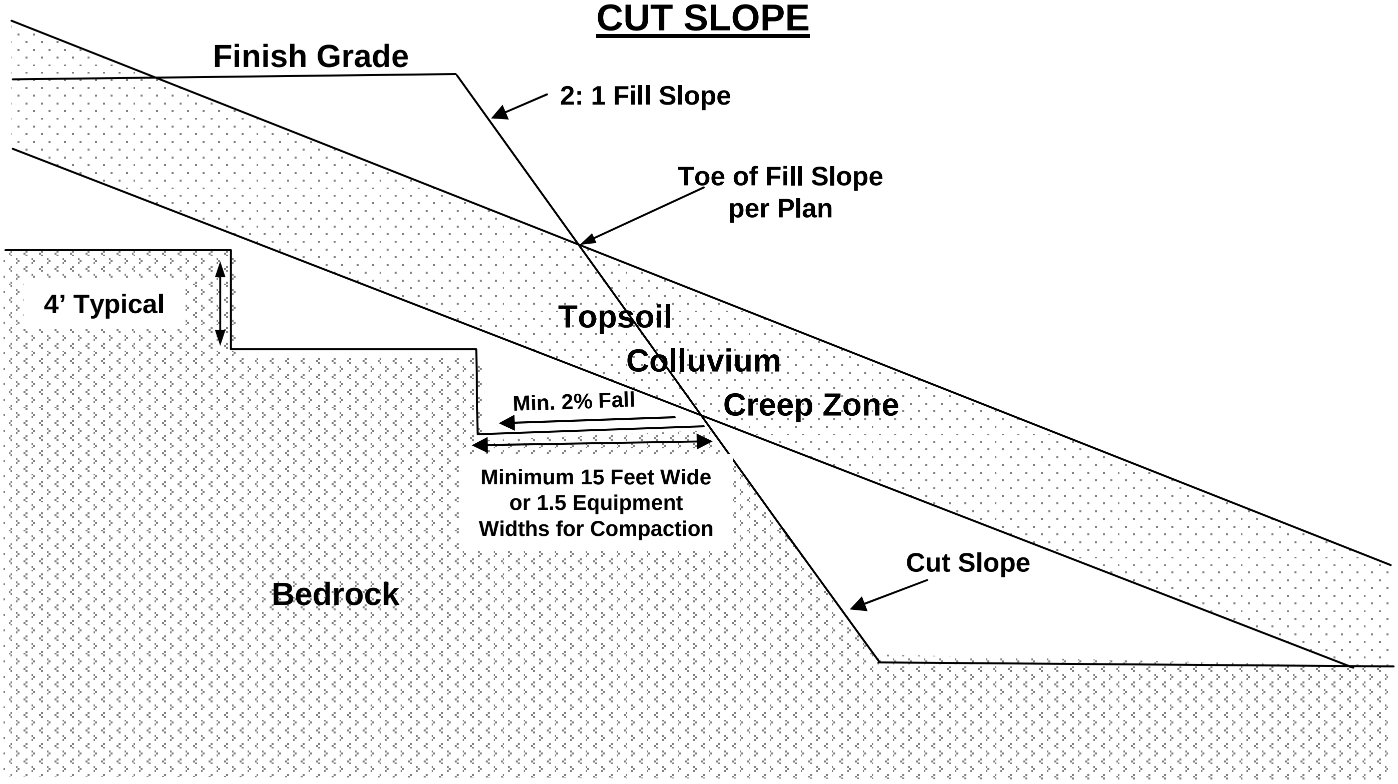
1548 North Maple Street
Corona, California 92880

TREATMENT ABOVE
NATURAL SLOPES

STANDARD GRADING
GUIDELINES

PLATE F-2

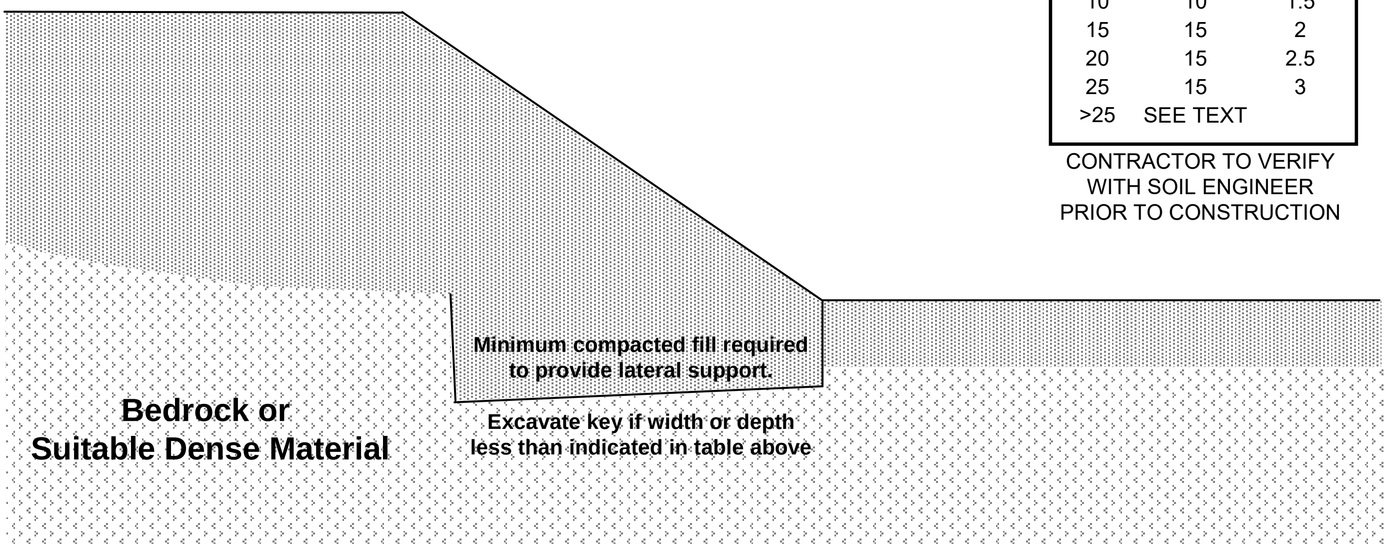
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY
WITH SOIL ENGINEER
PRIOR TO CONSTRUCTION



GEOTEK

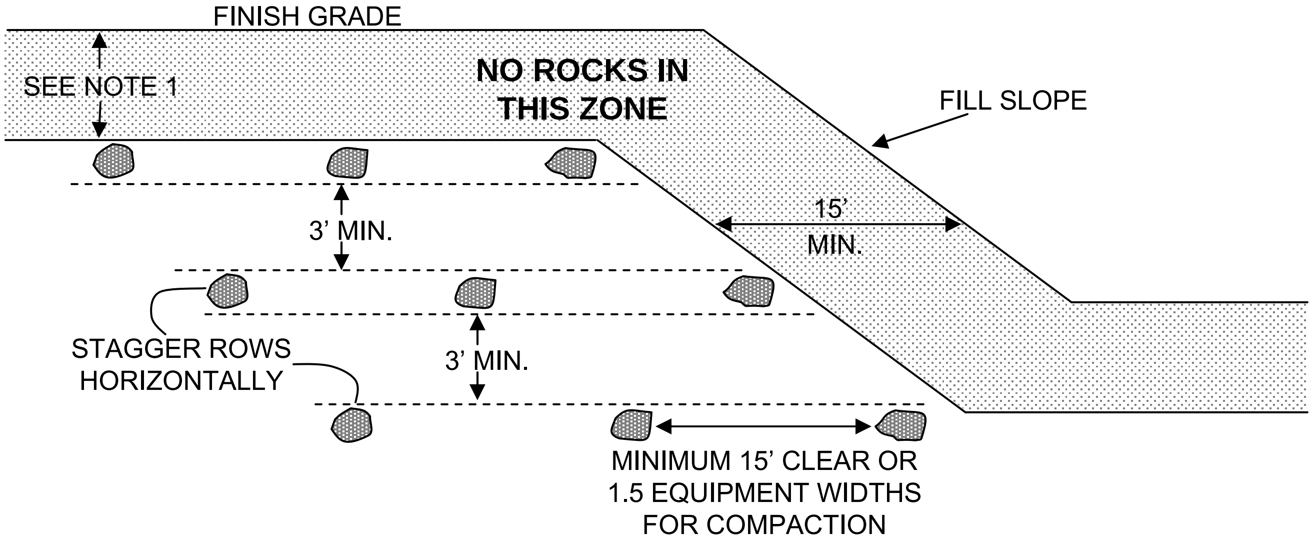
1548 North Maple Street
Corona, California 92880

COMMON FILL
SLOPE KEYS

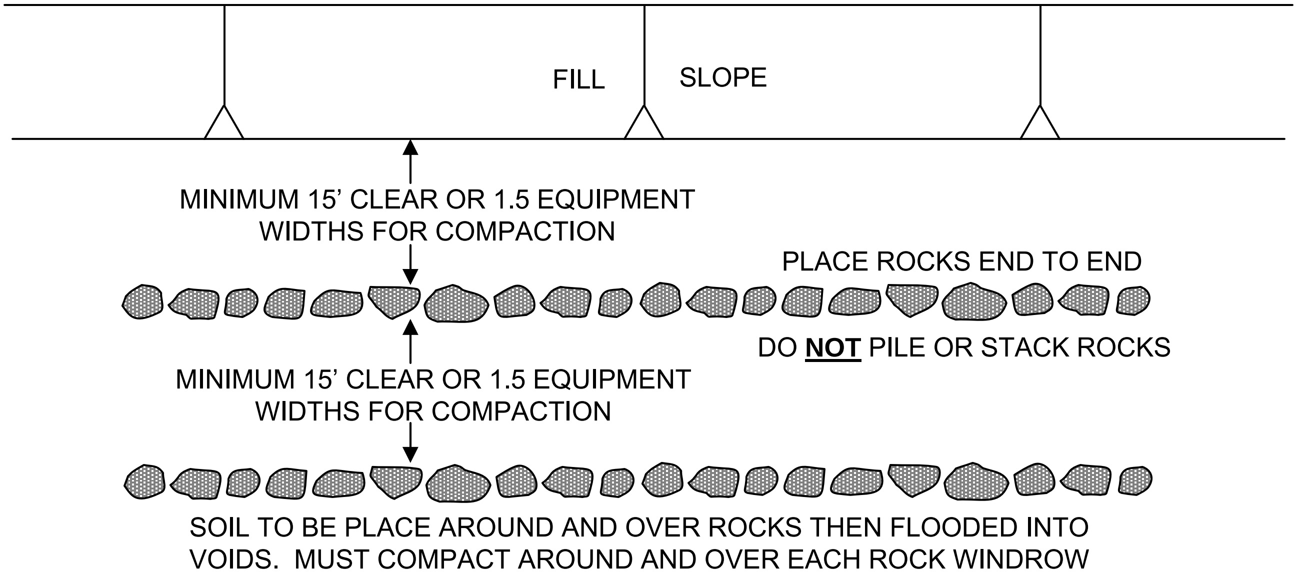
STANDARD GRADING
GUIDELINES

PLATE F-3

CROSS SECTIONAL VIEW



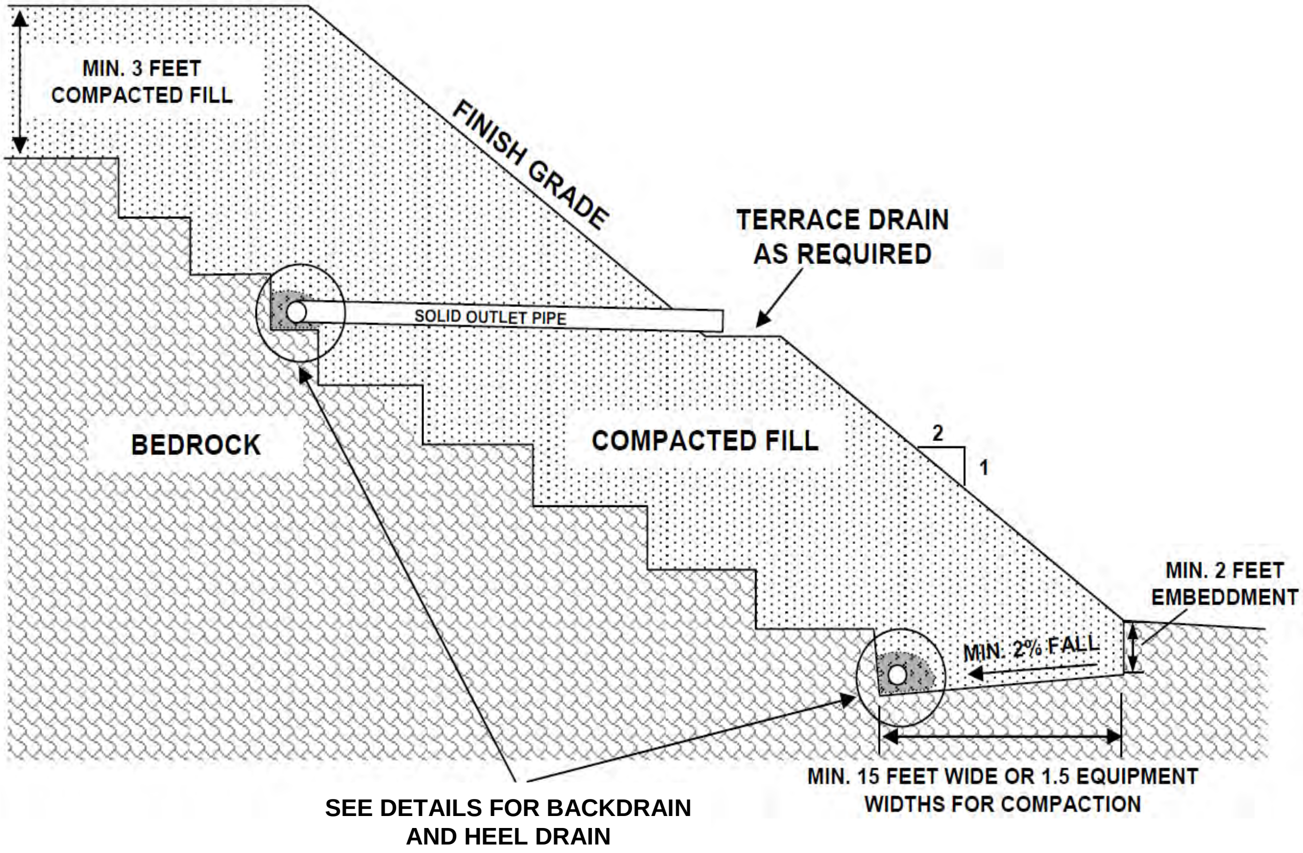
PLAN VIEW



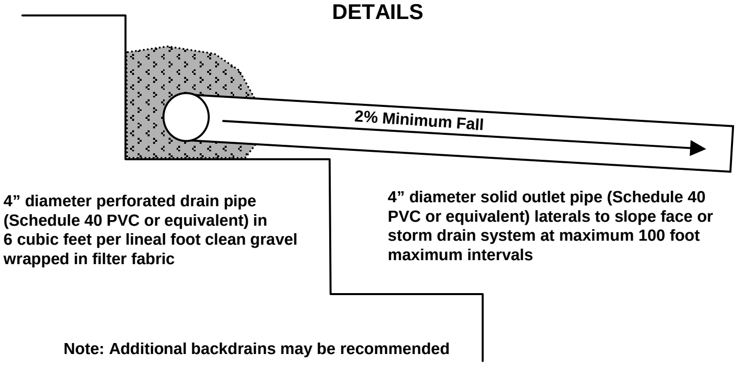
NOTES:

1) SOIL FILL OVER WINDROW SHOULD BE 7 FEET OR PER JURISDUICTIONAL STANDARDS AND SUFFICIENT FOR FUTURE EXCAVATIONS TO AVOID ROCKS
2) MAXIMUM ROCK SIZE IN WINDROWS IS 4 FEET IN DIAMETER
3) SOIL AROUND WINDROWS TO BE SANDY MATERIAL SUBJECT TO SOIL ENGINEER ACCEPTANCE
4) SPACING AND CLEARANCES MUST BE SUFFICIENT TO ALLOW FOR PROPER COMPACTION
5) INDIVDUAL LARGE ROCKS MAY BE BURIED IN PITS.

GEOTEK	1548 North Maple Street Corona, California 92880	ROCK BURIAL DETAILS	STANDARD GRADING GUIDELINES PLATE F-4



**BACKDRAIN
DETAILS**



4” diameter perforated drain pipe (Schedule 40 PVC or equivalent) in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric

4” diameter solid outlet pipe (Schedule 40 PVC or equivalent) laterals to slope face or storm drain system at maximum 100 foot maximum intervals

Note: Additional backdrains may be recommended

**HEEL DRAIN
DETAILS**

6” diameter perforated drain pipe in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric, outlet pipe to gravity flow with 2% minimum fall

GEOTEK

1548 North Maple Street
Corona, California 92880

TYPICAL BUTTRESS AND
STABILIZATION FILL

STANDARD GRADING
GUIDELINES

PLATE F-5

UPDATED GEOTECHNICAL EVALUATION

PROPOSED SINGLE-FAMILY RESIDENTIAL DEVELOPMENT

APN 487-470-025, WINCO SITE

NORTHEAST OF ALESSANDRO BOULEVARD AND LASSELLE AVENUE INTERSECTION

CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

D.R. HORTON LOS ANGELES HOLDING COMPANY, INC.
2280 WARDLOW CIRCLE, SUITE 100
CORONA, CALIFORNIA 92880

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92880

PROJECT NO. 2438-CR AUGUST 27, 2020

GEOTEK

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92880
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

August 27, 2020
Project No. 2438-CR

D.R. Horton Los Angeles Holding Company, Inc.
2280 Wardlow Circle, Suite 100
Corona, California 92880

Attention: Ms. Megan Whieldon

Subject: Updated Geotechnical Evaluation
Proposed Single-Family Residential Development
APN 487-470-025, Winco Site
Northeast of Alessandro Boulevard and Lasselle Avenue Intersection
City of Moreno Valley, Riverside County, California

Dear Ms. Whieldon:

We are pleased to provide the results of our updated geotechnical evaluation for the subject project located northeast of the Alessandro Boulevard and Lasselle Street intersection in the city of Moreno Valley, Riverside County, California. This report presents the results of our evaluation and discussion of our findings.

In our opinion, site development appears feasible from a geotechnical viewpoint. Final site development and grading plans should be reviewed by this firm as they become available, as it will be necessary to provide appropriate recommendations for intended specific site development as those plans become refined.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

EDWARD H. LaMONT
No. 1892
Exp.

Gaby Bogdanoff

GABY M. BOGDANOFF
NO. 3133

Edward H. LaMont
CEG 1892, Exp. 07/31/22
Principal Geologist

Gaby M. Bogdanoff
GE 3133, Exp. 06/30/22
Project Engineer

KYLE R. MCHARGUE
9790

Kyle R. McHargue
PG 9790, Exp. 02/28/22
Project Geologist

Distribution: (1) Addressee via email

G:\Projects\2401 to 2450\2438CR DR Horton Alessandro and Lasselle Ave Winco Site Moreno Valley\Rock Hardness Investigation\2438CR Updated Geotechnical Evaluation Winco Project.doc

TABLE OF CONTENTS

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS

ENCLOSURES

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the general geotechnical conditions on the site and provide updated geotechnical recommendations as deemed appropriate. Services for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Review of the referenced *Geotechnical Investigation,* prepared by EGA Consultants (2006),
- Perform a reconnaissance of the site,
- Excavation of eleven exploratory trenches and five exploratory borings to assess general subsurface soil conditions of the property,
- Site evaluation of rock hardness via a seismic refraction survey, performed by a subconsultant,
- Collection of relatively undisturbed and bulk samples of the onsite materials including samples for corrosion evaluation,
- Laboratory testing of selected soil samples,
- A corrosion study for the property,
- Review and evaluation of site seismicity, and
- Compilation of this updated geotechnical evaluation report which presents our findings, conclusions, and recommendations for the site development.

The intent of this report is to aid in the evaluation of the site for future development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report will likely need to be updated based on our review of final site development plans. These should be provided to GeoTek for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The site consists of a rectangular-shaped property located northeast of the Alessandro Boulevard and Lasselle Street intersection in the city of Moreno Valley, Riverside County, California. The site encompasses approximately 17.6 acres of vacant undeveloped land and is identified with Riverside County Assessor's Parcel Number (APN) 487-470-025. The general location of the site is shown in Figure 1.

Based on review of available maps, information provided within the referenced reports and observations at the time of our recent site reconnaissance, the site consists of vacant land with a light to moderate growth of dry weeds and brush and some dispersed trees and bushes. A 10-foot ± tall stockpile of soil was observed near the northeastern region of the site (area of Boring B-13 by EGA Consultants and Trench T-5 by GeoTek). The site also has some visible trash and litter.

The site presents various knobs of exposed granitic bedrock predominantly located within its northern half portion. Generally, site elevations range from approximately 1,626 feet above mean sea level (amsl) located in the north-northeast edge of the site and lowest ground elevation of 1,585 feet amsl towards the southwestern corner. Surface drainage is to the south-southwest.

The site is bounded by Alessandro Boulevard and vacant land to the south, Lasselle Street, single-family homes and vacant land to the west, a vacant parcel to the east, and Bay Avenue and single-family homes to the north.

2.2 PROPOSED DEVELOPMENT

According to the referenced *Lotting Study Plan and Cut/Fill Plan,* both prepared by Proactive Engineering Consultants West, Inc., plot date July 31, 2020, site development includes the grading and construction of 90 single-family residential lots, a water quality basin, an open space, underground utilities, and street improvements. Cuts and fills up to 18 and 15 feet, respectively, are anticipated to be required to reach design grades. Also, cut and fill slopes up to about 7 feet in height and at 2:1 (h:v) maximum gradients as well as retaining walls are expected. Plans for utility construction were not available at the time of this review. However, it is our assumption that the deepest utility proposed will be the sewer line at a depth of approximately 8 feet below street grade.

A water quality basin is also proposed within the southeastern portion of the property. Cuts on the order of 5 feet are expected to be required to reach the proposed basin bottom. However, it is currently unknown whether the basin will be utilized for infiltration or storage. As such, infiltration testing was not included as a part of this evaluation.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Final site development plans should be reviewed by GeoTek when they become available. Additional geotechnical field exploration, analyses, and recommendations may be necessary upon review of site development plans.

Copies of the Lotting Study Plan and Cut/Fill Plan are presented as Figures 2a and 2b.

3. REPORT REVIEW

GeoTek reviewed previous reporting by EGA Consultants, LLC. (EGA) titled *Geotechnical Investigation, for 17.7 Acre Proposed Mixed Use Commercial and Residential Property, Located at Northeast Corner of Alessandro Boulevard and Lasselle Street, Moreno Valley, California*, dated May 10, 2006. The study included hollow-stem auger borings and a seismic refraction rippability assessment. Twenty borings were excavated to a maximum depth of 36 feet below existing ground surface. The seismic refraction survey consisted of three 156-foot long seismic traverses.

EGA described the subsurface soil conditions at the site as being fill and/or topsoil underlain by igneous bedrock. The fill/topsoil was encountered in the majority of the borings to average depths of 2 to 3 feet with exception of the area of Boring B-13 (located in the northeast portion of the site) where the fill extended to 13 feet below grade. The fill soils consisted generally of light brown and gray, dry, loose silty sands. Underlying the fill/topsoil materials was igneous bedrock in all test borings by EGA. The bedrock was described as Cretaceous-age bedrock consisting primarily of very coarse grained crystalline tonalite, that is well-foliated and massive. The expansion index of the fill and the granitic bedrock was determined to be "very low" according to EGA.

Groundwater was not encountered by EGA to an explored depth of 36 feet below existing ground surface. EGA stated that the regional groundwater level is estimated to be greater than 50 feet below grade.

EGA stated that no traces of active faults have been mapped onsite. Additionally, secondary seismic hazards such as liquefaction was considered "nil". EGA also stated that expansive clays and landsliding do not appear to be evident at the subject site.

Based on the data from their seismic refraction traverses, EGA concluded that the upper 10 feet to 20 feet of site strata is considered weathered and rippable using conventional grading equipment (specified as D9R dozer with a multi- or single-shank ripper). EGA also stated that there were areas of non to marginally rippable bedrock, particularly at seismic line "S-1". EGA concluded that some light blasting may be required to achieve desired grade.

A copy of the boring logs, seismic refraction lines, and laboratory test results by EGA (2006) are presented in Appendix A of this report.

GeoTek received reporting by Leighton and Associates (Leighton) on the adjacent property to the east titled *Geotechnical investigation for Due-Diligence Purposes, 20-Acre, 74-Lot tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California*, dated April 22, 2005. Leighton's field investigation consisted of four hollow-stem auger borings, ten backhoe test pits, four D9R bulldozer test pits and a seismic refraction rippability study. The borings were excavated to a depth of 20 feet below grade, and the backhoe test pits were excavated to a maximum depth of 10 feet. The seismic refraction survey consisted of five seismic refraction lines about 250-foot long each.

Leighton's described the site subsurface conditions as granitic bedrock overlain by a thin veneer of alluvial and colluvial soils. The lower-lying areas, particularly in the central portions of the site have thicker accumulations of alluvial soils. The alluvial soils encountered were generally 2-3 thick and consisted of loose to very dense gravelly sand to silty sand. Also encountered was medium stiff to very stiff sandy silt. Locally deeper alluvium encountered in the central portion of the site ranged from approximately 4 to 10 feet in thickness. Granitic bedrock of tonalite composition was encountered below the alluvium and at the ground surface at some areas throughout the site.

The alluvial soils in the upper 5 to 10 feet were described as slightly compressible with a low collapse potential. Leighton recommended partial removal and recompaction of these soils. Representative sample of subsurface soils indicated an expansion index of 7 and 13 (very low), soluble sulfate content was described as negligible, and corrosivity testing indicated the onsite soils is considered severely corrosive to ferrous metals.

Groundwater was not encountered by Leighton to an explored depth of 20 feet below existing ground surface. A water seepage was reportedly encountered by Leighton in one of their trenches which was likely caused by recent rains and low topographic relief of the area. Leighton stated that the historic high groundwater level is estimated to be about 110 feet below the existing ground surface.

Leighton stated that no traces of active or potentially active faults have been mapped onsite and the potential for fault-induced ground rupture at the site is considered very low. Additionally, secondary seismic hazards such as liquefaction and seismically induced settlement were described as very low and minor, respectively.

Leighton used backhoe test pits, bulldozer test pits and a seismic refraction survey to assess rippability onsite of the onsite bedrock. The backhoe test pits generally encountered refusal on hard materials after 2 to 3 feet below ground surface. The bulldozer test pits utilized a D9R dozer with 32-inch rippers. The dozer was generally able to excavate to 10 feet below ground surface. However, at deeper depths it required heavy ripping and cross-ripping. Also, along the western half of the southern boundary the bulldozer test pit encountered refusal at 2 feet below grade. The seismic refraction survey conducted for Leighton concluded that granitic material was weathered and/or fractured to a depth of approximately 40 to 60 feet throughout the site. In light of the dozer test pits, Leighton concluded that cuts on the order of 5 to 10 feet deep in the elevated areas of the site can generally be made without the need for blasting; although floaters may be difficult to excavate. Additionally, deeper cuts are expected to require blasting, particularly the southwest corner of the site.

4. FIELD EXPLORATION, LABORATORY TESTING, AND CORROSION TESTING

4.1 FIELD EXPLORATION

GeoTek investigated the project site via exploratory trenches and borings which were performed between July 14, 2020 and July 17, 2020. The trenching exploration consisted of eleven trenches to depths ranging from 2 to 18 feet and were excavated to log the subsurface materials and examine the rippability and/or hardness of localized areas throughout the site.

The boring exploration consisted of drilling five exploratory borings to approximately 18 to 20 feet below grade. The trenches were excavated utilizing a Western SK500 excavator, and the borings were drilled with a track-mounted hollow-stem auger drill rig.

Also, a seismic refraction survey was conducted on July 28, 2020 by a subconsultant (Subsurface Surveys & Associates, Inc.). The seismic refraction survey involved the recording and measuring of man-made energy waves from six seismic refraction and tomography lines placed in site areas where deep excavations are proposed. The seismic survey summary report is included in Appendix C.

The approximate locations of our site explorations are shown on the Exploration Location Maps, Figures 2a and 2b. Logs of the borings by EGA, in addition to the borings, trenches and seismic refraction lines by GeoTek are provided in Appendices A and B, respectively.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively bulk soil and bedrock samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the subsurface materials encountered and to evaluate the soil/bedrock physical properties for use in the engineering design and analysis. Our test results along with a brief description and relevant information regarding testing procedures are included in Appendix D.

4.3 CORROSION TESTING

GeoTek collected a total of 12 samples across the site from the upper one foot. The samples were taken to the laboratory to be evaluated for their corrosion potential. The locations of the samples obtained for the site are shown on the Exploration Location Map, Figures 2a and 2b. The results of corrosion tests are presented in Appendix E.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends from the point of contact with the Transverse Ranges geomorphic province, southerly to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are mostly found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province, and the San Jacinto fault borders the province adjacent the Colorado Desert province.

More specific to the subject property, the site is located in an area geologically mapped by others to be underlain by granitic bedrock of quartz diorite to granodiorite (Dibblee, T.W. and Minch, J.A., 2003). The regional geologic maps noted the general trend of foliations in the bedrock had a northwest-southeast orientation and a 50-degree to 50-degree inclination to the northeast. Locally, one trend of foliations in the bedrock had a northeast-southwest orientation with no defined inclination.

No active faults are shown in the immediate site vicinity on the maps reviewed for the area. The site is not located within an Earthquake Fault Zone (Alquist-Priolo) as designated by the State of California. The Riverside County website (https://gis.countyofriverside.us/) has designated the site as "not in a fault zone", "not in a fault line", having "low" potential for liquefaction, and "susceptible" to subsidence.

5.2 EARTH MATERIALS

A brief description of the earth materials reported to be on the site by EGA (2006) and encountered in our explorations is presented in the following sections.

5.2.1 Undocumented Fill

Undocumented fill materials were observed stockpiled within the north-central portion of the site (area of trench T-5 and boring B-13, Figure 2). The fill stockpile has a height of about 10 feet. Our trench T-5 and boring B-13 by EGA also noted that the undocumented fill extends to approximately 13 feet below grade. Trench T-3 excavated west of this area also noted about 5 feet of fill below grade. These materials consist of silty sand which has various shades of brown and gray in color, slightly moist to moist, and is in loose condition, based on our field observations. The fill materials apparently were originated from the previous use of the property as a borrow site back in the 1990's.

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

5.2.2 Alluvium

Alluvium was encountered in our exploratory trenches T-6, T-7, T-8 and T-11 and boring B-5, which were excavated within the southwestern portion of the site. These materials consist of silty sand and extended from the ground surface to depths of about 2 to 7 feet. The alluvium was brown and red in color, dry to moist, and loose to medium dense, based on our field observations.

5.2.3 Granitic Bedrock

Granitic bedrock was observed at the property as rock outcrops or encountered in site explorations at typical depths of 0 to 7 feet and in some areas as deep as approximately 13 feet. Also, bedrock materials were found at or near the ground surface in the seismic refraction lines placed at the site by our firm. The regional geologic map shows the bedrock is foliated, generally in a northwest/southeast orientation with inclinations ranging from 50 degrees to 80 degrees to the northeast.

The on-site bedrock consists of tonalite and quartzite which is moderately to highly weathered within its upper portions and is recovered as grayish brown, brownish gray and gray fine to coarse sand when excavated. The bedrock becomes less weathered with depth. All our exploratory trenches (with exception of trench T-10) experienced refusal due to hard granitic bedrock at depths between 2 and 16 feet. However, highly weathered and fractured bedrock was encountered in trench T-10 near the southeastern end of the site which was excavated to a maximum depth of 18 feet without experiencing refusal.

The seismic refraction survey generally identified three zones of subsurface materials. The uppermost zone comprises mostly soil and colluvium and is estimated to extend up to 5 feet below grade. The middle zone was noted to correspond to highly weathered to weathered bedrock to depths ranging from 5 to 24 feet with velocities ranging from 2,691 to 4,910 fps. The bottom zone was noted to comprise less weathered bedrock with velocities ranging from 5,705 to 7,925 fps. Tomographic models conducted for selected seismic lines confirm that the seismic velocity (hardness) of the rock increases with depth. No evidence of hardrock floaters were noted on the topographic models, although some anomalies were noted.

To estimate the approximate depth to rippable bedrock and rippable trenching (utility construction) using the seismic refraction data collected at the site, we have utilized cut-off velocities of 5,000 fps and 3,800 fps, respectively. We have also used our field observations during the excavation of the recent site trenches and borings. Based on the above and per the proposed grades shown on the referenced *Cut/Fill Site Plan* (Proactive, 2020) and assuming a maximum wet utility depth of 8 feet below street grade and over-excavation of about 5 feet deep for cut lots into bedrock, we estimate that grading operations within the northwestern, elevated portions of the site will encounter marginally rippable bedrock. Hard, marginally rippable bedrock is anticipated to exist in that area at general depths ranging from 5 to 15 feet. While these materials may still be rippable with a Caterpillar D-9 Ripper, excavations may be slow and blasting or other excavation techniques could be more cost-effective.

Similarly, very difficult to non-rippable trenching was encountered in the areas of Lines 9 and 10 and Trenches T-2 and T-3 starting at 5 to 10 feet below existing grade. All these areas are also located within the northwestern portion of the site.

The seismic refraction traverses performed by EGA (2006) within the northwestern region also indicated marginally rippable bedrock near the southern end of traverse 1 at or very near the ground surface and marginally rippable bedrock starting at depths of about 5 to 10 feet for traverses 2 and 3.

Results of the seismic refraction survey are provided in Appendix C.

The surficial site materials were tested and found to have a "very low" expansion potential.

Detailed logs of the subsurface conditions of the site are presented in Appendices A and B.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

Surface water was not noted during our field work. If encountered during earthwork construction, surface water on this site is the result of precipitation or possibly some minor surface run-off from immediately surrounding properties. Overall site area drainage is generally to the south-southwest, as directed by site topography. Provisions for surface drainage will need to be accounted for by the project civil engineer.

5.3.2 Groundwater

Groundwater was not encountered in any of our exploratory borings or trenches excavated to a maximum depth of 20 feet. Groundwater was not encountered by EGA to an explored depth of 36 feet below existing ground surface. EGA stated that the regional groundwater level is estimated to be greater than 50 feet below the existing ground surface.

The California Department of Water Resources, Water Data Library, indicates that the groundwater depth for a well (State Well No. 03S03W15F001S) is greater than 100 feet below ground surface. The well is located approximately 1.5 southeast of the site. Based on the above, groundwater is not anticipated to be a factor during the site grading. However, seasonal perched groundwater may be encountered during grading within the lower elevations of the site.

GeoTek should review grading plans once available to determine if groundwater is anticipated to adversely affect the proposed developments.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within a State of California designated *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986).

The County of Riverside has designated the site as "not in a fault zone" and "not in a fault line."

5.4.1 Seismic Design Parameters

The site is located at approximately 33.9192 Latitude and -117.2077 Longitude. Site spectral accelerations (S_a and S_1), for 0.2 and 1.0 second periods for a Class "C" site, were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. Due to the presence of shallow bedrock, a Site Class C is considered appropriate. The results are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	1.755g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.687g
Site Coefficient for Site Class "C", F_a	1.2
Site Coefficient for Site Class "C", F_v	1.4
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	2.107g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.962g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.404g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.641g
Site Modified Peak Ground Acceleration, PGA_M	0.891g

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.4.2 Surface Fault Rupture

The site is in a seismically active region; however, no active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007). No faults are identified on geologic maps readily available and reviewed by this firm for the immediate study area. The nearest known active fault zone is the Elsinore Fault - Glen Ivy Section located approximately 8.5 miles southwest of the site. Therefore, the potential for surface rupture at the site is considered negligible.

5.4.3 Liquefaction and Seismically Induced Settlement

The County of Riverside has designated the site having "low" liquefaction potential, and "susceptible" to subsidence.

Liquefaction is not considered to be a hazard at the subject site due the presence of shallow bedrock materials. Also, the potential for seismically induced settlement at the property is considered to be nil because of the minimal thickness of soil atop bedrock.

5.4.4 Other Seismic Hazards

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

6.2 EARTHWORK CONSIDERATIONS

6.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Moreno Valley, the 2019 California Building Code (CBC), and recommendations contained in this report. The General Grading Guidelines included in Appendix F outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix F.

Final site grading plans should be reviewed by this office when they become available. Additional recommendations will likely be offered subsequent to review of these plans.

6.2.2 Site Clearing

Site preparation should start with removal of any existing improvements, deleterious materials, and vegetation within the planned development areas of the site. These materials should be properly disposed of off-site.

6.2.3 Remedial Grading

All undocumented fill, topsoil, loose alluvium, and highly weathered bedrock should be removed to expose competent native materials. Competent native materials are defined as either alluvium which is not visibly porous having and in-place compaction of at least 85 percent of the soil's maximum dry density (per ASTM D 1557) or firm, unyielding bedrock. A representative of this firm should observe and approve the bottom of all excavations.

Based on the data available, removals generally on the order of two to three feet (and up to five feet within alluvial areas) from existing grade or to a minimum of three feet below proposed grades, whichever is greater, should be performed below structural areas in fill. Actual depths of removal/over-excavation should be determined in the field based on observation and in-place density testing. As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally, whichever is greater. The bottom of the removals should be graded to drain toward the front of the lot at a gradient of at least two percent.

In order to facilitate footing excavation and installation of house services, consideration should be given to overexcavate cut lots to a minimum depth of five feet below proposed grades. We recommend that the entire lot be over-excavated. The bottom of the overexcavation should be graded to drain toward the front of the lot at a gradient of at least two percent.

To prevent potential differential settlement, the cut portions of transition (i.e. cut/fill) lots should be overexcavated a minimum of five feet below proposed grades or to a depth of one-half of the maximum fill thickness on the lot, whichever is greater. The horizontal extent of over-excavation could comprise the entire lot or extend at least five feet outside the structural area, or a distance equal to the depth of overexcavation below the bottom of the structural elements, whichever is greater. Overexcavation bottoms should be graded to drain toward the front of the lot (two percent minimum).

We also recommend that utility alignments be overexcavated to at least one foot below the depth of the lowest underground utility.

The approved removal/over-excavation bottom exposed should then be scarified to a depth of about six inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density, per ASTM D 1557.

6.2.4 Engineered Fill

The onsite materials are considered suitable for reuse as engineered fill provided the materials are free from vegetation, roots, and rock/hard lumps greater than six inches in maximum dimension.

The undercut areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in six- to eight-inch loose lifts, moisture conditioned to the optimum moisture content, and compacted to a minimum relative compaction of 90 percent as determined by ASTM D 1557. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

Our site excavations observed that the bedrock generally breaks into silty sand soils less than six inches in maximum dimension. However, if oversized materials (greater than six inches) are generated from cuts into bedrock, the oversized rock should be placed scattered (windrows) on site as detailed in Appendix F. Alternatively, oversized rock could be disposed of offsite or stockpiled on site and crushed for future use.

6.2.5 Excavation Characteristics

The preliminary *Site Cut/Fill Plan* (Proactive, 2020) indicates that the deepest cuts (up to 18 feet) are proposed to be conducted within the northwestern region of the site. The results of the seismic refraction survey (Appendix C) and our trenching and boring exploration suggest that bedrock materials marginally rippable with a Caterpillar D9R Ripper may be encountered within this zone starting at general depths of about 5 to 15 feet.

Similarly, the data suggests that very difficult to non-rippable trenching conditions may be experienced within the future utility areas located within the cited zone starting at depths of 5 to 10 feet, due to hard unweathered bedrock. Localized blasting, chipping to dislocate and remove corestones, or other special techniques may be warranted.

The seismic refraction traverses performed by EGA (2006) within the northwestern region also indicated marginally rippable bedrock near the southern end of traverse 1 at or very near the ground surface and marginally rippable bedrock starting at depths of about 5 to 10 feet for traverses 2 and 3.

Excavation of undocumented fill, alluvial deposits, and granitic bedrock (with exception of the northwestern region) to the design elevations is expected to be generally feasible with heavy-duty grading equipment in good operating condition. All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for cuts less than ten feet in height.

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

6.2.6 Slope Construction

An engineering geologist should observe all cut slopes. Cut slopes should expose competent bedrock. If adverse structure or incompetent materials are exposed and identified in the cut slopes, stabilization fills may be recommended.

Fill slopes constructed at maximum gradients of 2:1 (h:v), in accordance to industry standards, are anticipated to be both grossly and surficially stable. Where fill is to be placed against sloping terrain with gradients of 5:1 (h:v) or steeper, the sloping ground surface should be benched to remove loose and disturbed surface soil to assure that the new fill is placed in direct contact with competent bedrock and to provide horizontal surfaces for fill placement. A 10- to 15-foot wide keyway should be constructed at the toe of the fill slope areas extending at least 2 to 3 feet vertically into competent natural material.

The base of the keyways and benches should be sloped back into the hillside at a gradient of at least two percent. The base of the benches should be evaluated by a representative of GeoTek prior to processing. Upon approval, the exposed materials should be moistened to at least the optimum moisture content and densified to a relative compaction of at least 90 percent (ASTM D 1557).

Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction and then roll the final slope to provide a dense, erosion resistant surface.

6.2.7 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for short durations during construction and where cuts do not exceed ten feet in height. We anticipate that temporary cuts to a maximum height of four feet can be excavated vertically.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.2.8 Shrinkage and Bulking

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of five to ten percent may be considered for the surficial soils. Bedrock materials may bulk up to ten percent. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction.

Subsidence is not considered to be a factor with the underlying site materials.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2019 CBC, are presented herein. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Based on the results of laboratory testing, the on-site materials are classified as having "very low" (0≤EI≤20) expansion potential per ASTM D 4829. Additional laboratory testing should be performed at the completion of site grading to verify the expansion potential of the near-surface soils.

A summary of our preliminary foundation design recommendations is presented in the table below:

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALY REINFORCED SHALLOW FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential (0≤EI≤20)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- and Two-Story – 12
Minimum Foundation Width (Inches)*	One- and Two-Story – 12
Minimum Slab Thickness (actual)	4 inches
Minimum Slab Reinforcing	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab
Minimum Footing Reinforcement	Two No. 4 Reinforcing bars, one top and one bottom
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% to a depth of 12 inches

*Code minimums per Table 1809.7 of the 2019 CBC.

It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

An allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This value may be increased by 400 psf for each additional 12 inches in depth and by 400 psf for each additional 12 inches in width to a maximum value of 3,000 psf. Additionally, an increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads).

Based on the recommended site grading, we estimate a total static settlement of less than 1 inch. A differential static settlement of about ½ inch over a 30-foot span is also estimated. Seismically induced total and differential settlement are considered to be negligible.

The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

A grade beam, a minimum of 12 inches wide and 12 inches deep, should be utilized across large entrances. The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as the result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. It is GeoTek's opinion that a minimum ten mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and atmospheric conditions.

Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeance) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

We recommend that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural engineer.

6.3.2 Miscellaneous Foundation Recommendations

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.

Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

6.3.3 Foundation Set Backs

Where applicable, the following setbacks should apply to all foundations. Any improvements not conforming to these setbacks may be subject to lateral movements and/or differential settlements:

- The outside bottom edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least 5 feet and need not exceed 40 feet.
- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least 5 feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom inside edge of the wall footing.
- The bottom of any proposed foundations for structures should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom of the nearest excavation.

6.4 RETAINING WALL DESIGN AND CONSTRUCTION

6.4.1 General Design Criteria

Recommendations presented herein may apply to typical masonry or concrete vertical walls retaining up to six feet of soil. Additional review and recommendations should be requested for higher walls.

Retaining wall foundations embedded a minimum of 12 inches below the lowest adjacent grade and should rest on either 24 inches of compacted fill placed on competent bedrock or on competent bedrock. Wall footings should be designed using an allowable bearing capacity of 2,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

An equivalent fluid pressure approach may be used to compute the horizontal active pressure against the wall. The appropriate fluid unit weights are given in the table below for specific slope gradients of retained materials.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (H:V)	Equivalent Fluid Pressure (PCF) Native Materials*
Level	41
2:1	60

*The design pressures assume the native backfill material has an expansion index less than or equal to 20. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

The above equivalent fluid weights do not include superimposed loading conditions such as expansive soils, vehicular traffic, structures, seismic conditions or adverse geologic conditions.

6.4.2 Restrained Retaining Walls

Any retaining wall that will be restrained prior to placing backfill or walls that have male or reentrant corners should be designed for at-rest soil conditions using an equivalent fluid pressure of 61 pcf, plus any applicable surcharge loading. For areas having male or reentrant corners, the restrained wall design should extend a minimum distance equal to twice the height of the wall laterally from the corner, or as otherwise determined by the structural engineer.

6.4.3 Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have and expansion index of less than 20. Retaining walls should be provided with an adequate pipe

and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one-cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one-foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The rock should be separated from the earth with filter fabric. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within two feet of the ground surface. The subdrain should be placed at the base of the wall in direct contact with the Miradrain 2000.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained. Walls from two to four feet in height may be drained using localized gravel packs behind weep holes at eight feet maximum spacing (e.g. approximately 1.5 cubic feet of gravel in a woven plastic bag). Weep holes should be provided or the head joints omitted in the first course of block extended above the ground surface. However, nuisance water may still collect in front of the wall.

Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements.

6.4.3.1 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.

- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

6.4.4 Pavement Design Considerations

Pavement design for proposed on-site and off-site street improvements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements. Based on traffic indices (TIs) of 6.0 and 7.0 generally associated with these types of projects and using an assumed design R-value of 50, the following preliminary sections were calculated:

PRELIMINARY PAVEMENT SECTIONS

TI	R-Value	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
6.0	50	4*	6*
7.0		4*	6*

*Minimum pavement structural section per City of Moreno Valley Street Standards

The TIs used in our pavement design are considered reasonable values for the proposed street areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper 12 inches) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green

Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.4.5 Soil Corrosivity

A corrosion report was prepared for the site by our sub-consultant HDR based on various samples recently obtained across the site. The site corrosion report is included in Appendix E. In general, the report concluded that the on-site materials are "moderately corrosive" to ferrous metals and "aggressive" to copper.

6.4.6 Soil Sulfate Content

The corrosion evaluation performed by HDR, Inc. states that the site soils have negligible sulfate concentrations. Based upon the test results, no special concrete mix design is required by Code for sulfate attack resistance. Additional recommendations for mitigation of soil corrosion are provided in Appendix E.

6.4.7 Import Soils

Import soils should have expansion characteristics similar to the on-site soils. GeoTek also recommends that the proposed import soils be tested for expansion and sulfate potential. GeoTek should be notified a minimum of 72 hours prior to importing so that appropriate sampling and laboratory testing can be performed.

6.4.8 Concrete Flatwork

6.4.8.1 Exterior Concrete Slabs, Sidewalks, and Driveways

Exterior concrete slabs, sidewalks and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required from a geotechnical perspective. However, some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in industrial construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

Subgrade soils should be pre-moistened prior to placing concrete. The subgrade soils below exterior flatwork should be pre-saturated to a minimum of 100 percent of optimum moisture content to a depth of at least 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City inspector, if necessary.

6.4.8.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 0.125-inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent upon a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

6.5 POST CONSTRUCTION CONSIDERATIONS

6.5.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundations. This type of landscaping should be avoided. Due to the presence of high expansive soils, irrigation should be minimized adjacent to the buildings. Planters within 30 feet of the buildings should be above ground and underlain by a concrete slab. Waterproofing of the foundation and/or subdrains may be warranted and advisable. We could discuss these issues, if desired, when plans are made available.

6.5.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times, as directed by the project civil engineer. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings and floor-slabs. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

Roof gutters should be installed that will direct the collected water at least 20 feet from the buildings.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.6 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading, specifications, retaining wall/shoring plans and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. Additional recommendations may be necessary based on these reviews. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek's representative perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement including utility trenches.
- Test the fill for field density and relative compaction.
- Test the near-surface soils to verify proper moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

7. LIMITATIONS

This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our proposal (Proposal No. P-0602020-

CR) dated July 1, 2020 and geotechnical engineering standards normally used on similar projects in this region.

The materials observed on the project site appear to be representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

8. SELECTED REFERENCES

American Society of Civil Engineers (ASCE), 2017, “Minimum Design Loads for Buildings and Other Structures,” ASCE/SEI 7-16.

Bowles, J. E., 1977, “Foundation Analysis and Design”, Second Edition.

Bryant, W.A., and Hart, E.W., 2007, "Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," California Geological Survey: Special Publication 42.

California Code of Regulations, Title 24, 2019 “California Building Code,” 2 volumes.

California Geological Survey (CGS, formerly referred to as the California Division of Mines and Geology), 1977, “Geologic Map of California.”

_____, 1998, “Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada,” International Conference of Building Officials.

_____, 2008, “Guidelines for Evaluating and Mitigating Seismic Hazards in California,” Special Publication 117A.

Dibblee, T.W. and Minch, J.A., 2003, “Geologic Map and Digital Database of the Sunnymead/South ½ if Redlands Quadrangle, San Bernardino and Riverside Counties, California,” U.S Geological Survey DF-110, scale 1:24,000.

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

EGA Consultants, 2006, "Geotechnical Investigation for 17.7 Acre Proposed Mixed Use Commercial and Residential Property L:ocated at NEC Alessandro Blvd. and Lasselle Street, Moreno Valley, California", May 10, Project No. VB435.1.

GeoTek, Inc., In-house proprietary information.

Leighton and Associates, Inc., 2005, Draft version of "Geotechnical Investigation for Due-Diligence Purposes, 20-Acre, 74-Lot Tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California", dated April 22, Project No. 021521-001.

Proactive Engineering Consultants West, Inc., 2020, Lotting Study Plan and Cut/Fill Plan, dated July 31.

Terzaghi, K. and Peck, R. B., 1967, "Soil Mechanics in Engineering Practice", Second Edition.

U.S. Seismic Design Maps (http://earthquake.usgs.gov/designmaps).

D•R•Horton Los Angeles Holding Company
Winco Site
Moreno Valley, Riverside County, California

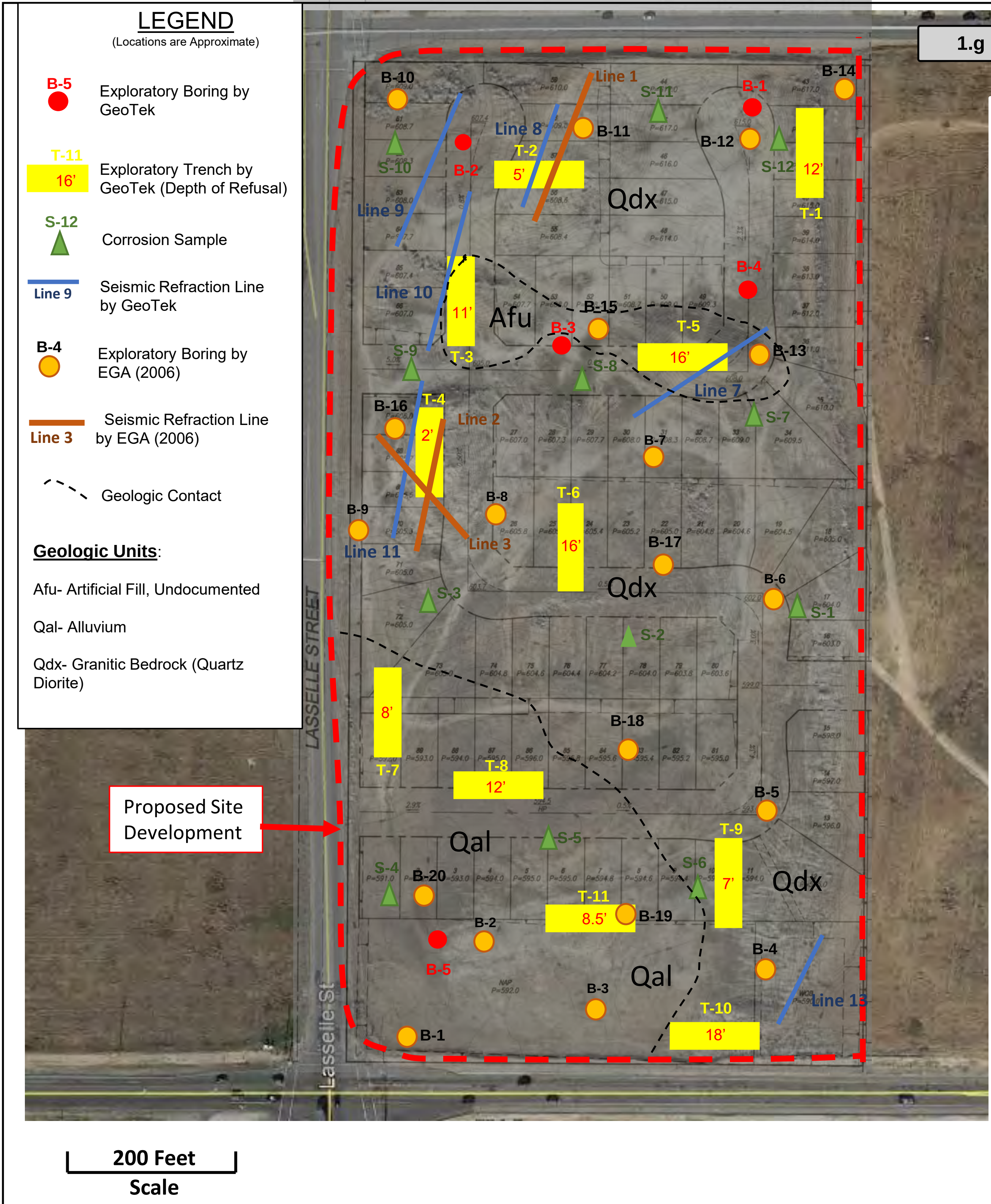
Project No. 2438-CR

Scale: As Shown

0 1 mi.

Figure 1

Site Location Map



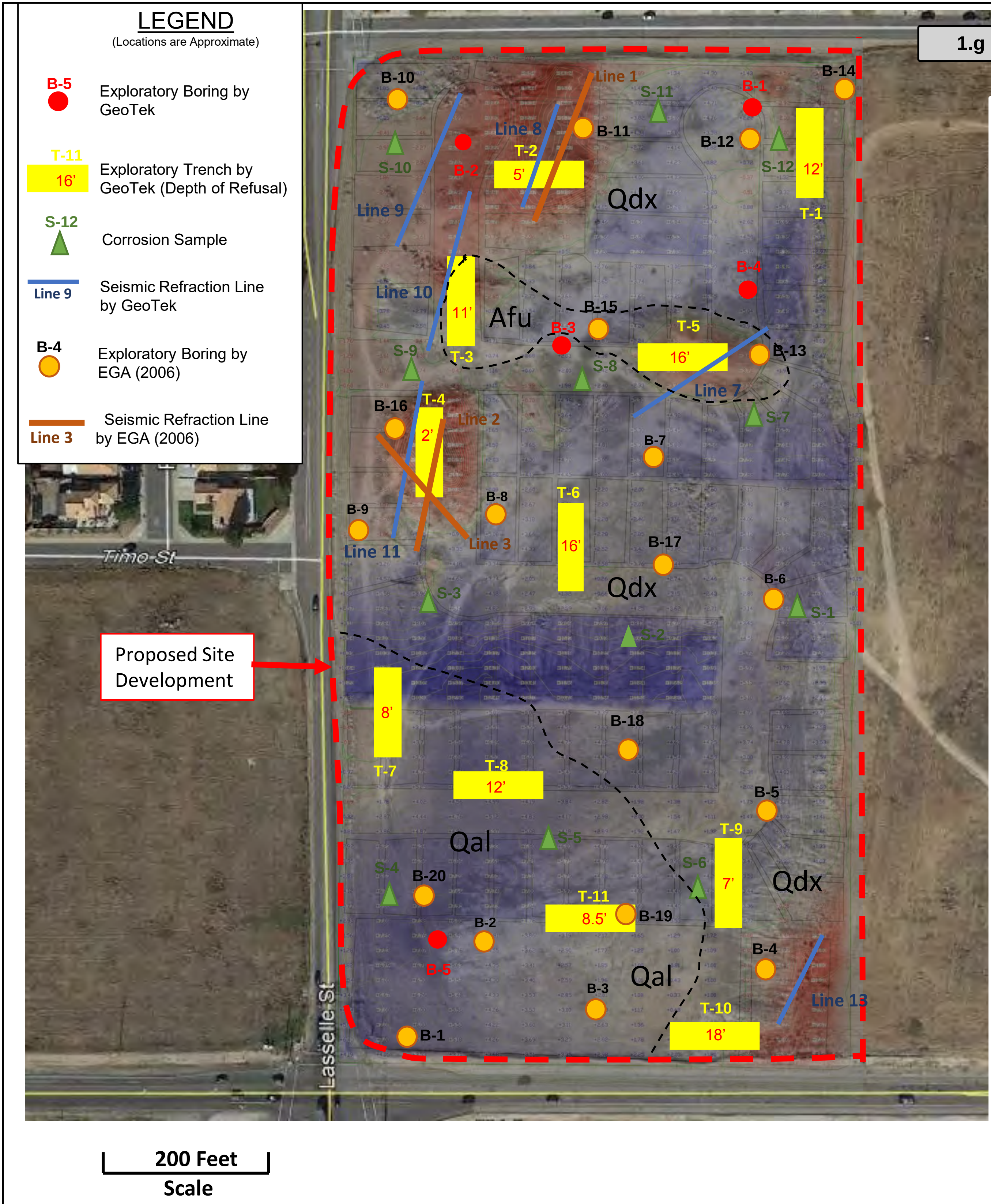
DR Horton Los Angeles Company, Inc.
Winco Site
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

N

Figure 2a

Exploration Location Map



DR Horton Los Angeles Company, Inc.
Winco Site
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 2b

Exploration Location Map

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family

APPENDIX A

EXPLORATORY BORINGS LOGS, SEISMIC REFRACTION TRAVERSES, AND LABORATORY TEST RESULTS BY EGA CONSULTANTS, INC. (2006)

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-1**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1585 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type Undisturbed	Sample Type Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ °	Direct Shear C psf	Other Tests
1	SM		◩	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒	◩	BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/5"	2.0	117.3					
10		◫	◩		50/4"							
		☒			50/3"	2.4	112.7					
15				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-1

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-2**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1587 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒	⧄	BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/6"	3.3	120.5					
10		◫	⧄		50/5"							
15		☒		Sample disturbed.	50/3"	2.9						
20		◫			50/3"							
25		◫		Very difficult to drill. Refusal.	50/3"							
30				Total Depth: 25 ft. at Refusal No Water No Caving Backfilled 4/17/06								
35												
40												

EGA Consultants

Figure
A-2

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-3**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1590 ft. above MSL

Sample Type: ■ Thin Wall Tube; ☒ 2.5" Ring Sample; ⧄ Bulk Sample; ◫ Standard Split Spoon Sample; ∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ °	Direct Shear: C psf	Other Tests
1	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/2"	1.3						
10		◫			50/2"							
15		☒			50/2"	1.3	117.9					
20		◫		Very difficult to drill. Refusal.	50/2"							
25				Total Depth: 23 ft. at Refusal No Water No Caving Backfilled 4/17/06								
30												
35												
40												

EGA Consultants

Figure
A-3

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: B-4
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1593 ft. above MSL

Sample Type: ■ Thin Wall Tube ☒ 2.5" Ring Sample ▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/2"	2.7	110.8					
10		◫			50/2"							
			▨									
15		◫		at 15 ft. - "salt and pepper" appearance.	50/3"	1.3	117.9					
20		◫			50/2"							
25		◫			50/2"							
30		◫			50/2"							
35		☒		Very difficult to drill. Refusal.	50/3"	13.9						
40				Total Depth: 36 ft. at Refusal No Water No Caving. Backfilled 4/17/06								

EGA Consultants

Figure A-4

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-5**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1594 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/3"	2.3	113.2					
10		◫			50/4"	2.2						
15		◫			50/3"	3.0						
		◫			50/3"	3.4						
20				Total Depth: 20 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-5

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-6**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1598 ft. above MSL

Sample Type: ■ Thin Wall Tube; ☒ 2.5" Ring Sample; ◪ Bulk Sample; ◫ Standard Split Spoon Sample; ∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM		◪	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
			◪	BEDROCK (Kt): at 6" Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.				0	133.5	57	30	O.M. 7.5
5		☒	◪		50/4"	1.6	120.3					
10		◫		at 10 ft. becomes white and orange.	50/2"	1.7						
				Becomes very difficult to drill.								
15		◫			50/2"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure
A-6

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-7**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1603 ft. above MSL

Sample Type:
■ Thin Wall Tube
☒ 2.5" Ring Sample
▱ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ °	Direct Shear: C psf	Other Tests
0	SM		▱	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1			▱									O.M. 7.5
2			▱	BEDROCK (Kt): at 6" Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.				0	133.5			
5		☒			50/3"	1.8	119.9					
10		◫		at 10 ft. becomes white and orange.	50/3"	2.1						
				Becomes very difficult to drill.								
15		◫			50/3"							
				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-7

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: B-8
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1606 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1				BEDROCK (Kt): Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.				0		57	30	
5		☒			50/4"	3.4	110.3					
		◫		Difficult to drill.	50/3"							
10				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-8

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-9**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1605 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◫ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. "Salt and peper" appearance.	50/4"	6.5	122.7					
10		◫			50/3"	5.2						
		◫			50/3"							
15				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-9

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-10**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1607 ft. above MSL

■ Thin Wall Tube ☒ 2.5" Ring Sample
▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type		SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear		Other Tests
		Undisturbed	Bulk							φ °	C psf	
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		BEDROCK (Kt): at 1 ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. "Salt and peper" appearance.	50/3"	4.1	128.8					
10		◫			50/2"	1.7						
15				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-10

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-11**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1626 ft. above MSL

■ Thin Wall Tube ☒ 2.5" Ring Sample ▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ °	Direct Shear: C psf	Other Tests
1		☒		BEDROCK (Kt): Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.	50/4"	2.6	115.8					
5				Total Depth: 3.25 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-11

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-12**
Boring Location: See Figure 2

Rig: Mob. CM75 w/8" augers
Grnd Elev. 1613 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◿ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1		☒		BEDROCK (Kt): at 1 ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.	50/1"	1.4		0				
5				Total Depth: 4.5 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-12

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-13**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1614 ft. above MSL

Sample Type: ■ Thin Wall Tube ☒ 2.5" Ring Sample ◿ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM		◿	FILL: Dark to reddish brown, dry, loose to med.-dense, fine to med.-grained silty sand. Mottled.					133.5			7.5
5		☒			38	5.1	129.7					
10		◫			26							
15		◫		at 13 ft becomes: BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Difficult to drill.	50/3"							
20		◫			50/2"							
25				Total Depth: 20 ft. No Water No Caving Backfilled 4/17/06								
30												
35												
40												

EGA Consultants

Figure A-13

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-14**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1616 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type		SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear		Other Tests
		Undisturbed	Bulk							φ°	C psf	
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.	50/6"	2.9	117.5					
10		◫			50/4"	2.7						
				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-14

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-15**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1604 ft. above MSL

■ Thin Wall Tube

☒ 2.5" Ring Sample

▨ Bulk Sample

◫ Standard Split Spoon Sample

∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
				BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.								
5		◫			50/4"							
10		◫			50/4"							
15												
20												
25												
30												
35												
40												

Total Depth: 10 ft.
No Water
No Caving
Backfilled 4/17/06

EGA Consultants

Figure
A-15

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-16**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1624 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type		SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear		Other Tests
		Undisturbed	Bulk							φ°	C psf	
1				BEDROCK (Kt): Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.								
		◫			50/3"							
5												
				Total Depth: 5 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-16

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-17**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1600 ft. above MSL

Sample Type:
- ■ Thin Wall Tube
- ☒ 2.5" Ring Sample
- ▨ Bulk Sample
- ◫ Standard Split Spoon Sample
- ∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
0–1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1				BEDROCK (Kt): at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.								
6		◫			50/3"							
10		◫			50/4"							
11				at 11 ft. becomes white and orange.								
14		◫		Becomes very difficult to drill.	50/2"							
15				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								

Depth scale: 1, 5, 10, 15, 20, 25, 30, 35, 40

EGA Consultants

Figure A-17

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-18**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1592 ft. above MSL

Sample Type: ■ Thin Wall Tube; ☒ 2.5" Ring Sample; ▨ Bulk Sample; ◫ Standard Split Spoon Sample; ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
5		◫		BEDROCK (Kt): at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.	50/3"							
10		◫		at 11 ft. becomes white and orange.	50/3"							
15		◫		Becomes very difficult to drill.	50/2"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-18

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-19**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1590 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
5		◫		BEDROCK (Kt): at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and well-foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.	50/3"							
10		◫		at 11 ft. becomes white and orange.	50/3"							
15		◫		Becomes very difficult to drill.	50/3"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure
A-19

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1
Project:	NEC Alessandro & Lasselle Moreno Valley, CA
Date Started:	4/17/2006
Date Completed:	4/17/2006

Boring No: **B-20**
Boring Location: See Figure 2

Rig: Mob. CM75 w/8" augers
Grnd Elev. 1585 ft. above MSL

■ Thin Wall Tube ☒ 2.5" Ring Sample
▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5			7.5
		◫			50/4"							
5				BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.								
10		◫		Large crystals to 1/4-inch dia.	50/2"							
15		◫		Difficult to drill.	50/3"							
20				Total Depth: 15 ft. No Water No Caving. Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure
A-20

LABORATORY TEST RESULTS

Summarized below are the results of requested laboratory testing on samples submitted to our office.

Dry Density and Moisture Content

Tabulated below are the results of field dry density/moisture contents of undisturbed soils samples retained in 2 3/8–inch inside diameter by one-inch height rings. Moisture only results were obtained from bulk samples.

TABLE 1

Sample Identification	Dry Density (pcf)	Moisture Content (%)
B-1@ 5'	117.3	2.0
B-1@ 15'	112.7	2.4
B-2@ 5'	120.5	3.3
B-2@ 15'	106.2 Disturbed	2.9
B-3@ 5'	*	1.3
B-3@ 15'	117.9	1.3
B-4@ 3'	110.8	2.7
B-4@ 35'	*	13.9
B-5@ 5'	113.2	2.3
B-5@ 10'	*	2.2
B-5@ 15'	*	3.0

TABLE 1 (Cont.)

Sample Identification	Dry Density (pcf)	Moisture Content (%)
B5@ 20'	*	3.4
B-6@ 3'	120.3	1.6
B-6@ 10'	*	1.7
B-7@ 5'	119.9	1.8
B-7@ 10'	*	2.1
B-8@ 5'	110.3	3.4
B-9@ 5'	122.7	6.5
B-9@ 10'	*	5.2
B-10@ 5'	128.8	4.1
B-10@ 10'	*	1.7
B-11@ 3'	115.8	2.6
B-12@ 5'	*	1.4
B-13 @ 5'	129.7	5.1
B-14@ 5'	117.5	2.9
B-14@ 10'	*	2.7

Note: (*) denotes soil sample disturbance and/or insufficient soil sample for density determination. No density possible

Maximum Dry Density and Optimum Moisture Content

A maximum dry density and optimum moisture content test was performed on the requested bulk soil sample in accordance with ASTM: D 1557. The results are shown below:

Sample Identification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-6 @ 0-4'	133.5	7.5

Sieve Analysis

Two sieve analyses were performed on bulk soil samples identified as B-2 @ 15-20 feet and B-4 @ 20-30 feet. These tests were performed in accordance with ASTM D422 and the results are shown graphically on Plates B-1and B-2.

Direct Shear

Direct shear tests were performed on relatively undisturbed ring samples, identified as B-6 @ 3 feet, with a direct shear machine of the strain-controlled type. The controlled rate of strain is 0.004 inch per minute. The samples were soaked in a confined state prior to shearing. Then the samples where sheared under varied loads ranging from 1.0 ksf to 4.0 ksf. The test results are plotted on Plate B-3.

Expansion Index

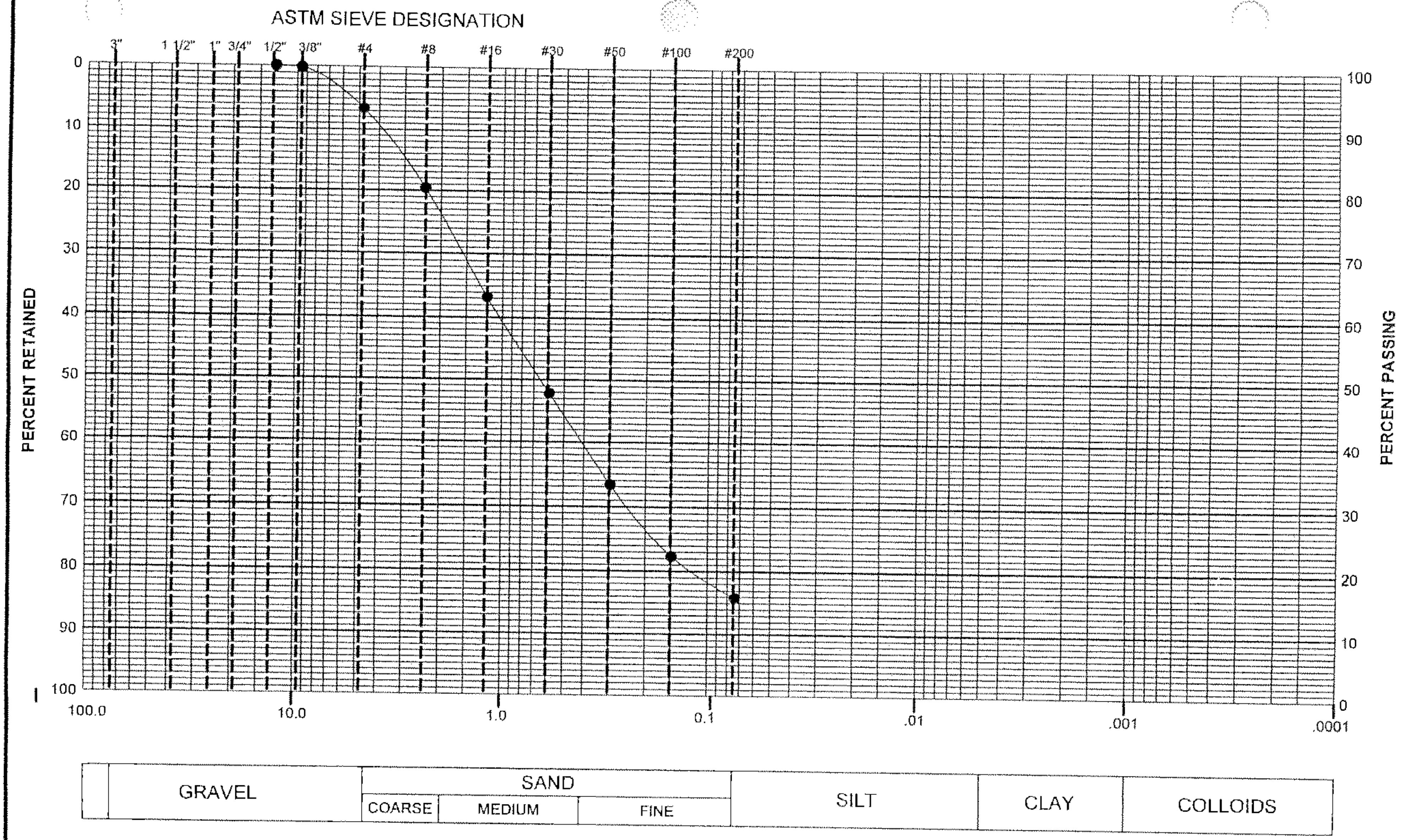
A bulk soil sample was tested for expansion potential following the ASTM D-4829 Test Procedure. Test results are presented below:

Sample Identification	Expansion Index	Expansion Potential (UBC 18-1-B)
B-6 @ 0-4'	0	Very Low

Sulfate Content

A selected bulk sample was tested for soluble sulfate content in accordance with Hach procedure. The test result is shown below.

Sample Identification	Water Soluble Sulfate In Soil (Percentage by weight (%))	Sulfate Exposure (UBC Table 19-A-4)
B-14 @ 0-3'	0.0022	Negligible

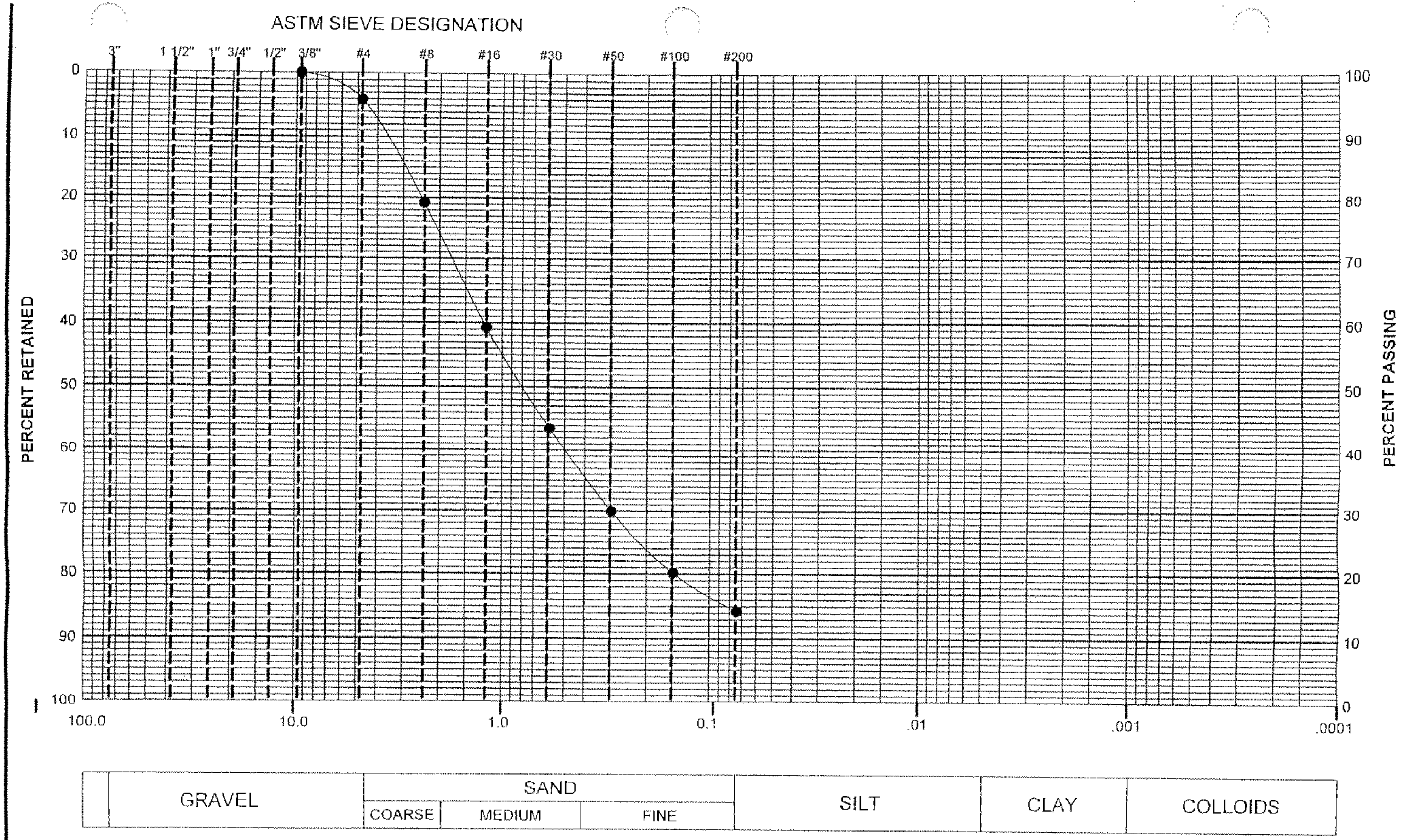


Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-2	15-20'				15.8		EGA @ Alessandro Site

GRAIN SIZE DISTRIBUTION

NEBLETT & ASSOCIATES,INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649
714 840-8286

P.N. 314-087-12 **DATE 5/8/06**

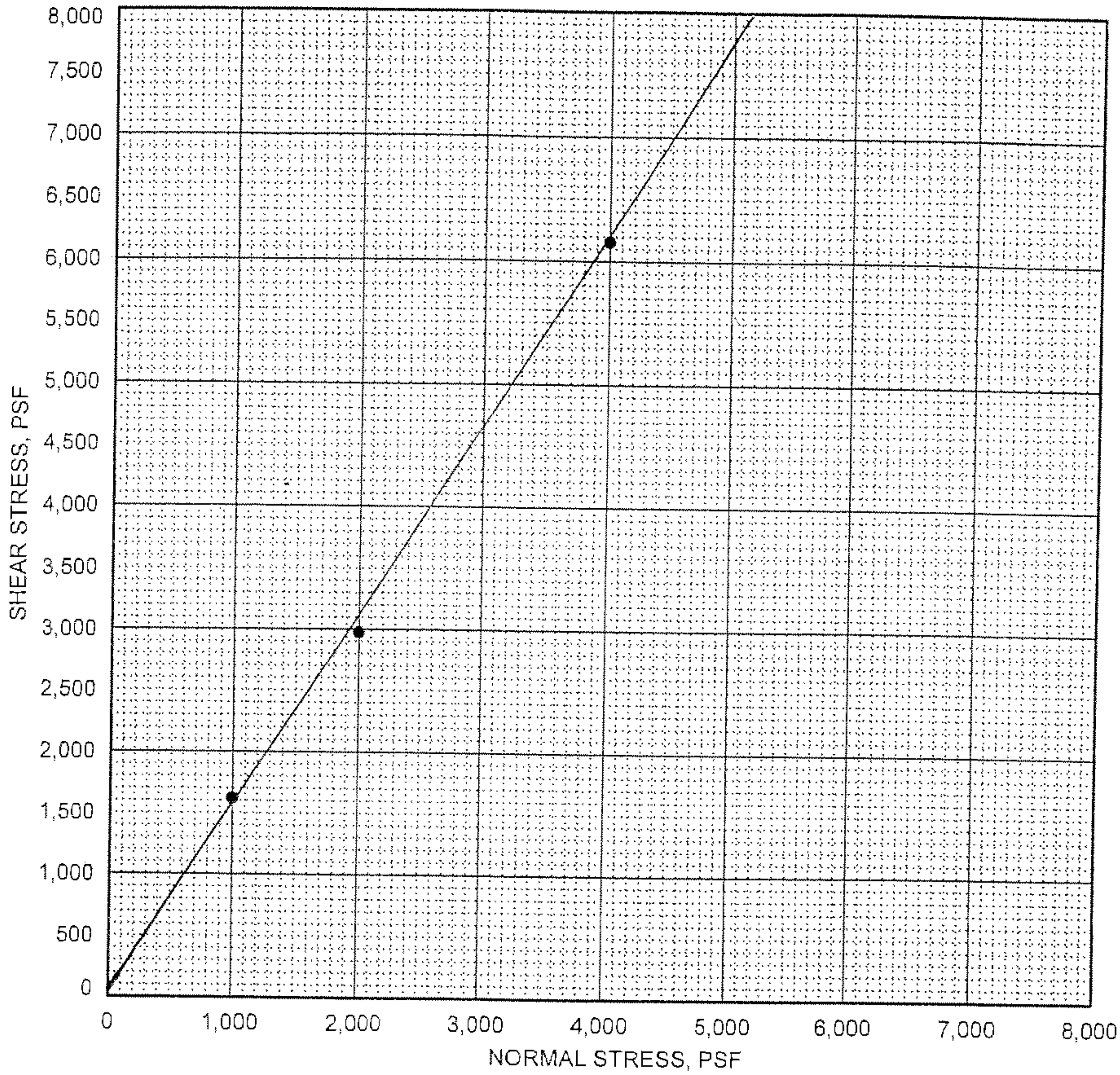


Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-4	20–30'				14.2		EGA @ Alessandro Site

GRAIN SIZE DISTRIBUTION

NEBLETT & ASSOCIATES,INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649 714 840-828
P.N. 314-087-12 DATE 5/8/06

DIRECT SHEAR TEST
Undisturbed



EGA@ Alessandro Site	COHESION	30	psf.
	FRICTION ANGLE	57.0	degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-6	3.0			

DIRECT SHEAR TEST

NEBLETT & ASSOCIATES, INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649 714 840-8286

P.N. 314-087-12 **DATE 5/8/06**

PLATE B-3

SCHIFF ASSOCIATES

www.schiffassociates.com
Consulting Corrosion Engineers – Since 1959

Table 1 - Laboratory Tests on Soil Samples

EGA Consultants
Alessandro, Moreno Valley, CA
Your #314-087-12, MJS&A #06-0668LAB
25-Apr-06

Sample ID			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	270,000
saturated		ohm-cm	13,000
pH			8.1
Electrical Conductivity		mS/cm	0.03
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	28
magnesium	Mg^{2+}	mg/kg	17
sodium	Na^{1+}	mg/kg	ND
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	82
chloride	Cl^{1-}	mg/kg	ND
sulfate	SO_4^{2-}	mg/kg	ND
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

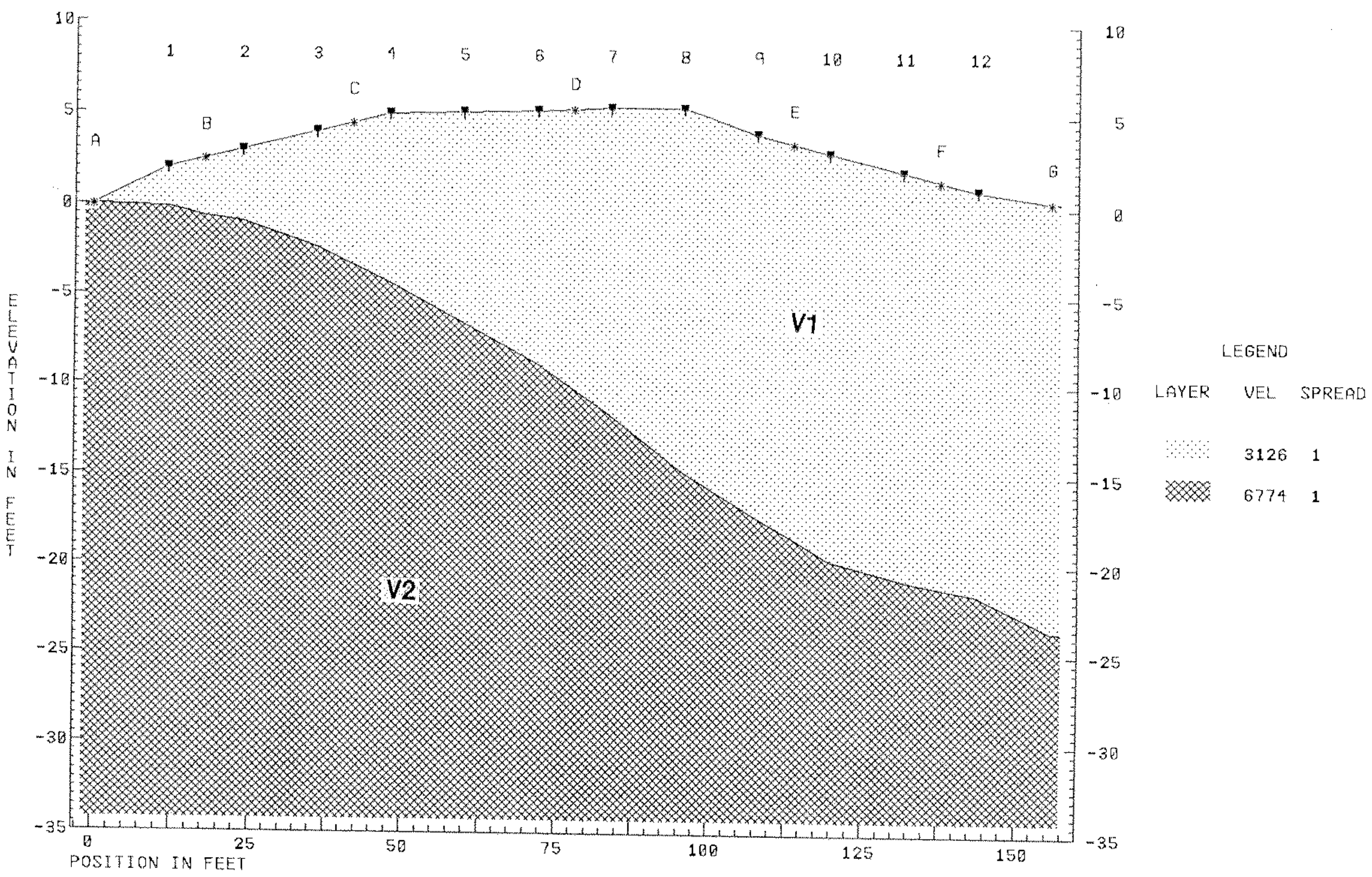
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

LAYER VELOCITY PROFILE S-1

North 25° East →

FILE 2071-1.SIP
SEISMIC LINE S-1

SPREAD 1

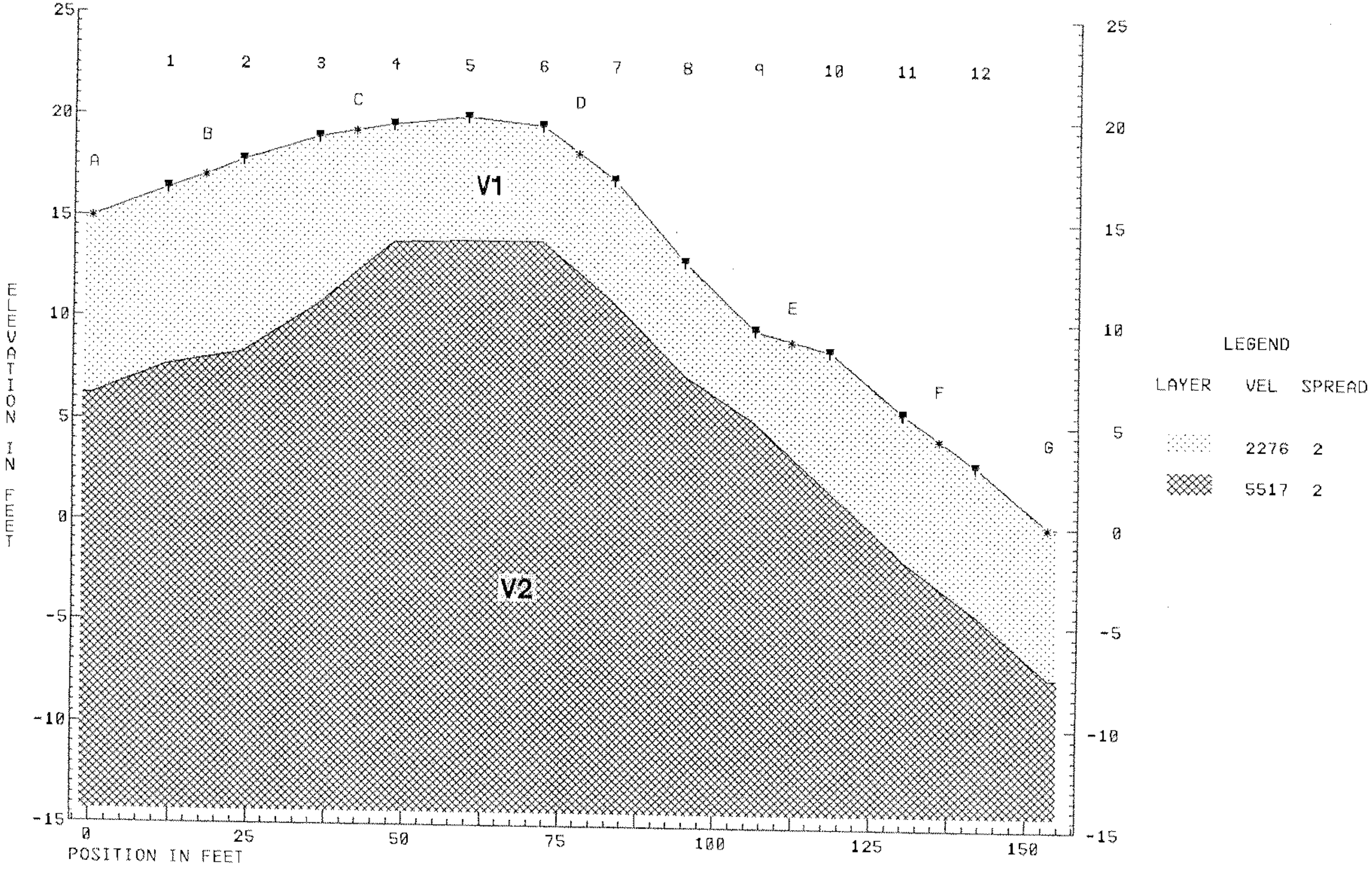


LAYER VELOCITY PROFILE S-2

South 10° West →

FILE 2071-2.SIP
SEISMIC LINE S-2

SPREAD 2

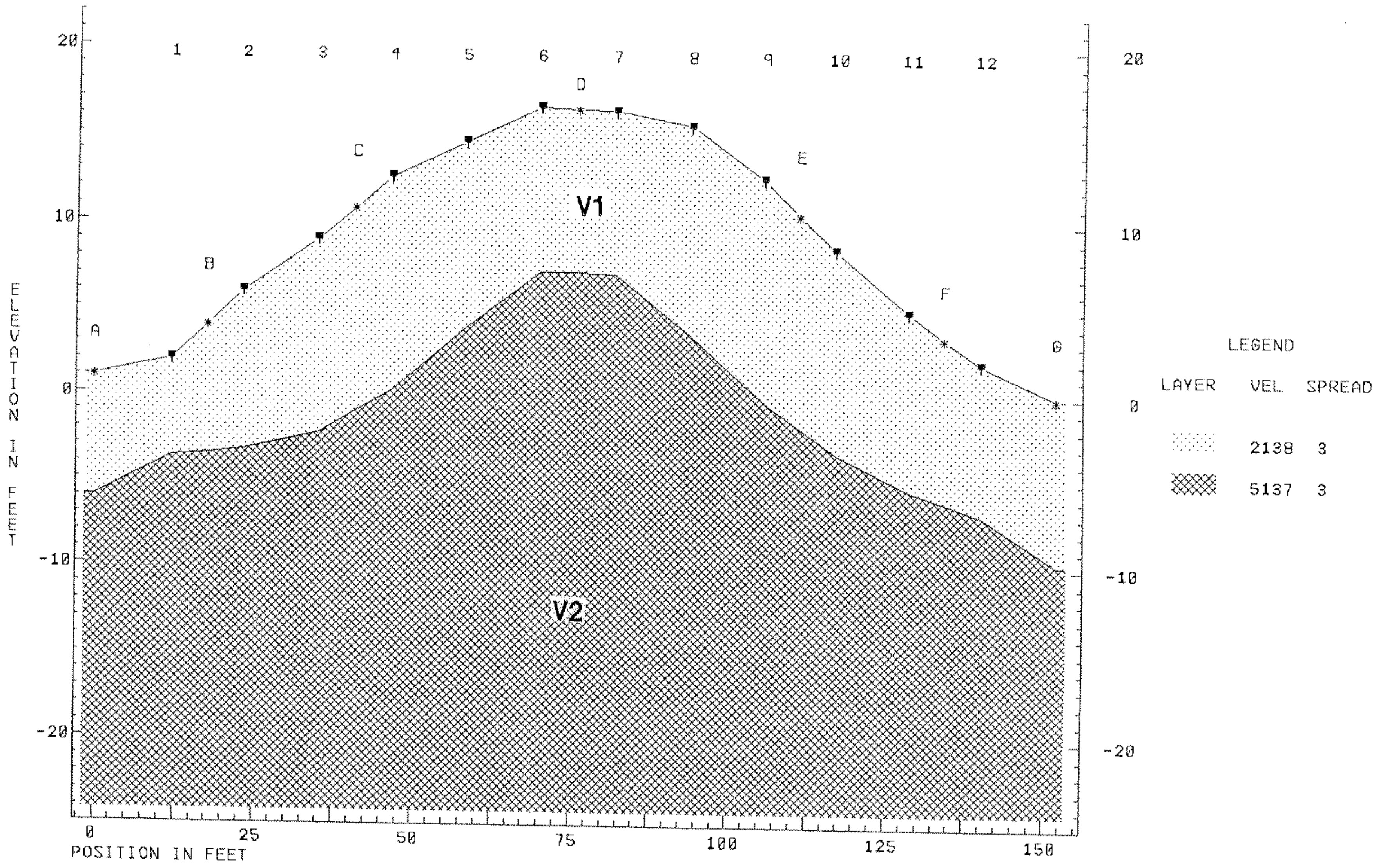


LAYER VELOCITY PROFILE S-3

North 35° West →

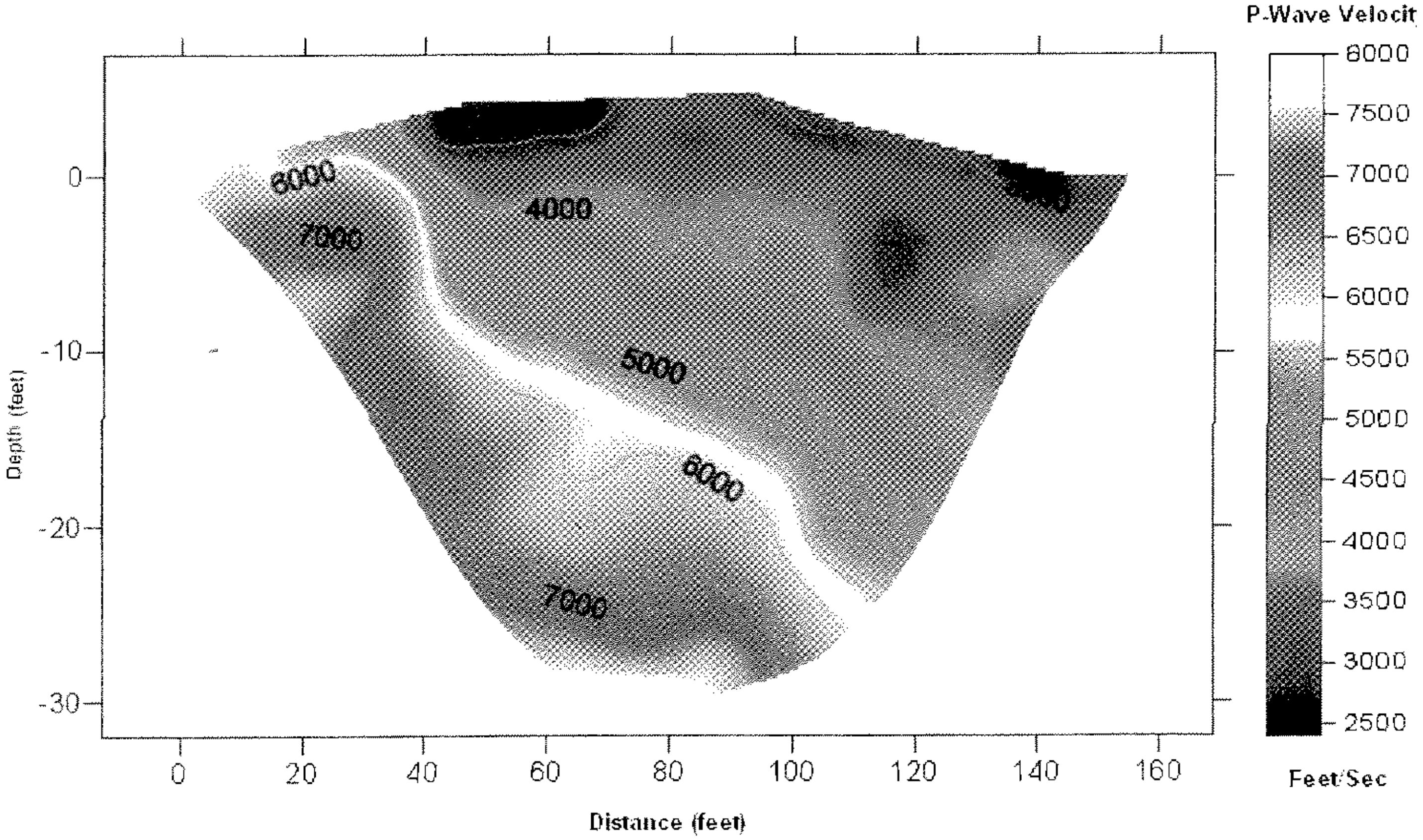
FILE 2071-3.SIP
SEISMIC LINE S-3

SPREAD 3



SEISMIC LINE S-1

North 25° East →

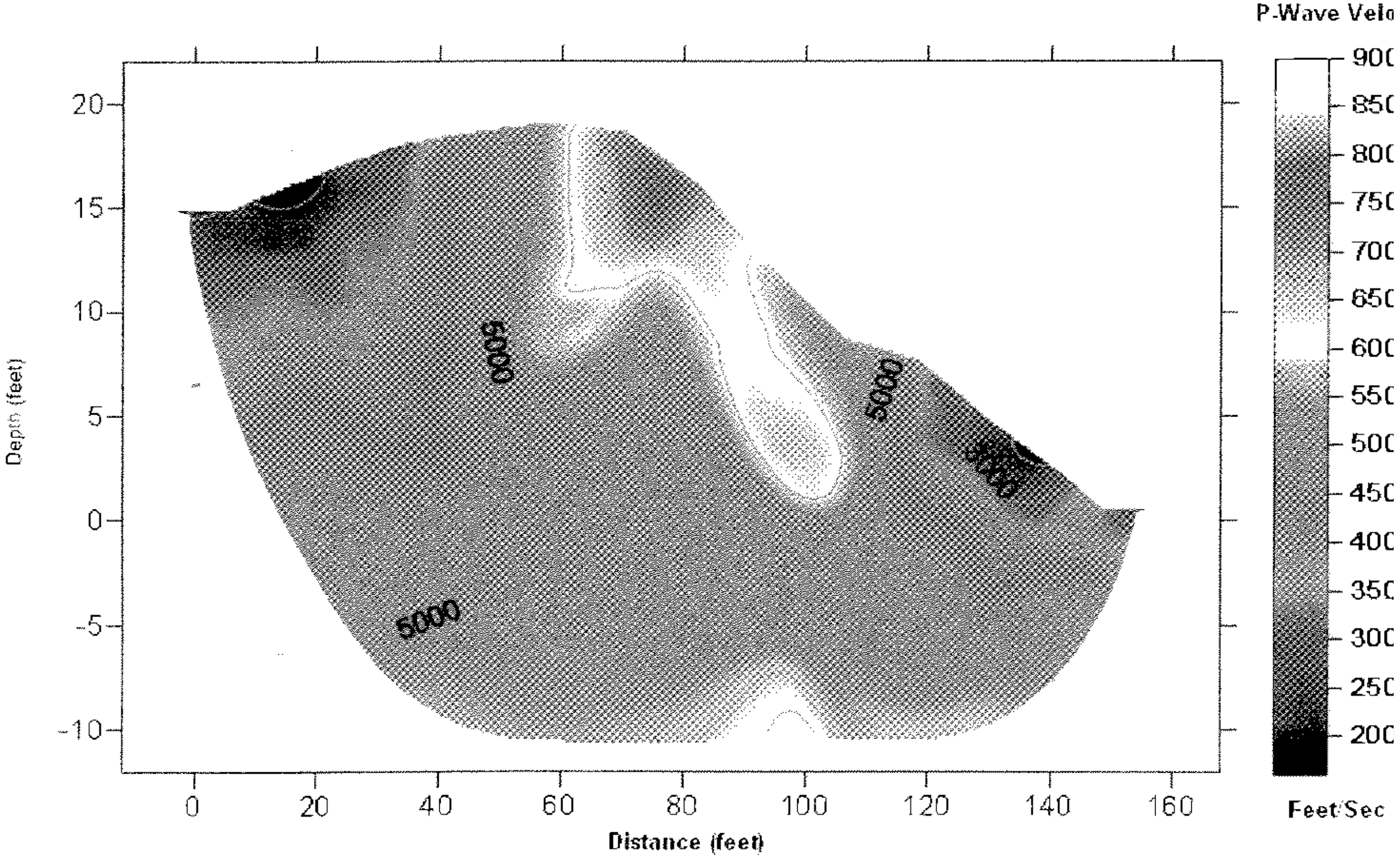


TOMOGRAPHIC MODEL

SEISMIC LINE S-2

South 10° West →

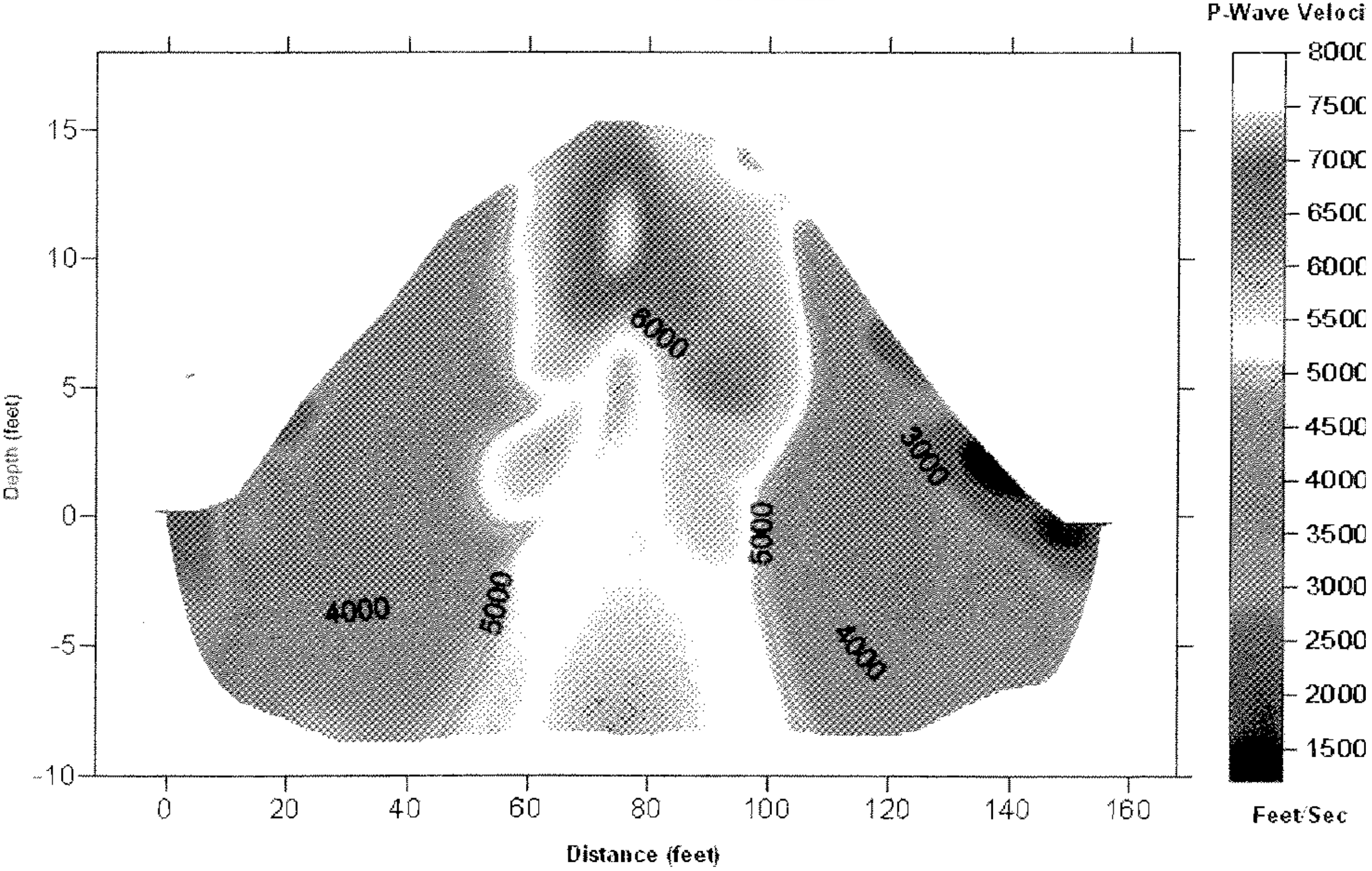
TOMOGRAPHIC MODEL



SEISMIC LINE S-3

North 35° West →

TOMOGRAPHIC MODEL



APPENDIX B

LOGS OF EXPLORATORY TRENCHES AND BORINGS
BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

Bulk Samples (Large)
These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)
These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – TRENCH/BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of trenches and borings:

SOILS	
USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium
GEOLOGIC	
B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
―――	Solid Line denotes unit / formational change
━━━	Thick solid line denotes end of the trench/boring

(Additional denotations and symbols are provided on the log of trench/boring)

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	**BORING NO.: B-1** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					Granitic Bedrock: excavates as Silty f-c SAND, gray, dry, fairly easy to drill			
5								
					Same as above, drilling slowed down slightly but material is still friable			
10					Becomes brownish gray, slightly moist			
15								
					Becomes very hard to drill Driller had drill rig off the ground with no auger advancement			
					BORING TERMINATED AT 18 FEET (REFUSAL)			
20					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 10:42			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-2

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					Granitic Bedrock:			
					Excavates as Silty f-c SAND, brown, dry			
5					excavates as Silty f-c SAND, gray, slightly moist, friable			
10					Becomes grayish brown, moderately hard to drill			
					Becomes gray			
15								
					Very hard drilling, excavates as silty f-c SAND, light gray, slightly moist			
					Material still appears friable			
20					**BORING TERMINATED AT 20 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 9:42			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-3

Depth (ft)	SAMPLES Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Dry Density (pcf)	Others
					Granitic Bedrock:			
	☒				excavates as Silty f-c SAND, brown, dry			MD, EI, SH
5					Excavates as Silty f-c SAND, gray, slightly moist, friable			
10					Becomes hard to drill			
15								
					Same as above, still appears friable			
20					**BORING TERMINATED AT 20 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 10:32			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-4

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					Granitic Bedrock:			
					Excavates as Silty f-c SAND, brown, dry			
5					Same as above, becomes hard to drill			
10					Becomes light gray			
15								
					Same as above, still appears friable			
20					**BORING TERMINATED AT 20 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 11:27			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ▱ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

Depth (ft)	SAMPLES Sample Type	 Blows/ 6 in	 Sample Number	USCS Symbol	**BORING NO.: B-5** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
					Alluvium:			
	■	9 9 7		SM	Silty f-c SAND, brown, slightly moist, loose	8.8	126.4	
5	■	8 16 21			Silty f-c SAND, reddish brown, moist	6.8	129.1	HC
					Granitic Bedrock: Excavates as silty f-c SAND, reddish brown to brown, slightly moist			
10								
15					Becomes harder to drill, excavates as silty f-c SAND, light gray, slightly moist			
					Same as above, appears friable			
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 7 feet to 20 feet was 6:21			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◿ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

	SAMPLES			**TRENCH NO.: T-1**	Laboratory Testing		
Depth (ft)	Sample Type	Time for Excavation	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
				Granitic bedrock: Weathered granite, excavates as silty f-vc SAND, brownish gray, slightly moist, moderately easy to excavate 2-3 scratches for full bucket			
		0:53					
				Same as above, becomes moderately hard 3-4 scratches for 1/2 to full bucket			
		2:52		Same as above			
5							
		5:19		Same as above			
				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		10:10		Same as above			
10		16:45		Same as above, very tight but still friable			
		28:10		Becomes almost unexcavatable, 7+ scratches for 1/8 to 1/4 bucket			
				TRENCH TERMINATED AT 12 FEET (REFUSAL)			
				No groundwatered encountered			
				Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ⊽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-2** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Granitic bedrock: Slightly weathered granite, excavates as silty f-c SAND, gray, dry, moderately hard to excavate 3-4 scratches for 1/2 to full bucket			
		3:36		Becomes very hard to excavate, 8 scratches for 1/8 to 1/4 bucket, granitic clasts approx. 6-8" in diameter more apparent in spoils			
		11:07 19:07		Same as above			
5				**TRENCH TERMINATED AT 5 FEET (REFUSAL)** No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resistivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map

LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	TRENCH NO.: T-3 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Undocumented fill:			
			SM	Silty clayey f-c SAND, brown to grayish brown, slightly moist			
		0:26					
		1:30		Same as above			
5				**Granitic bedrock:**			
				Weathered, excavates as silty f-c SAND, grayish brown, slightly moist			
		3:04					
				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket, excavates as silty f-vc SAND, gray, slightly moist			
		11:47					
10							
		19:19		Same as above			
		25:25					
				TRENCH TERMINATED AT 11 FEET (REFUSAL)			
				No groundwatered encountered			
				Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resistivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	TRENCH NO.: T-4 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
		6:17		**Quartzite bedrock:** Non-weathered quartzite, excavates as sandy GRAVEL with cobbles, very hard to excavate 5+ scratches for 1/8 to 1/2 bucket			
				TRENCH TERMINATED AT 2 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
5							
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Trench Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES		USCS Symbol	**TRENCH NO.: T-5**	Laboratory Testing		
	Sample Type	Time for Excavation		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
				Undocumented fill:			
		0:25	SM	Silty f-c SAND, brown, slightly moist, trace asphalt fragments			
		1:36		Same as above			
5							
		2:27		Same as above, very easy to excavate			
		4:21		Silty f-c SAND, brown, moist			
10		6:12		Same as above			
		8:40					
				Granitic Bedrock:			
		11:40		Non weathered granite, excavates as silty f-c SAND, gray, slightly moist, hard to excavate 4-5 scratches for 1/2 to full bucket			
15				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		23:25					
				TRENCH TERMINATED AT 16 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ∇ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resistivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-6	Laboratory Testing		
	Sample Type	Time for Excavation		MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
			SM	**Alluvium:** Silty f-c SAND, reddish brown, dry to slightly moist			
		0:31					
		1:31		Silty clayey f-c SAND, reddish brown, moist			
5							
		2:49		Same as above			
		5:17		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, grayish brown, slightly moist, hard to excavate 4-5 scratches for 1/2 to full bucket			
10		9:52		Same as above			
		14:38		Same as above, becomes gray			
				becomes very hard to excavate 5+ for 1/4 to 1/2 bucket			
		23:52		Same as above			
15							
		33:14					
				TRENCH TERMINATED AT 16 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

TRENCH NO.: T-7

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
			SM	**Alluvium:** Silty clayey f-c SAND, reddish brown, dry			
		0:41		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, grayish brown, dry to slightly moist, moderately easy to excavate 2-3 scratches for full bucket			
		3:24		Becomes hard to excavate 4-5 scratches for 1/2 to full bucket			
5							
		9:28		Becomes very hard to excavate 5 scratches for 1/4 to 1/2 bucket, excavates as silty f-c SAND, gray, slightly moist			
		22:07		Excavated material appears to be quartzite, excavates as f-c sandy gravel with some cobbles			
				TRENCH TERMINATED AT 8 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-8** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			sM	Silty clayey f-c SAND, brown, dry			
		0:34		Same as above, becomes slightly moist			
		1:21		Same as above			
5							
		2:31		Silty f-c SAND, brown, slightly moist			
				Granitic Bedrock:			
		5:44		Weathered granite, excavates as silty f-vc SAND, brownish gray, slightly moist, becomes hard to excavate 4-5 scrathes for 1/2 to full bucket			
10		11:12		Same as above			
		19:00		Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		25:26 31:26		Same as above, still friable but very tight			
15				**TRENCH TERMINATED AT 12 FEET (REFUSAL)** No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

TRENCH NO.: T-9

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
				Granitic bedrock:			
		2:31		Non-weathered granitic bedrock, excavates as silty f-vc SAND, gray, dry to slightly moist, very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		8:53		Same as above, still friable			
5				Same as above, some of the material is excavated in cobble sized clasts			
		14:00 22:07		Same as above, there is a quartzite dike appro 2-3 in wide that appears unexcavatable perpendicular to the test pit			
				TRENCH TERMINATED AT 7 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Time for Excavation	USCS Symbol	TRENCH NO.: T-10 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
				Quartzite bedrock:			
		0:33		Very weathered quartzite, excavates as silty clayey f-c SAND, light gray, dry, easy to excavate			
		1:35		Same as above			
5				Becomes moderately easy to excavate 2-3 scrathes for 1/2 to full bucket			
		3:42					
		7:03		Same as above, becomes moist			
10							
		10:56					
				Becomes easy to excavate 1-2 scratches for full bucket, trace clayey fault gouge becomes apparent			
		12:43					
		15:16					
15							
		17:44		Still easy to excavate, clayey fault gouge becomes more apparent			
		19:28					
				TRENCH TERMINATED AT 18 FEET No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ∇ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

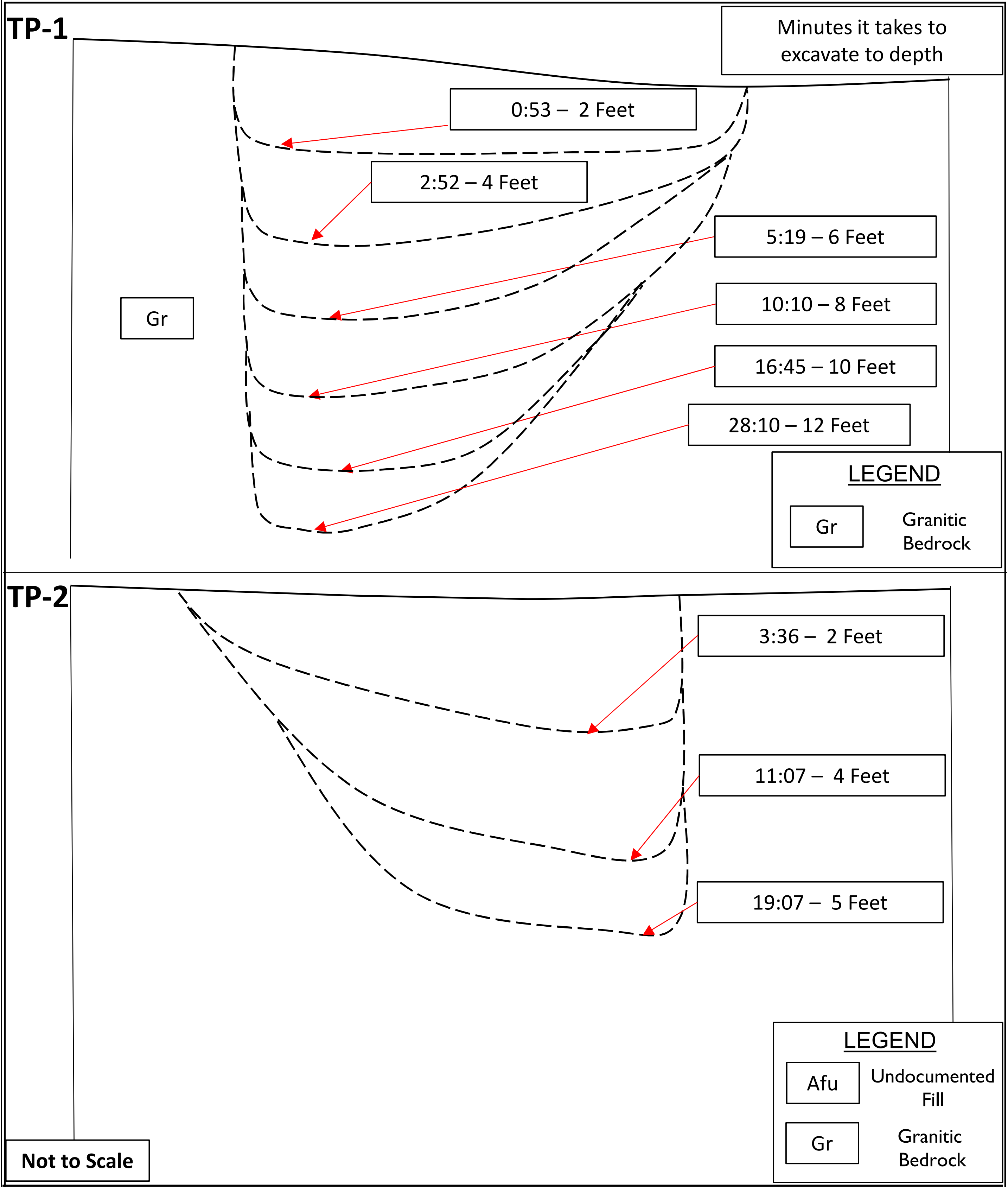
Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-11** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			SM	Silty f-c SAND, brown, dry to slightly moist			
		0:27		**Granitic bedrock:** weathered granite, excavates as silty f-c SAND, brownish gray, slightly moist			
		1:52		Same as above, becomes moderately easy to excavate 2-3 scratches for 1/2 to full bucket			
5							
		4:14		Becomes hard to excavate 4-5 scratches for 1/2 to full bucket, some quartzite clasts become apparent within spoils Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		19:06		Excavator scratching on quatrzite that is unexcavatable			
				TRENCH TERMINATED AT 8.5 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ∇ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density



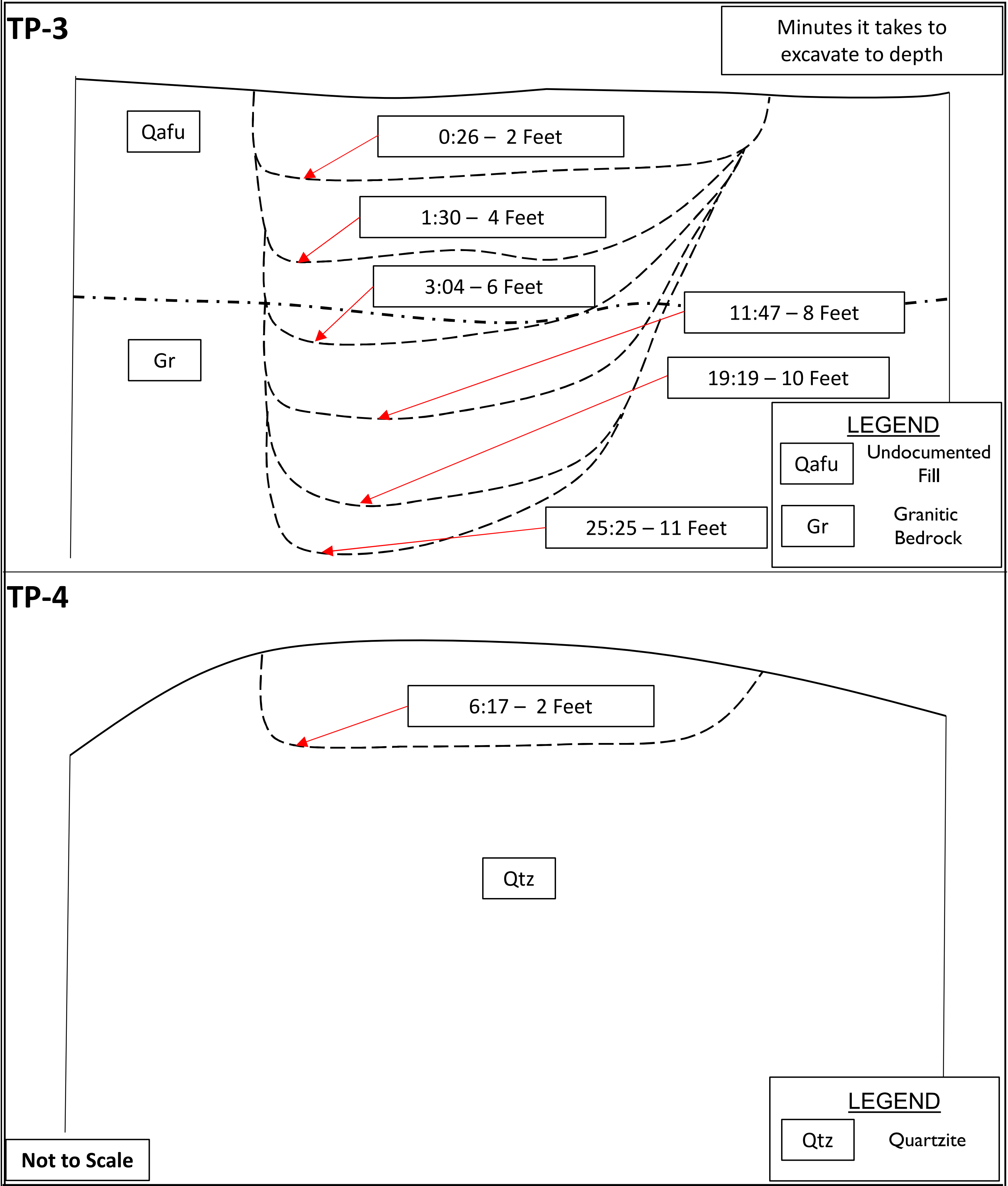
DR Horton
Winco Site Project
Moreno Valley, Riverside County,
California

GeoTek Project No. 2438-CR

Figure I

Graphic Trench Logs

GEOTEK



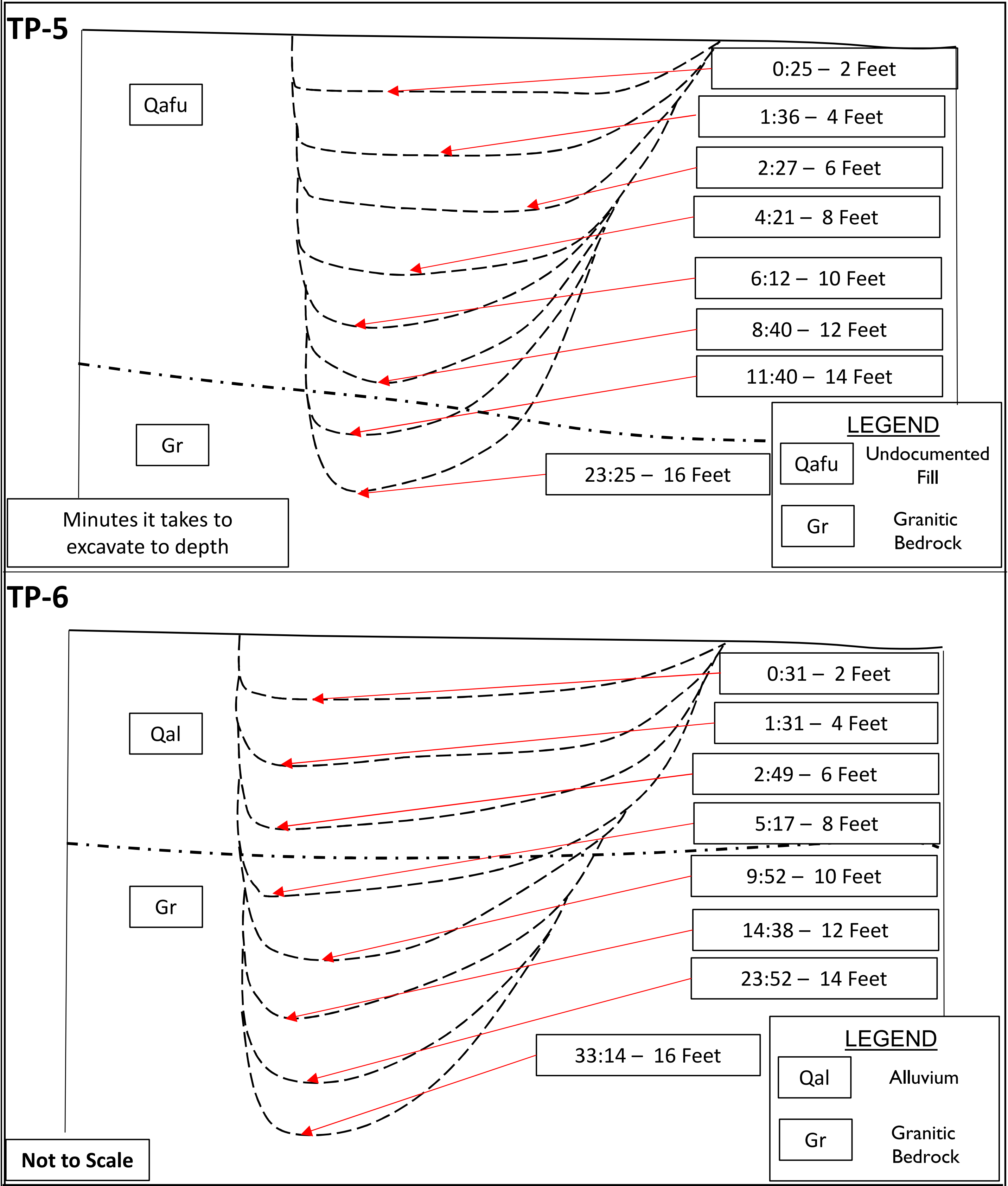
DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 2

Graphic Trench Logs

GEOTEK



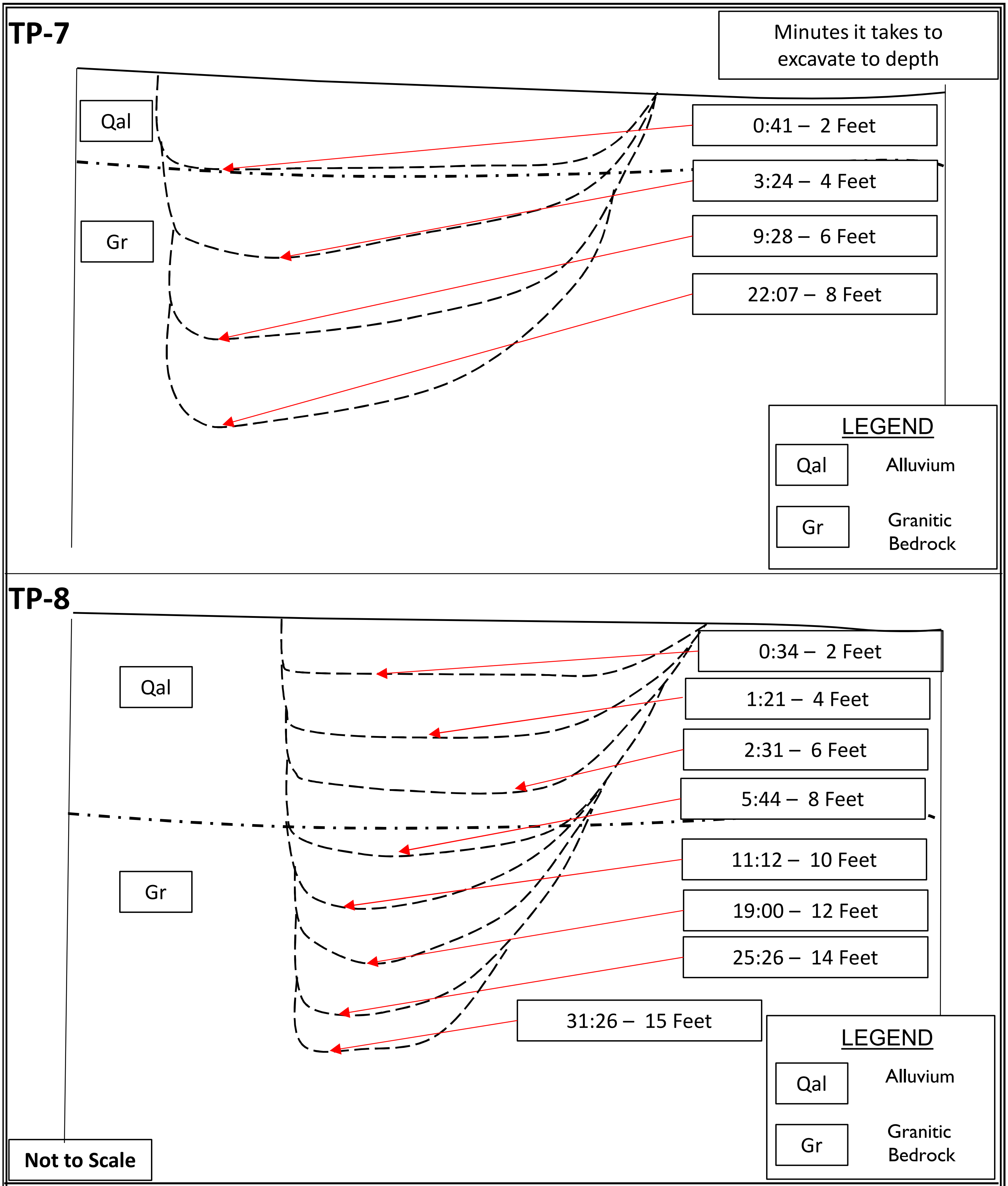
DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 3

Graphic Trench Logs

GEOTEK



Not to Scale

DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

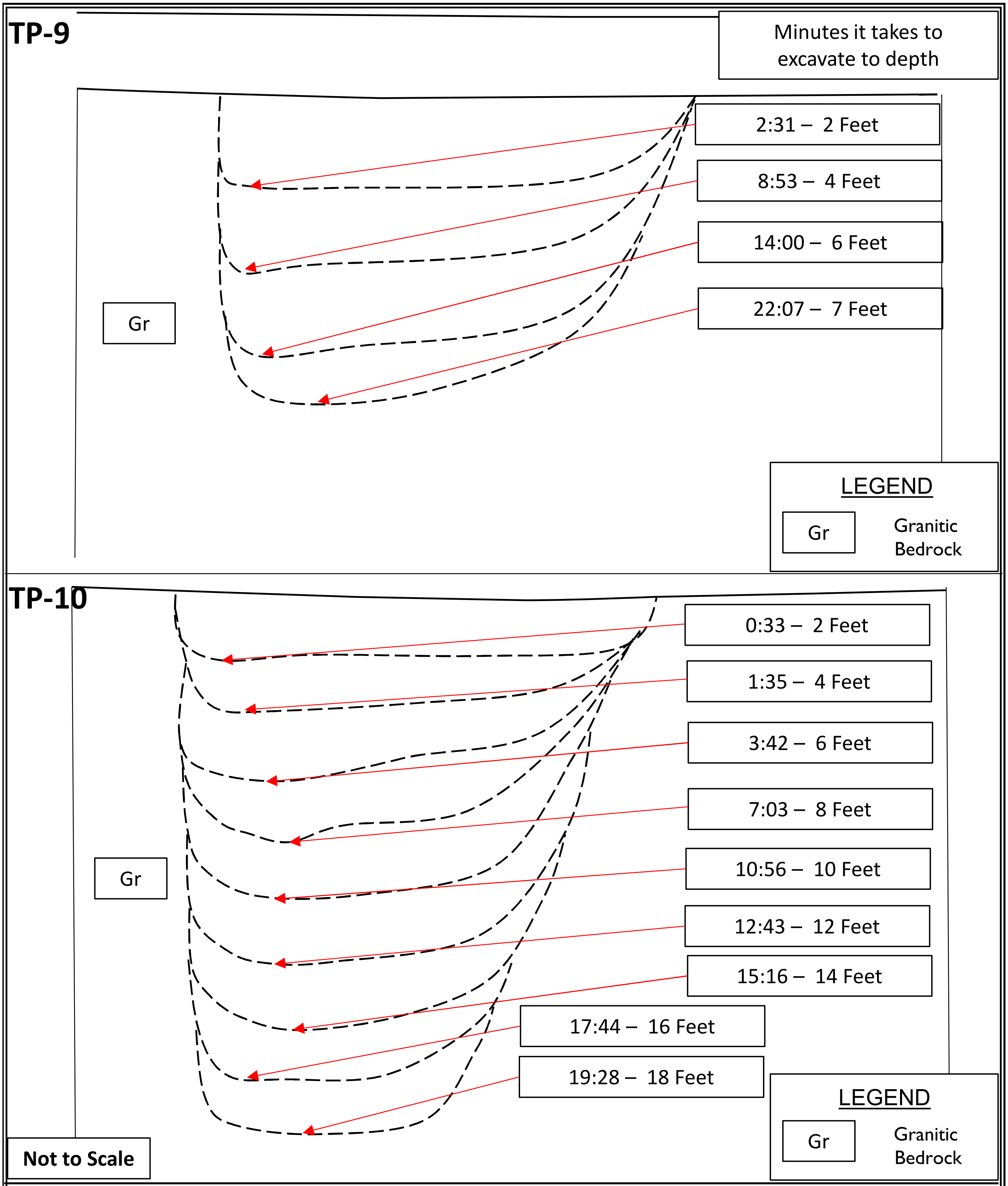
GeoTek Project No. 2438-CR

Figure 4

Graphic Trench Logs

GEOTEK

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

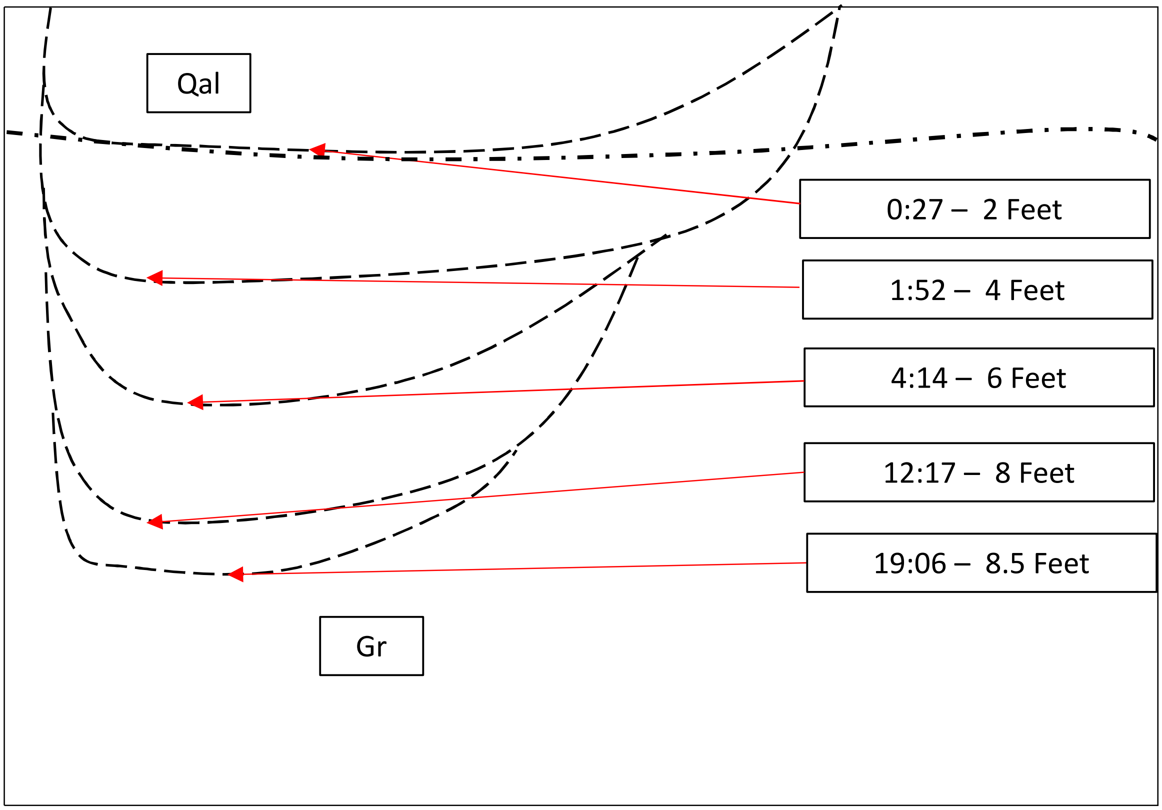
Figure 5

Graphic Trench Logs

GEOTEK

TP-11

Minutes it takes to excavate to depth



Not to Scale

LEGEND

Qal	Alluvium
Gr	Granitic Bedrock

DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 6

Graphic Trench Logs

GEOTEK

APPENDIX C

SEISMIC REFRACTION SURVEY RESULTS BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

Subsurface Surveys & Associates, Inc.
2075 Corte Del Nogal, Suite W   Carlsbad, CA 92011
Phone: (760) 476-0492   Fax: (760) 476-0493

GeoTek. Inc.
1548 North Maple Street
Corona, CA   92880

August 19, 2020

Attn: Ed LaMont

Re: Seismic Survey Summary Report
Darwin 72 Project, Moreno Valley, CA

This report covers the results of a seismic refraction survey performed at the Darwin 72 Project site in Moreno Valley, California. The purpose of the survey was to measure the compressional wave velocity of bedrock for rippability assessment and to provide cross sections showing thickness of the weathered zone and depth to the unweathered interface. This should be useful for planning cuts, grading, and other earthwork.

The field work was conducted during July 27-28, 2020. Thirteen seismic lines were recorded at locations selected by GeoTek. A survey location map is provided on Figure 1 that shows the position and orientation of the traverses.

GEOLOGIC SETTING

A review of the “Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California ”, (USGS Open File Report 2006-1217, 2006) indicates the survey area is underlain by Cretaceous tonalite (Kt), undifferentiated.

Surface deposits are mapped as very old alluvial fan deposits (Qvof).

DATA ACQUISITION AND FIELD METHODS

Seismic refraction data were recorded with a Bison 9024 signal enhancement seismograph and 28 Hz geophones. The standard spread layout used 24 geophones with a 5 or 8-foot spacing which provided a line length of 120 and 192 feet, respectively. Each spread used five shotpoints, one off each end (5-foot offset) and three within the interior of the spread. Depth of investigation was approximately 20-45 feet

Compressional wave energy was created by sledge hammer impacts on a metal plate. The signal enhancement feature of the seismograph allowed returns from repeated hits to be stacked, thus improving the signal. Each record was stored digitally on an internal hard disk and printed copies of each seismogram were made in the field on thermal paper. Example field records are shown on Figure 2.

Relative elevations of all shotpoints and geophones were determined by differential leveling with a hand level. Geophone 1 (distance = 0 ft.) at the beginning of each line was assigned a elevation value of 0.0 feet. This datum point served as the reference elevation for all other measurements.

Labeled wooden stakes were placed at the beginning and end of each spread and a Garmin handheld GPS receiver was used to record the latitude and longitude coordinates of the stakes. The coordinates were used to make the location map shown on Figure 1.

SEISMIC REFRACTION METHOD

The refraction method involves measuring the total time for compressional waves to travel from a shotpoint through the subsurface to a set of geophones placed linearly along the ground. Based on Snell's Law, when two or more layers are present with increasingly higher acoustic velocity, waves become critically refracted across the layer boundaries and begin traveling at the speed of the underlying layer. The advancing waves then generate new wavefronts back to the ground surface. The first surge of energy hitting the geophone is termed the "first arrival" and is depicted on the seismogram as a high angle deflection along each trace.

Recognition of direct wave arrivals (non-refracted) verses refracted waves is a key element of refraction interpretation. To assist this process, the first arrival times measured from the seismic records are plotted on graphs of time verses distance called Time-Distance graphs. An example T-D graph from Line 3 is shown on Figure 3. Based on changes in slope on the graphs, a preliminary layer number (i.e. 1, 2, 3) is assigned to each segment of the graph. The layer assignments together with time, distance and elevation data are input to a computer for additional processing.

DATA REDUCTION AND VELOCITY DETERMINATION

Seismic data from this survey were processed using two methods. The first method uses “SIPT2", an interactive inversion modeling program developed by James Scott for the U.S. Bureau of Mines. This software applies a modified “delay-time” approach to calculate the average velocity across the refraction horizons and calculate the thickness of the layers.

The second modeling method uses what is referred to as tomographic inversion and produces velocity gradient cross sections in color. Tomography does not perform refraction layer calculations or attempt to measure discrete depths. Instead, the main objective is to create a velocity distribution grid in the subsurface. Each node of the grid has a specific velocity associated with it. The goal is to adjust or “iterate” the velocity matrix so that the computer derived travel-time curves match what was recorded in the field. The final velocity grid is then loaded into a contouring program that produces color filled cross sections. This method is typically used for imaging the shape and configuration of complex structures such as faults, landslides and intrusions, and areas where strong lateral velocity gradients are suspected within the weathered profile.

The tomographic modeling program used for this survey is SeisOpt Version 3.5 from Optim LLC. It uses a proprietary inversion algorithm that applies a non-linear optimization technique called generalized simulated annealing to adjust the velocity grid points for the best statistical match. It is referred to as an optimization because it attempts to find the model that has the least minimum travel-time error between the calculated and observed (field) measurements.

SUMMARY OF RESULTS

Prior to starting the fieldwork, Geotek provided information on the proposed cuts beneath each of the 13 traverses. Where planned cuts were 15 feet or less, data were recorded with a 5-foot geophone spacing to provide good resolution of the geologic units and a penetration depth of about 20-25 feet. This group included Lines 2, 5, 6, 8, 12, and 13. Proposed cuts beneath the other seven traverses ranged for 18 to 28 feet. An 8-foot geophone spacing was used for these lines to provide a greater exploration depth beneath of about 40 feet.

Seismic Refraction Layer Models

Results from refraction analysis show a three layer solution beneath all lines (see Figures 5-17). Velocities posted on the cross sections represent averages as described in the previous section. Therefore, minor localized changes in velocity may occur along any profile.

Four main geologic units are interpreted from the modeling results. The refraction software was used to determine the average velocity of each layer. A description of the layers is provided below and a velocity summary is shown in Table 1. Please note: only three of the four layers are displayed on the cross sections. This is the result of Layer 2 being very thin, generally less than five feet thick, and therefore was not resolved beneath lines with 8-foot spacing.

Layer 1 -	is mostly loose soil and colluvium with rock fragments. Thickness is generally less than 5 feet.
Layer 2 -	is interpreted to be highly weathered or decomposed bedrock.
Layer 3 -	is interpreted to be weathered bedrock. The velocity range is 3360-4887 ft/sec. Based on the Cat rippability chart shown on Figure 4, this range is considered easily rippable with a D-9 Cat.
Layer 4 -	represents moderately weathered to unweathered bedrock.

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 1. Cross Section Summary Velocity in (ft/sec), Depth in (feet)

Line	Velocity Layer 1	Velocity Layer 2	Velocity Layer 3	Depth Range Moderately Weathered to Unweath. Bedrock Interface
1	1512	4617	6494	10 - 26
2	1471	3270	4793	ND
3	1750	4887	6134	19 - 29
4	1364	3900	5699	19 - 38
5	1166	2930	4020	ND
6	1104	3039	4594	ND
7	1395	3379	5838	11 - 24
8	1321	4131	7464	9 - 16
9	1613	4910	7925	6 - 17
10	1447	3663	6080	4 - 21
11	1667	4191	5705	10 - 22
12	1234	2630	4134	ND
13	1148	2691	3360	ND

ND - Not Detected

Weathering tends to be gradational for most granitic rock types and usually produces a gradual increase in velocity with depth. Consequently, variation of ± 10-15 % from the posted averages may occur between the top and bottom of Layer 2.

Tomographic Models

Following the end of fieldwork, Geotek requested tomographic modeling for Lines 1, 5, 6, 8-11, and 13. The main objective was to provided additional graphics to explore for evidence of possible core stones in the weathered rock matrix.

The five shotpoints per line recorded for refraction survey were to be used for modeling. This is less than the 7 to 9 shotpoints Subsurface Surveys typically uses for tomography because it limits ray-path coverage and localized shotpoint control.

Results are displayed on adjacent pages following the layer model cross sections for each traverse. Some short comings should be noted: 1) areas with poor ray-path density tend to produce low velocity anomalies compared to the surrounding contours and may disrupt the lateral continuity of the higher velocity data and 2) the relatively thin surface layers shown on the refraction models may pinch out or be missing on the tomographic models.

Based on a review of the modeling results and an inspection of all the time-distance graphs, there doesn't appear to be any evidence of core stones with significant size, that would impact grading operations or the digging of utility trenches beneath the seismic lines.

Rippability

Figure 4 presents a rippability chart (courtesy of Caterpillar Tractor Co.) for a D9R Ripper. Bar graphs show the relationship between seismic compressional wave velocity and ripper performance for various rock types in three categories: rippable, marginal, and non-rippable. Granitic rocks are listed as marginally rippable at approximately 6800 ft/sec and are considered non-rippable above 8000 ft/sec. This chart is provided only as a guide and should not be considered absolute. Other geologic factors that may influence bedrock rippability at this site include changes in composition of the bedrock and the presence of fractures and joints.

All data acquired during this survey is considered confidential and is available for review by your staff at any time. We appreciate the opportunity to participate in this project.

Please call if there are any questions.

PAWalen

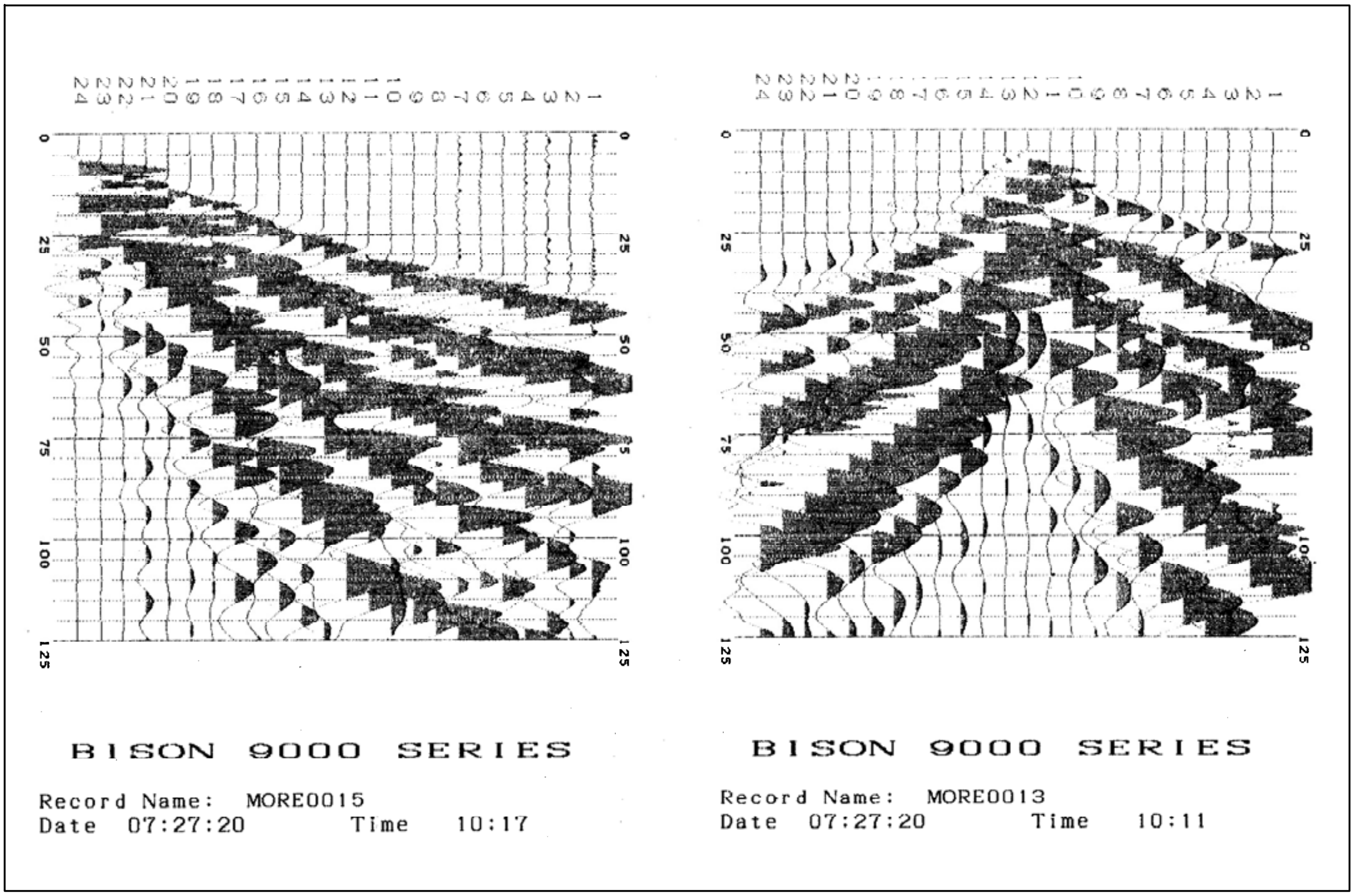
Phillip A. Walen
Senior Geophysicist
CA Registration No. GP917

Seismic Survey Location Map

Tract 31589, Darwin 72 Project -- Moreno Valley, California

Figure 1

Example Seismic Field Records



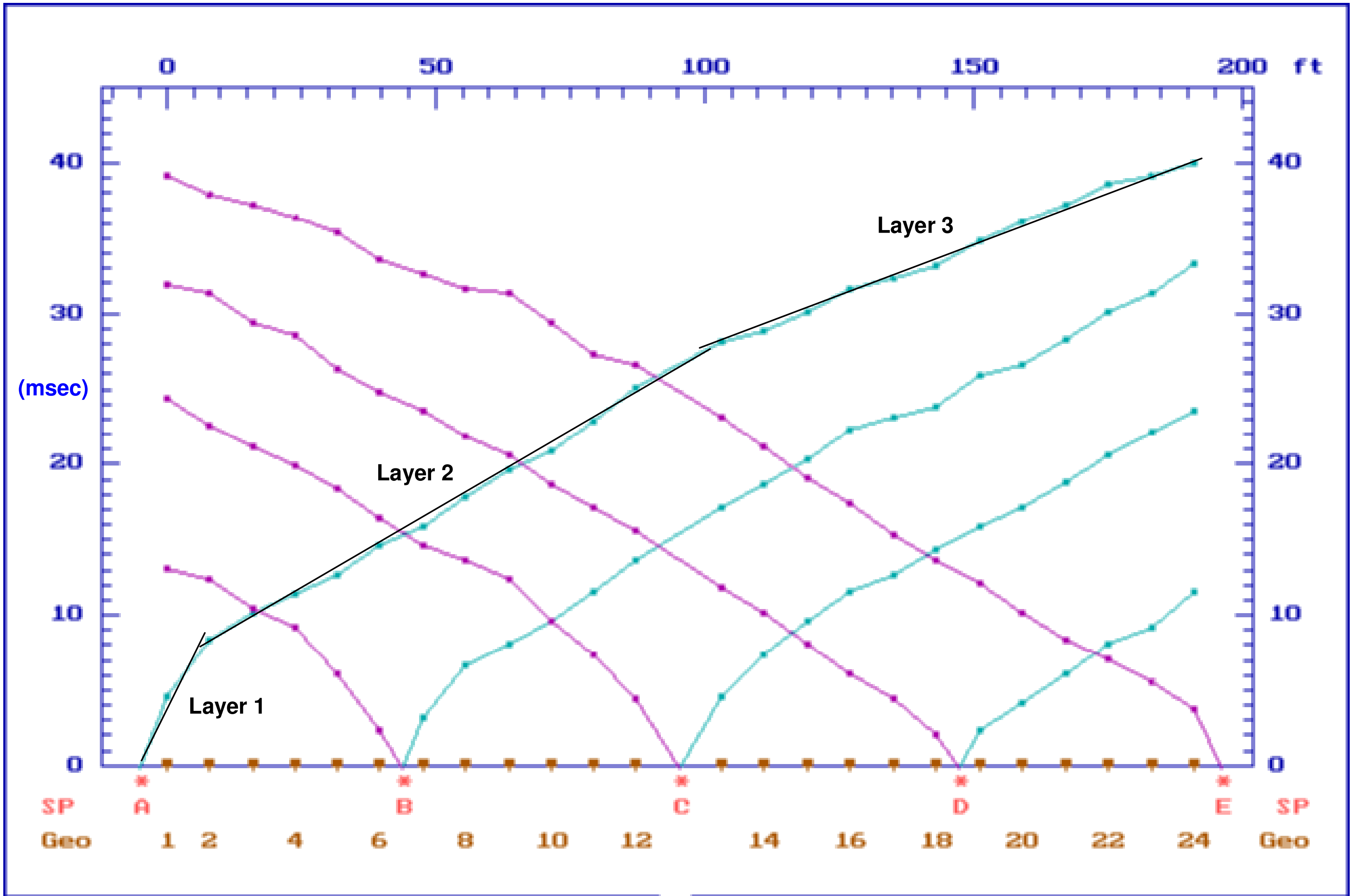
Record Name: MORE0015
Date 07:27:20 Time 10:17

Record Name: MORE0013
Date 07:27:20 Time 10:11

Figure 2

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Example Time-Distance Graph -- Line 3



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 3

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD

Rippers | Ripper Performance
● D9R/D9T

D9R/D9T
- **Multi or Single Shank No. 9 Ripper**
- **Estimated by Seismic Wave Velocities**

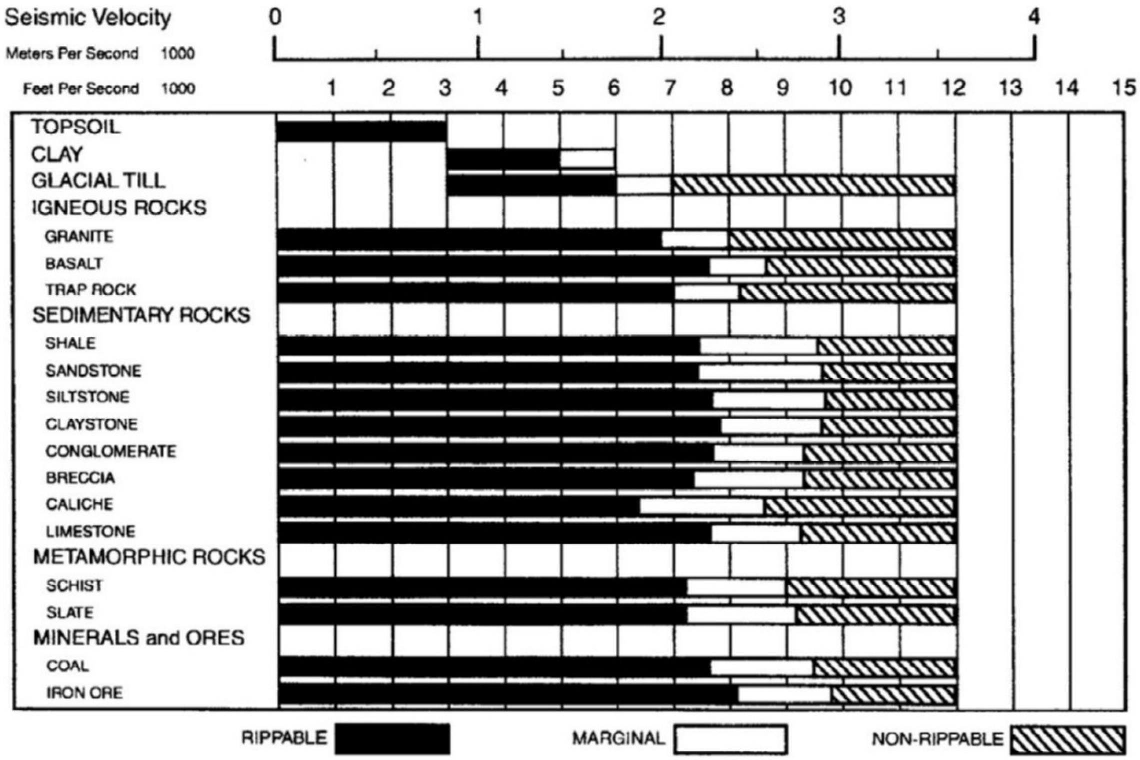
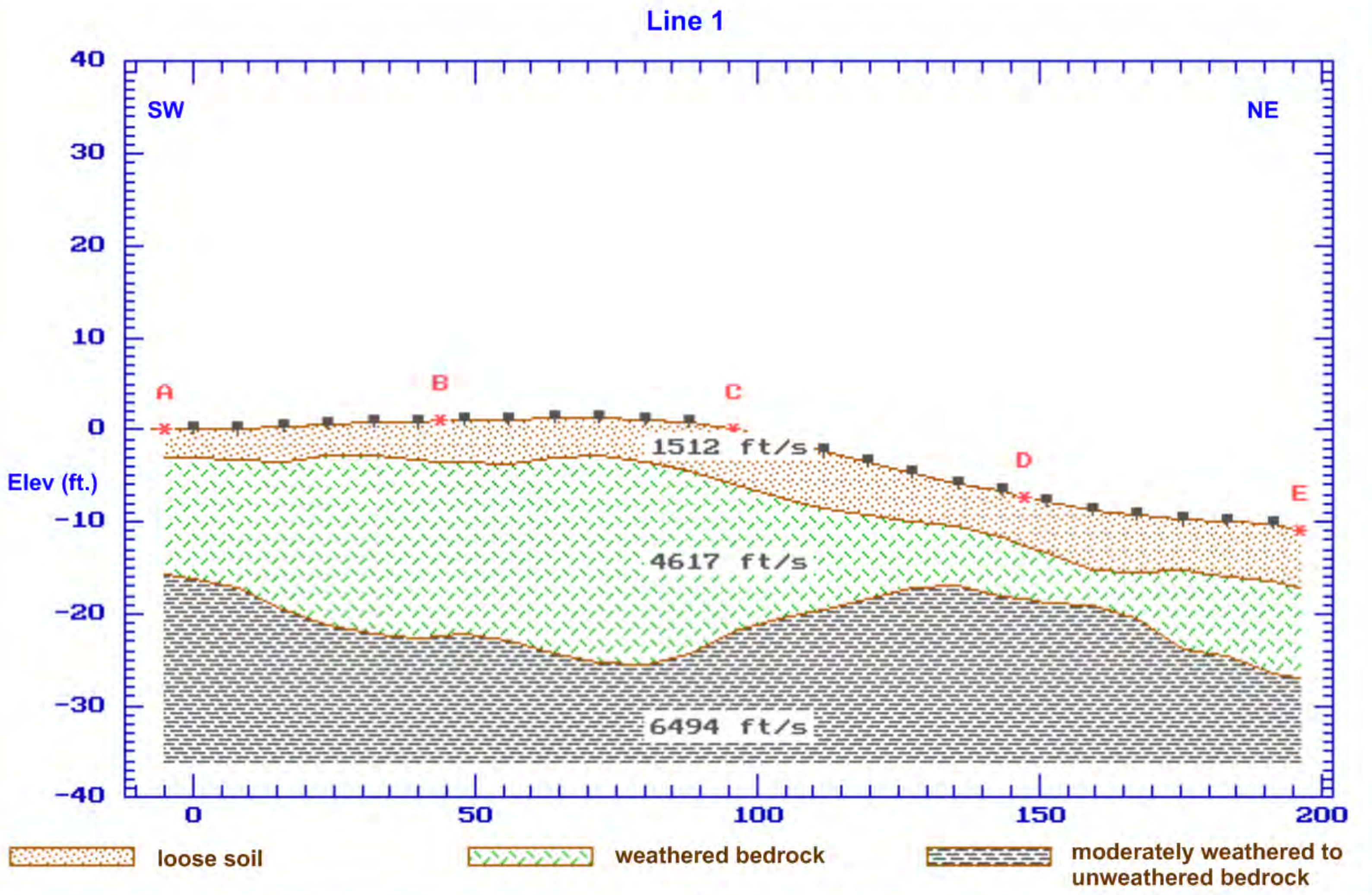


Figure 4



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 5

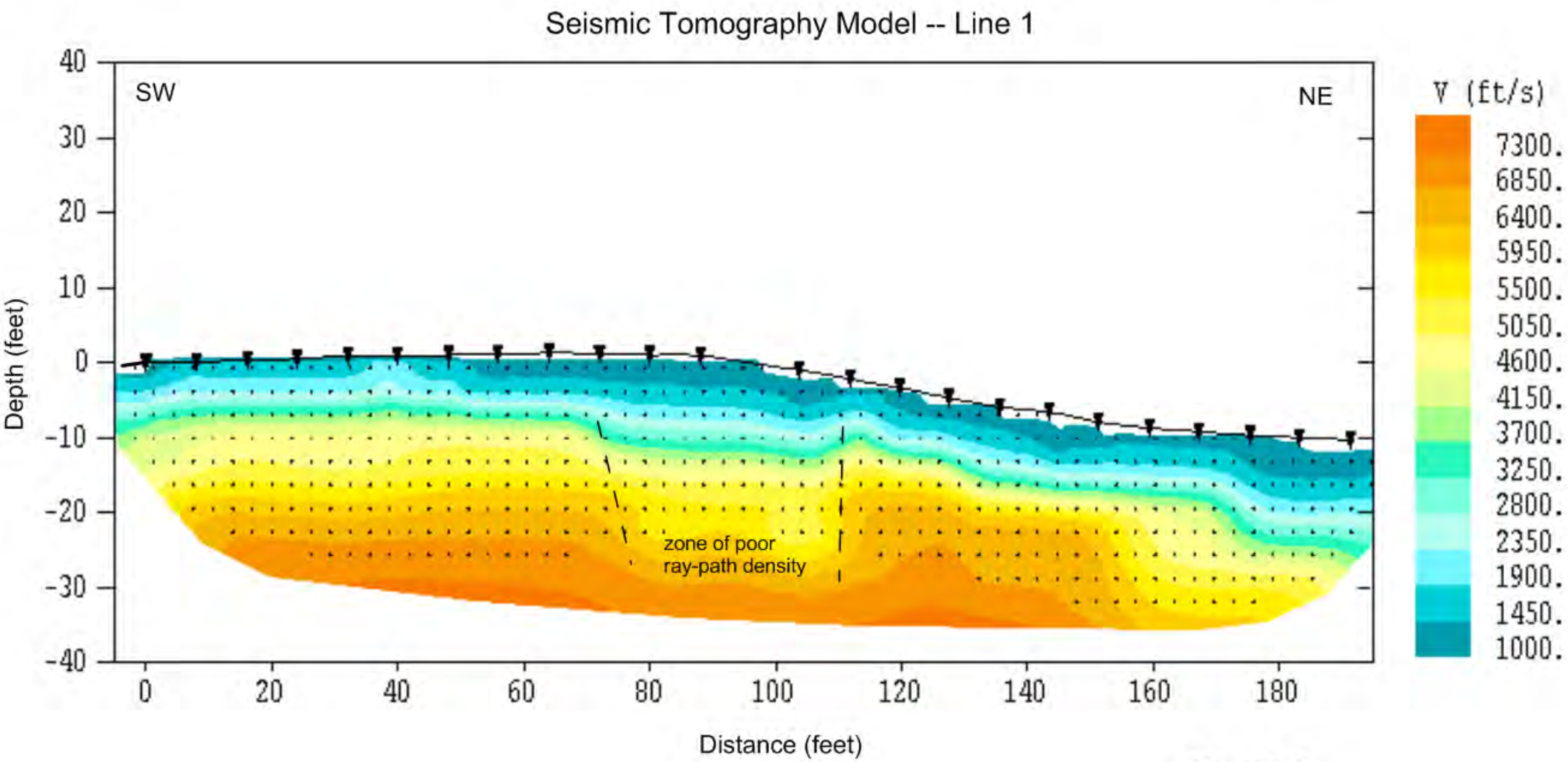
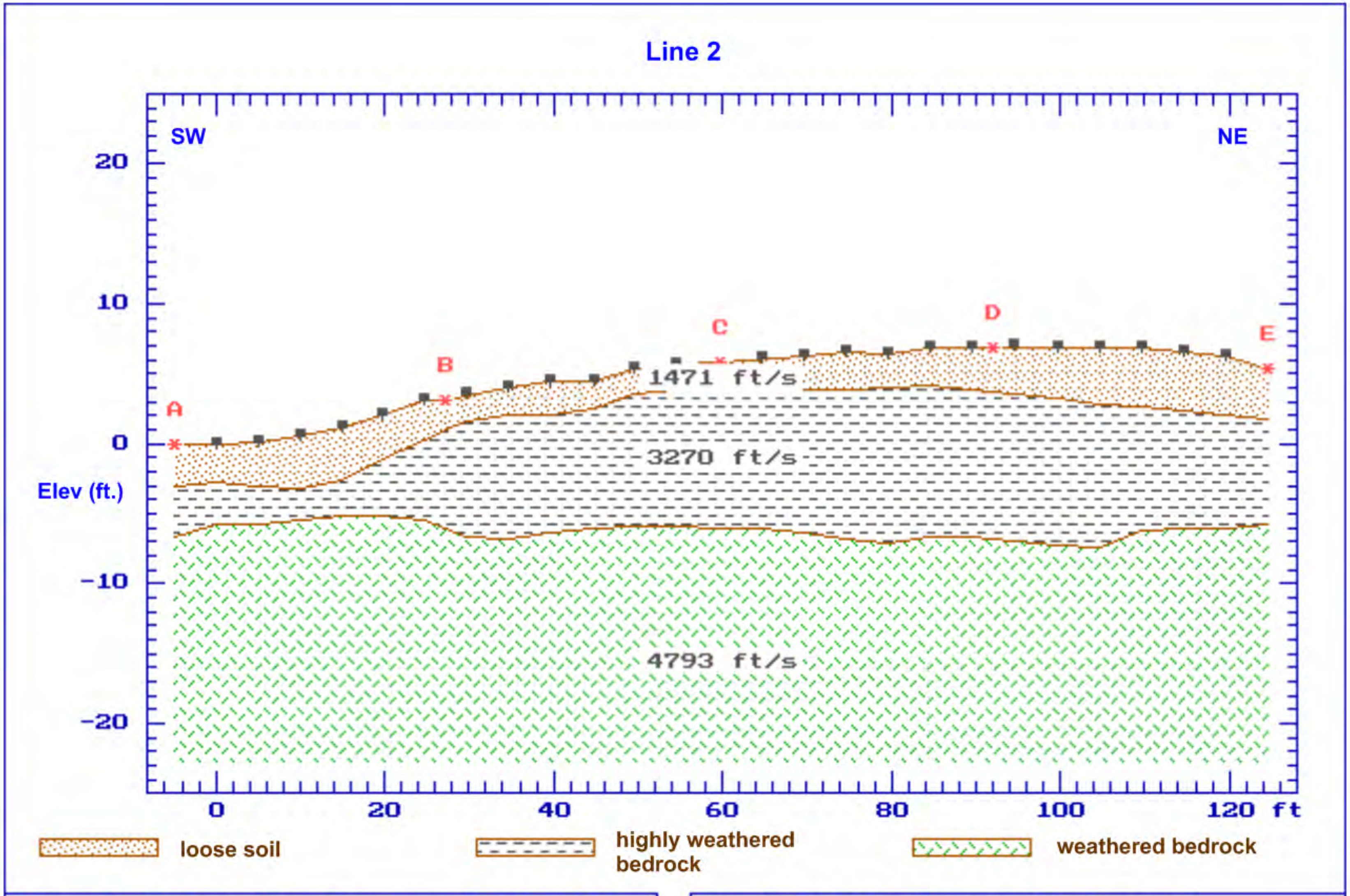

Seismic Tomography Model -- Line 1
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
Distance (feet)
0
20
40
60
80
100
120
140
160
180
zone of poor
ray-path density
V (ft/s)
7300.
6850.
6400.
5950.
5500.
5050.
4600.
4150.
3700.
3250.
2800.
2350.
1900.
1450.
1000.

Figure 5-1



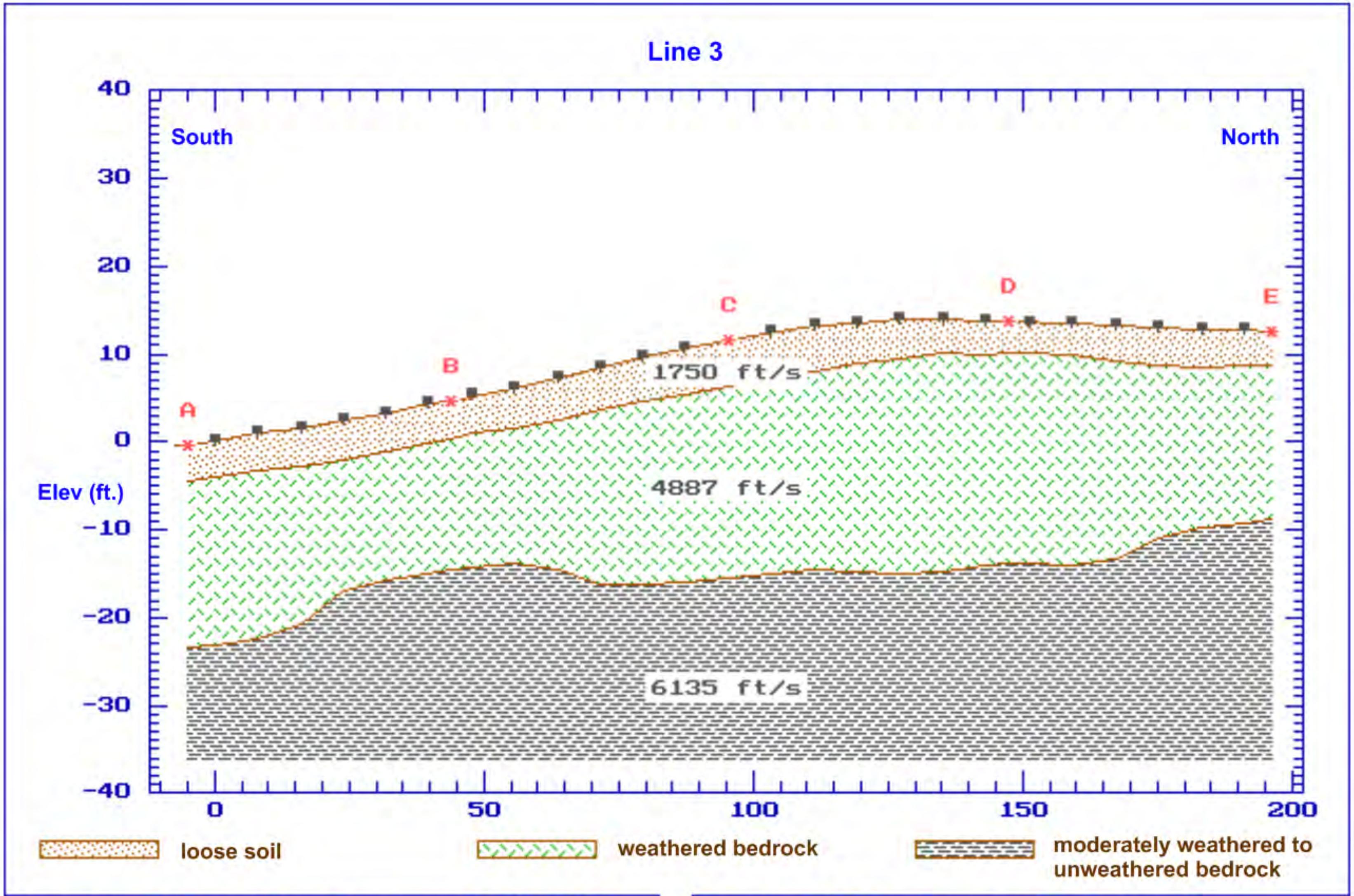
Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

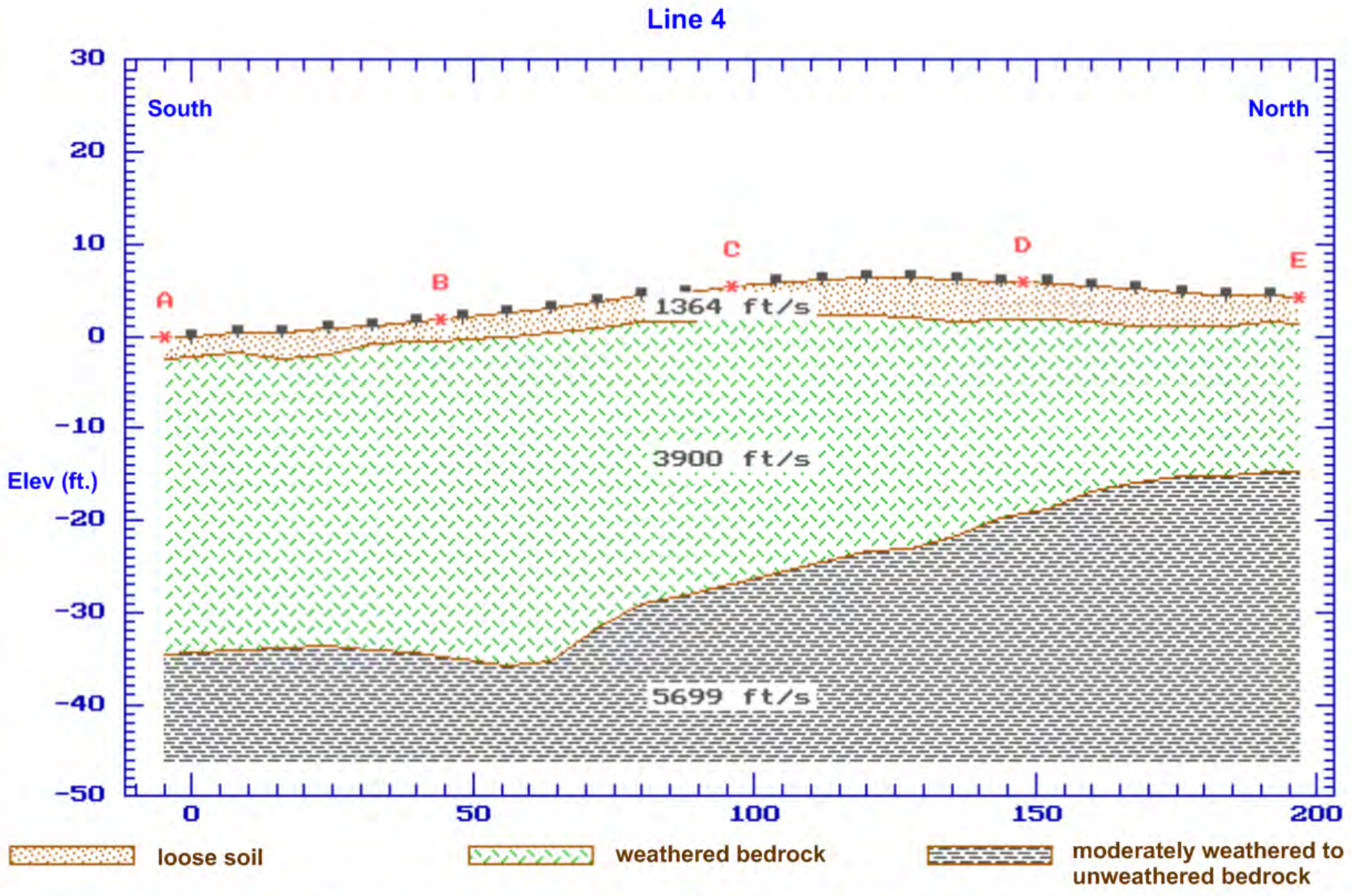
Moreno Valley, California

Figure 6



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 7

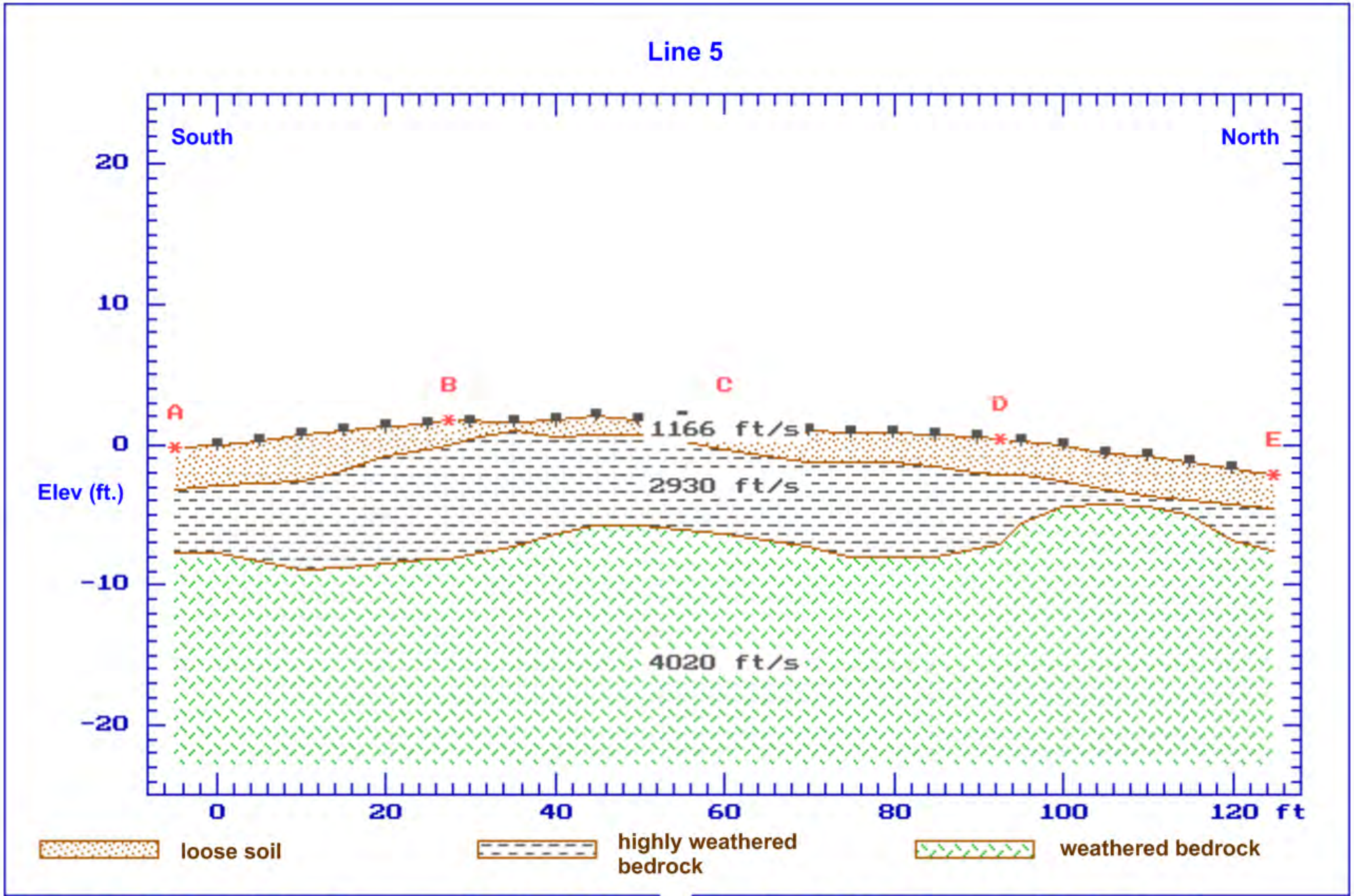
Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP



Seismic Refraction Survey 7/27/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 8



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California Figure 9

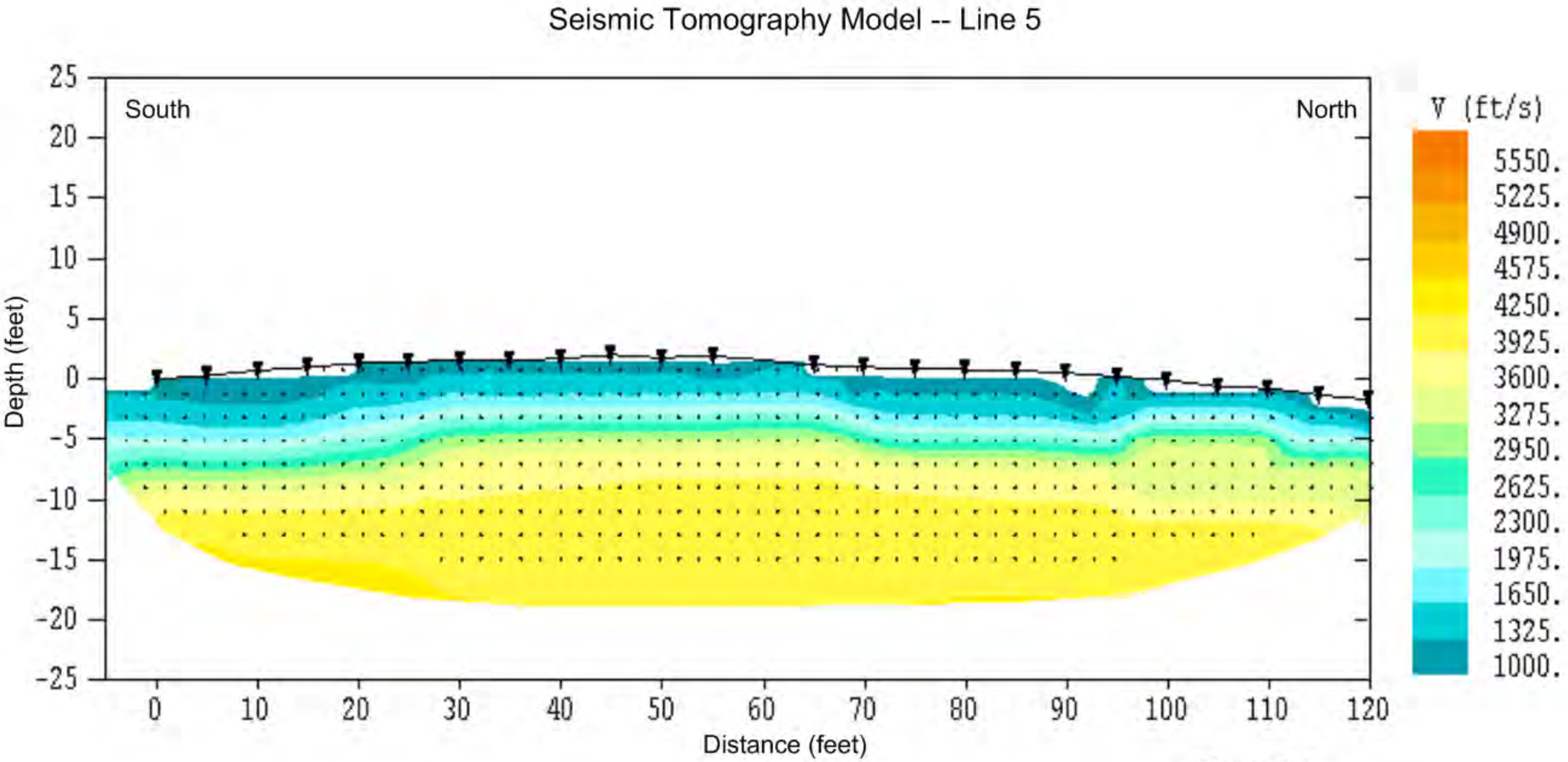
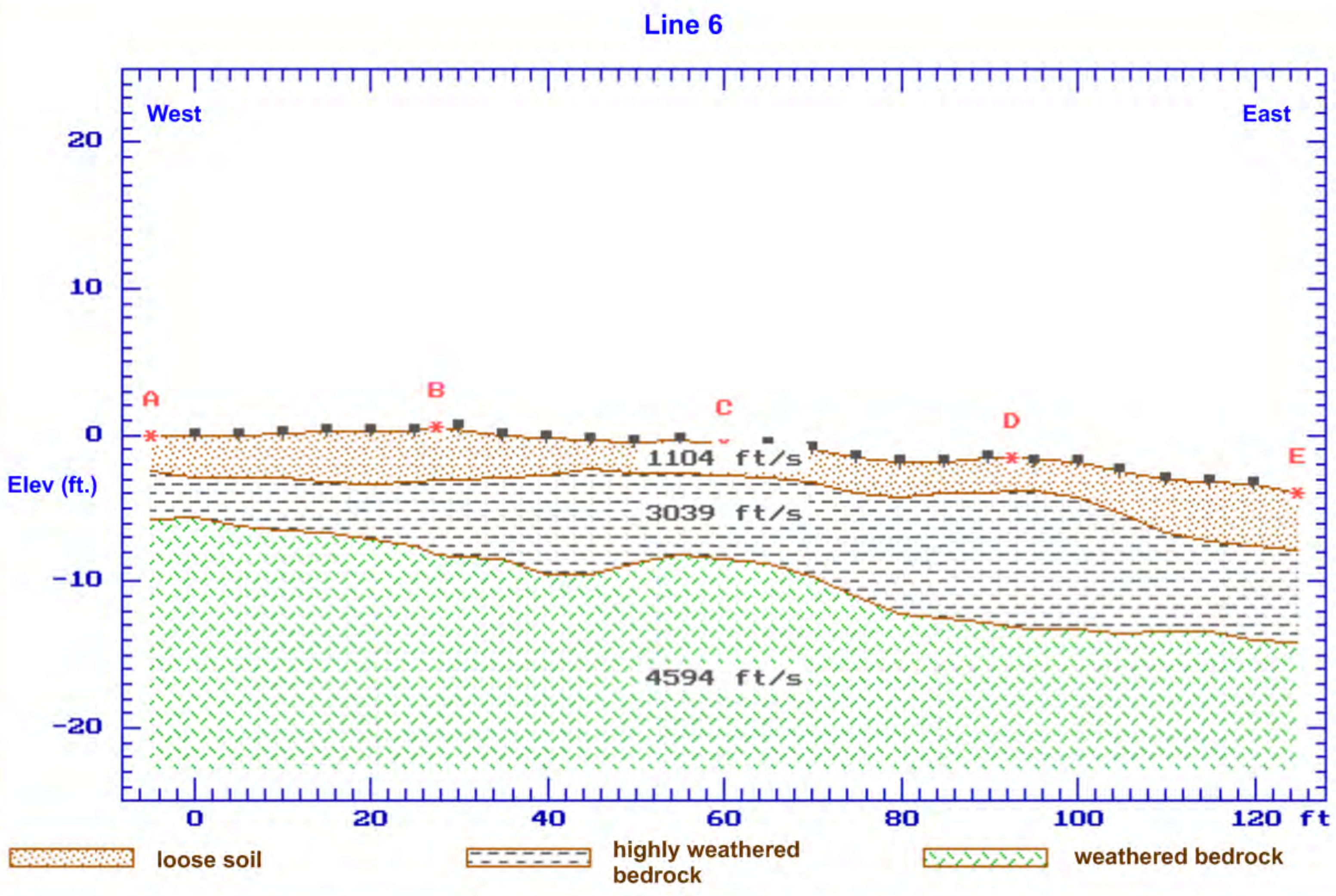

Seismic Tomography Model -- Line 5
South
North
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
110
120
Distance (feet)
V (ft/s)
5550.
5225.
4900.
4575.
4250.
3925.
3600.
3275.
2950.
2625.
2300.
1975.
1650.
1325.
1000.

Figure 9-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 10

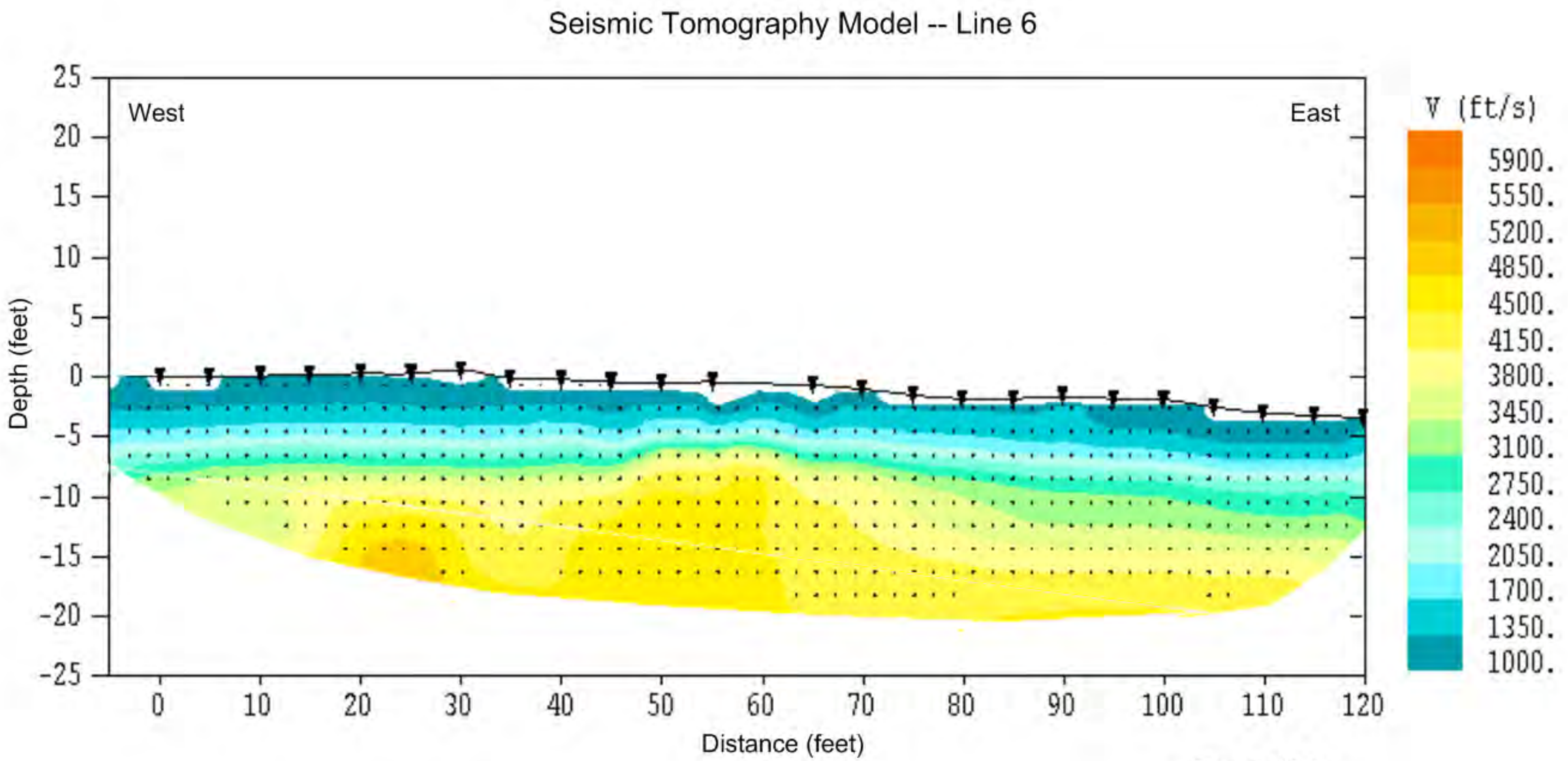
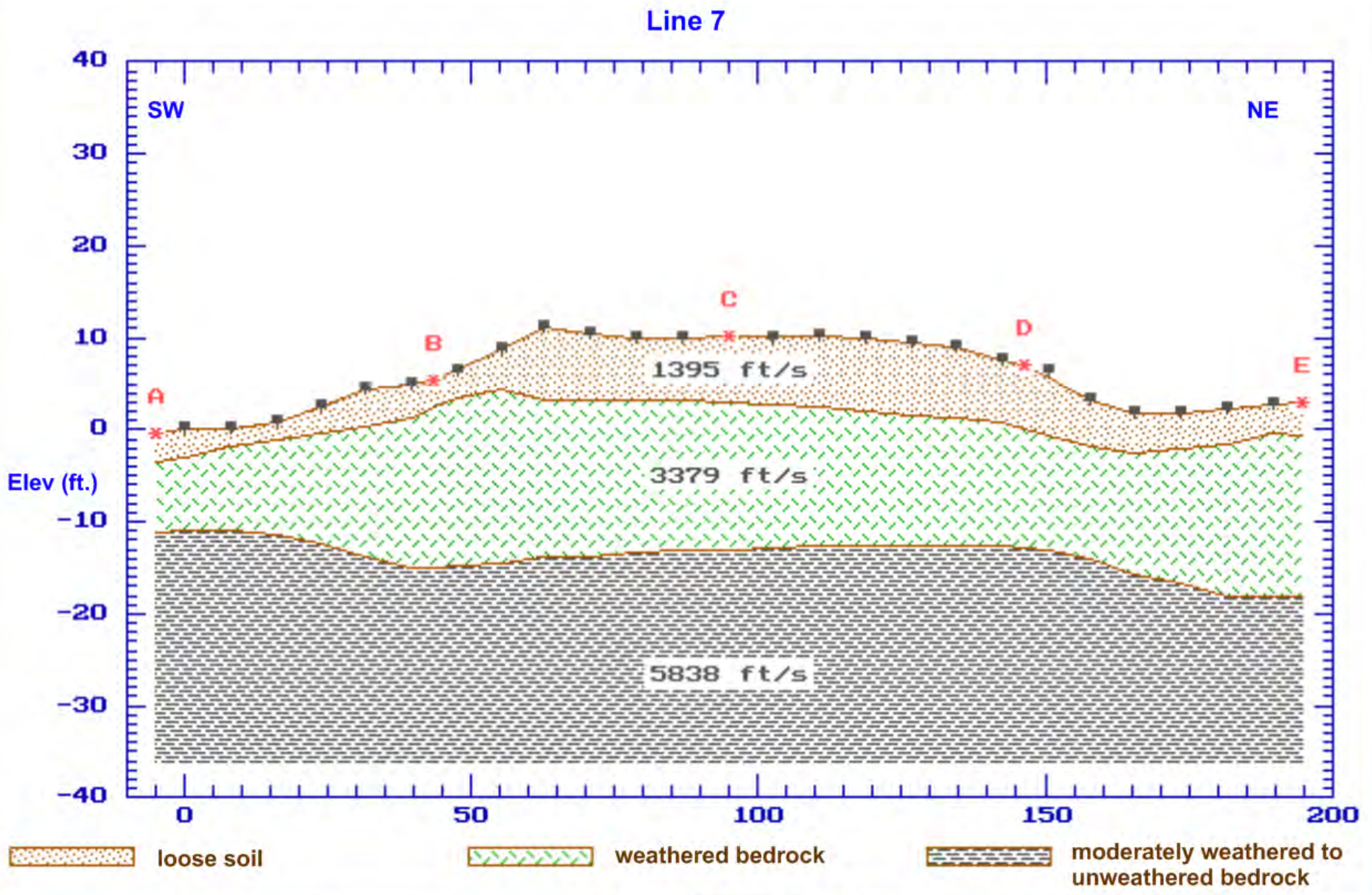
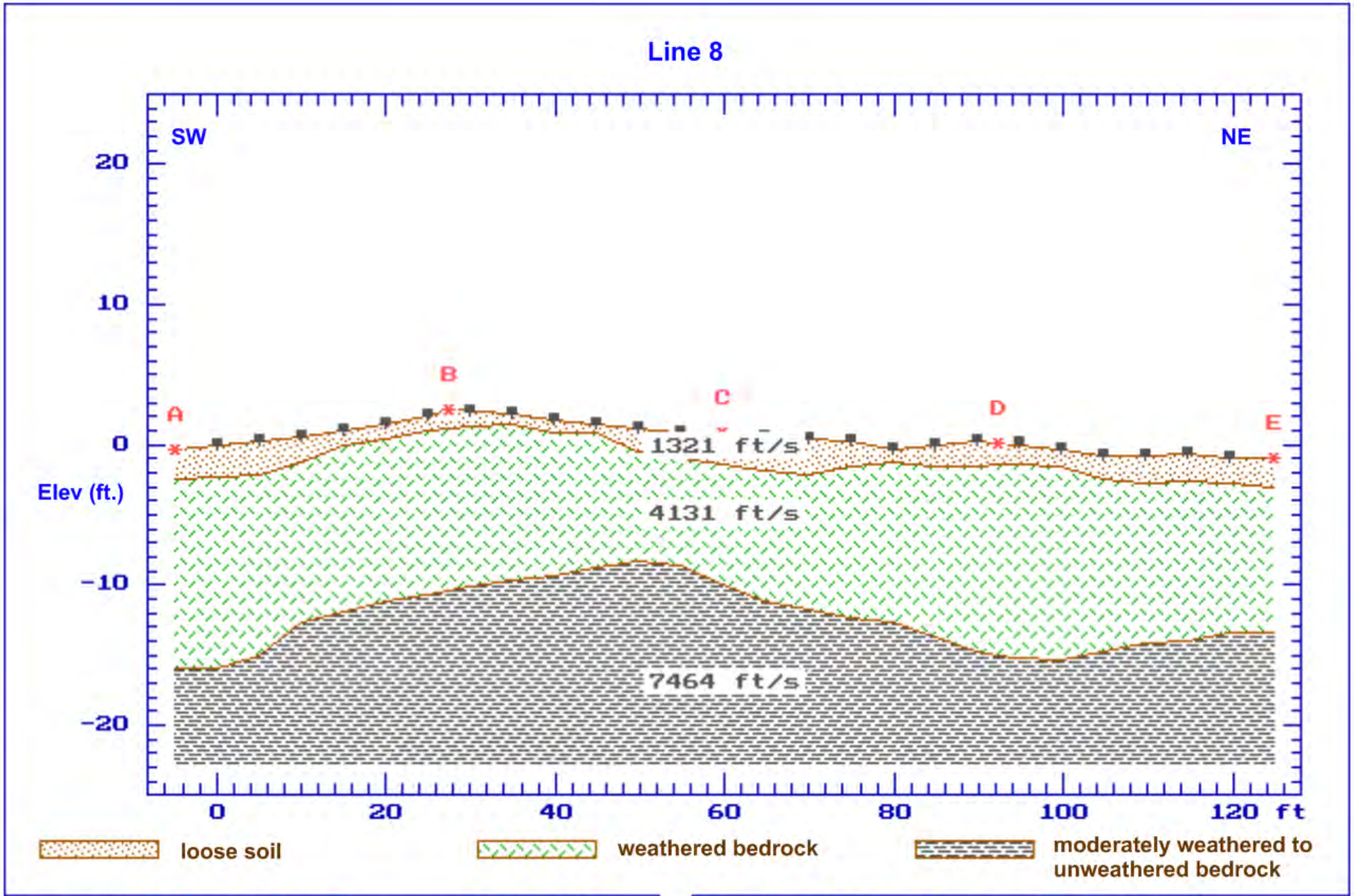

Seismic Tomography Model -- Line 6
West
East
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
110
120
Distance (feet)
V (ft/s)
5900.
5550.
5200.
4850.
4500.
4150.
3800.
3450.
3100.
2750.
2400.
2050.
1700.
1350.
1000.

Figure 10-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 11



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 12

Seismic Tomography Model -- Line 8

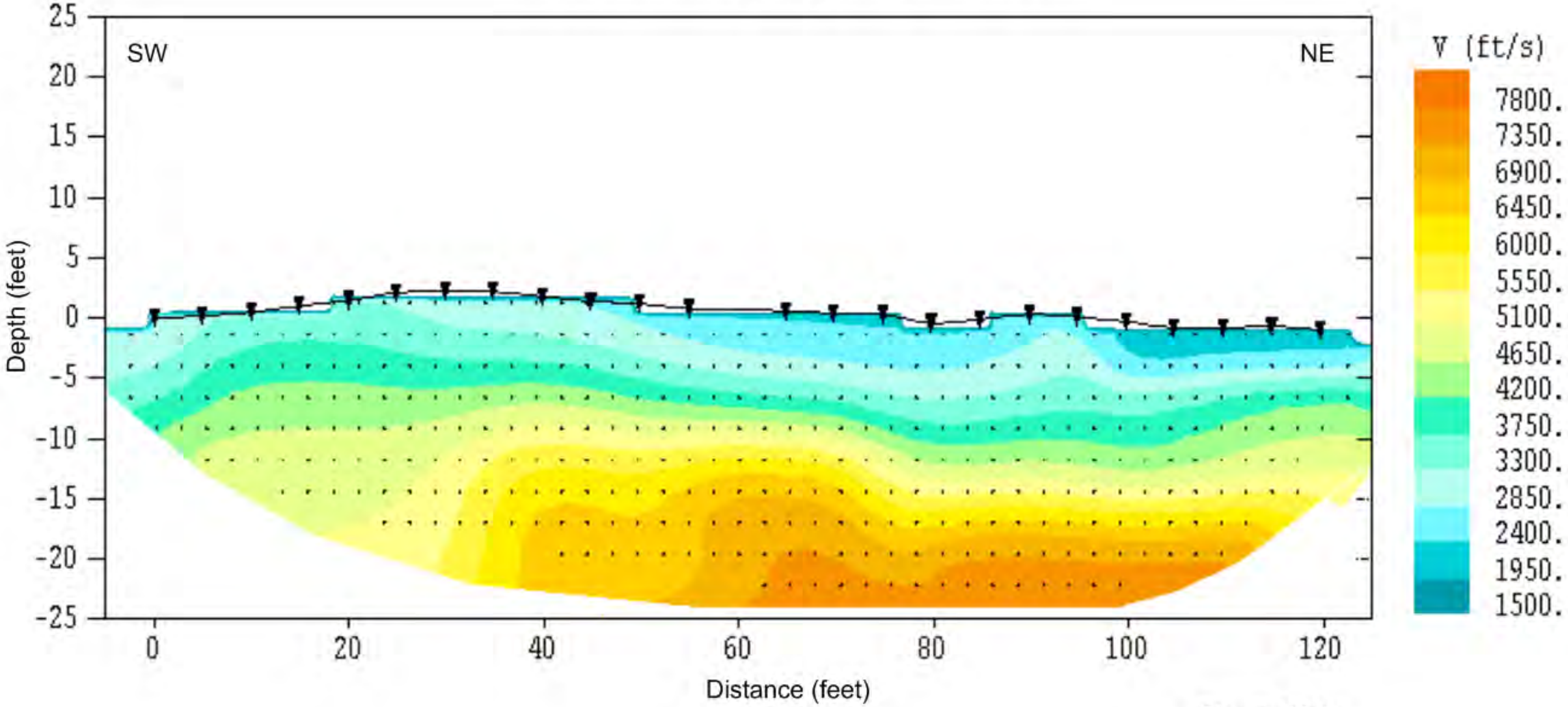
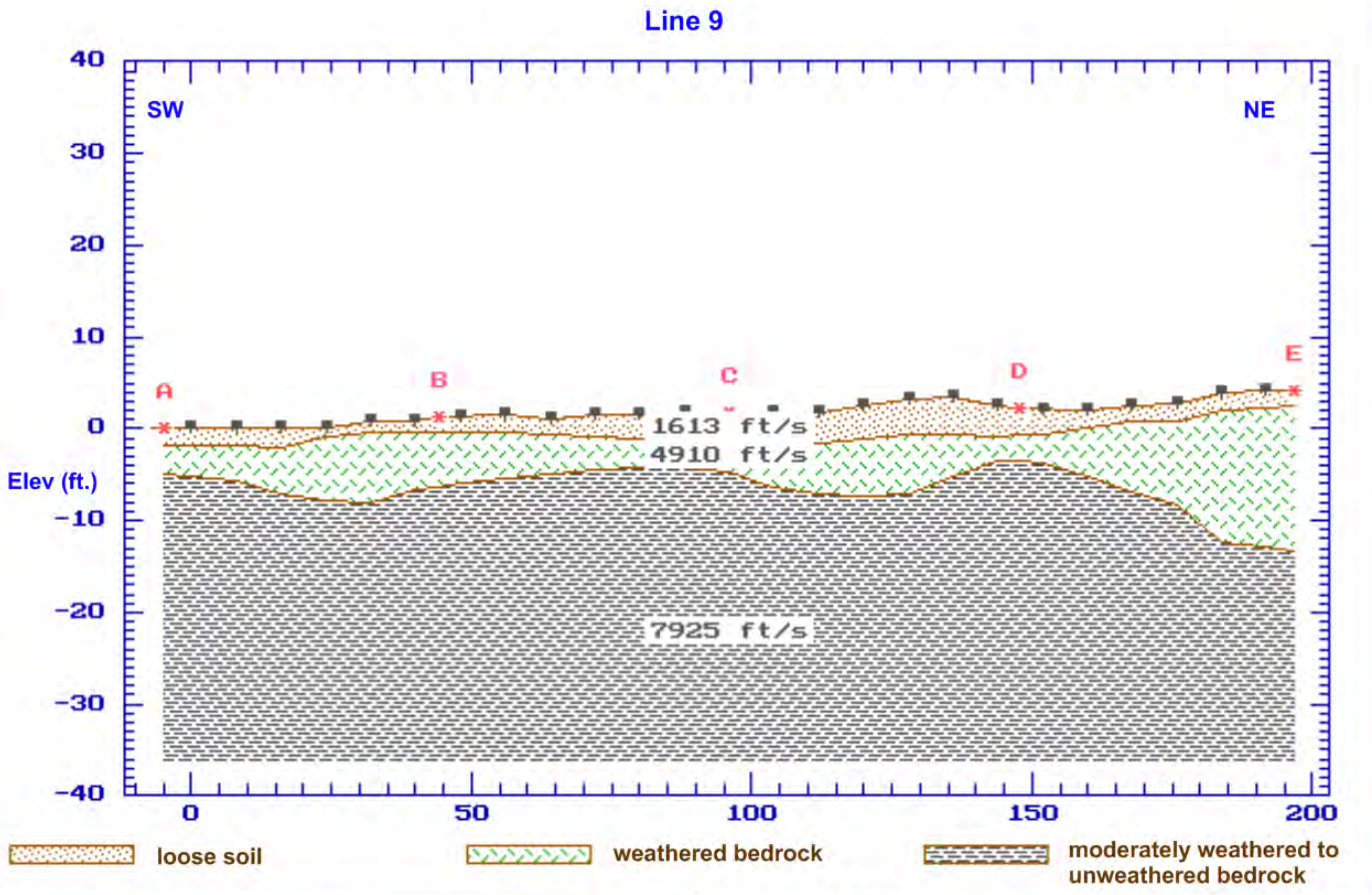


Figure 12-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 13

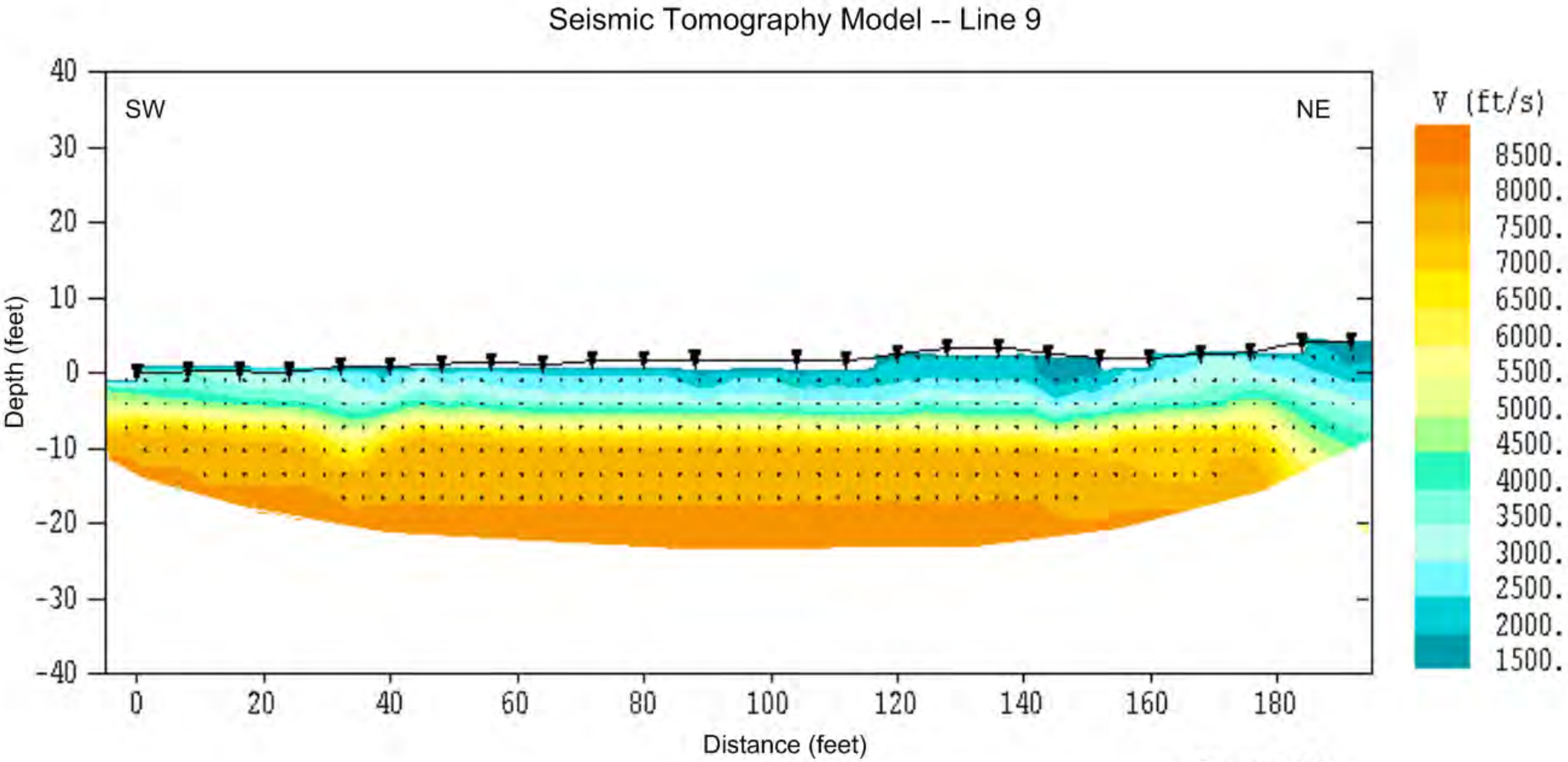
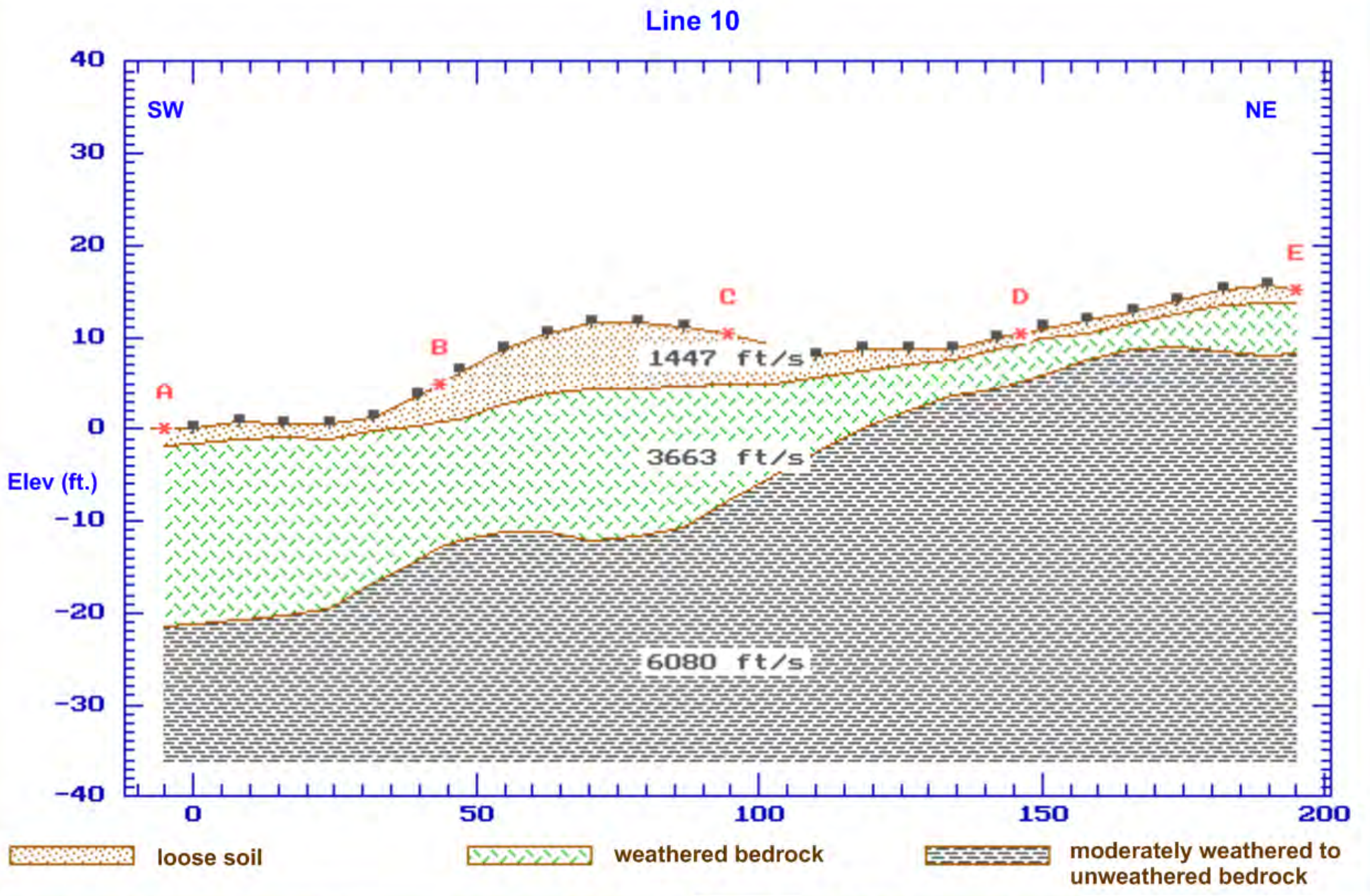

Seismic Tomography Model -- Line 9
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
8500.
8000.
7500.
7000.
6500.
6000.
5500.
5000.
4500.
4000.
3500.
3000.
2500.
2000.
1500.

Figure 13-1



Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 14

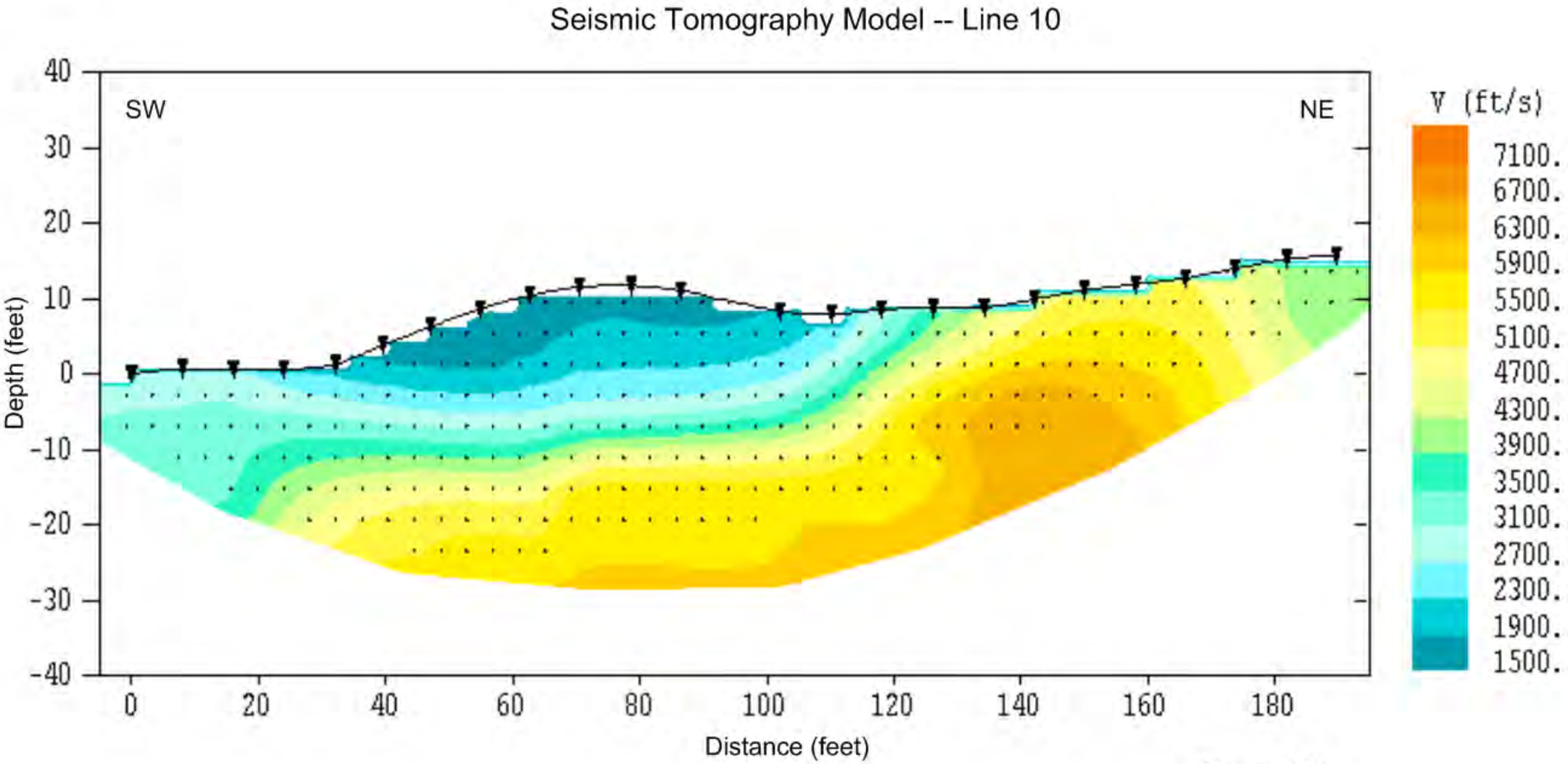
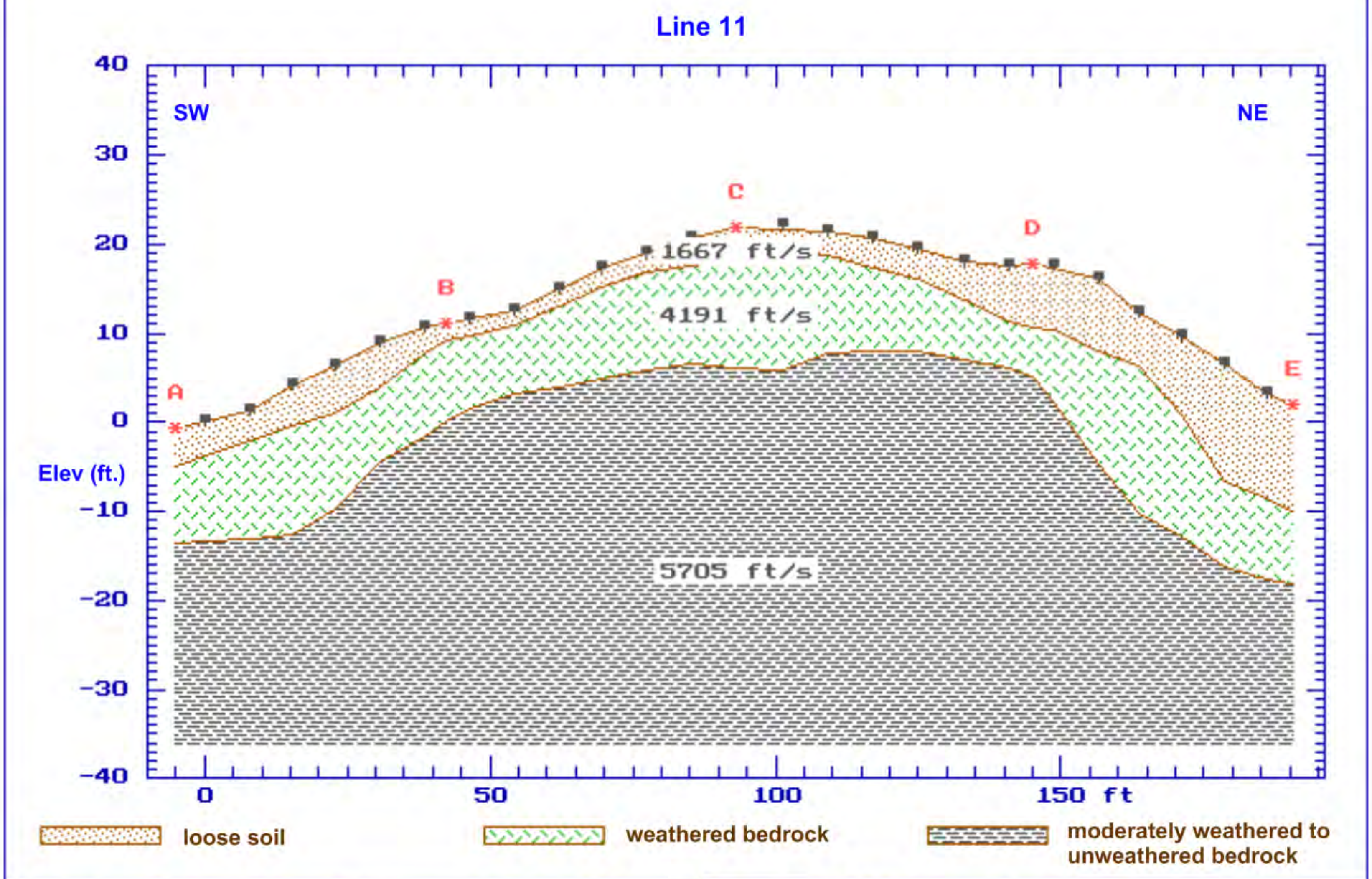

Seismic Tomography Model -- Line 10
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
7100.
6700.
6300.
5900.
5500.
5100.
4700.
4300.
3900.
3500.
3100.
2700.
2300.
1900.
1500.

Figure 14-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California

Figure 15

Seismic Tomography Model -- Line 11

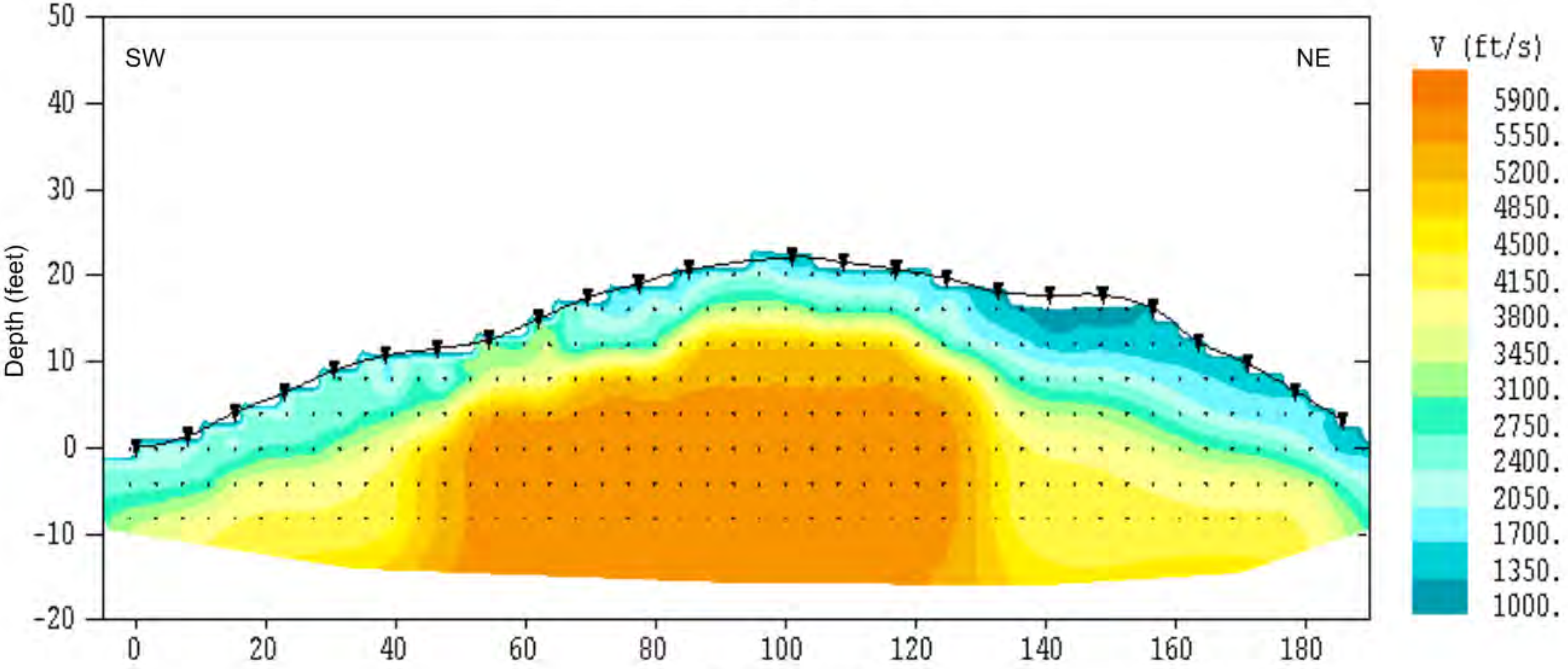
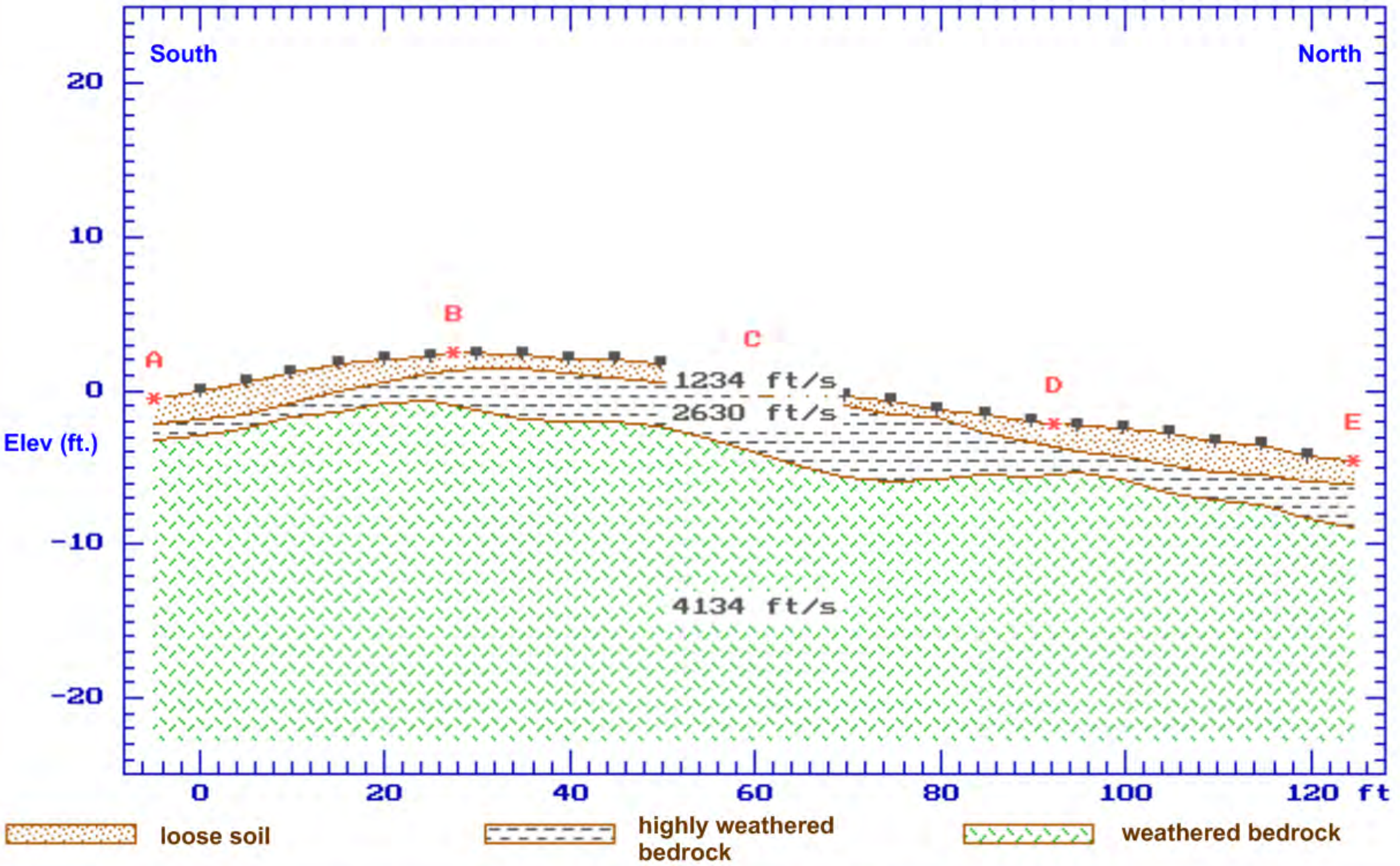


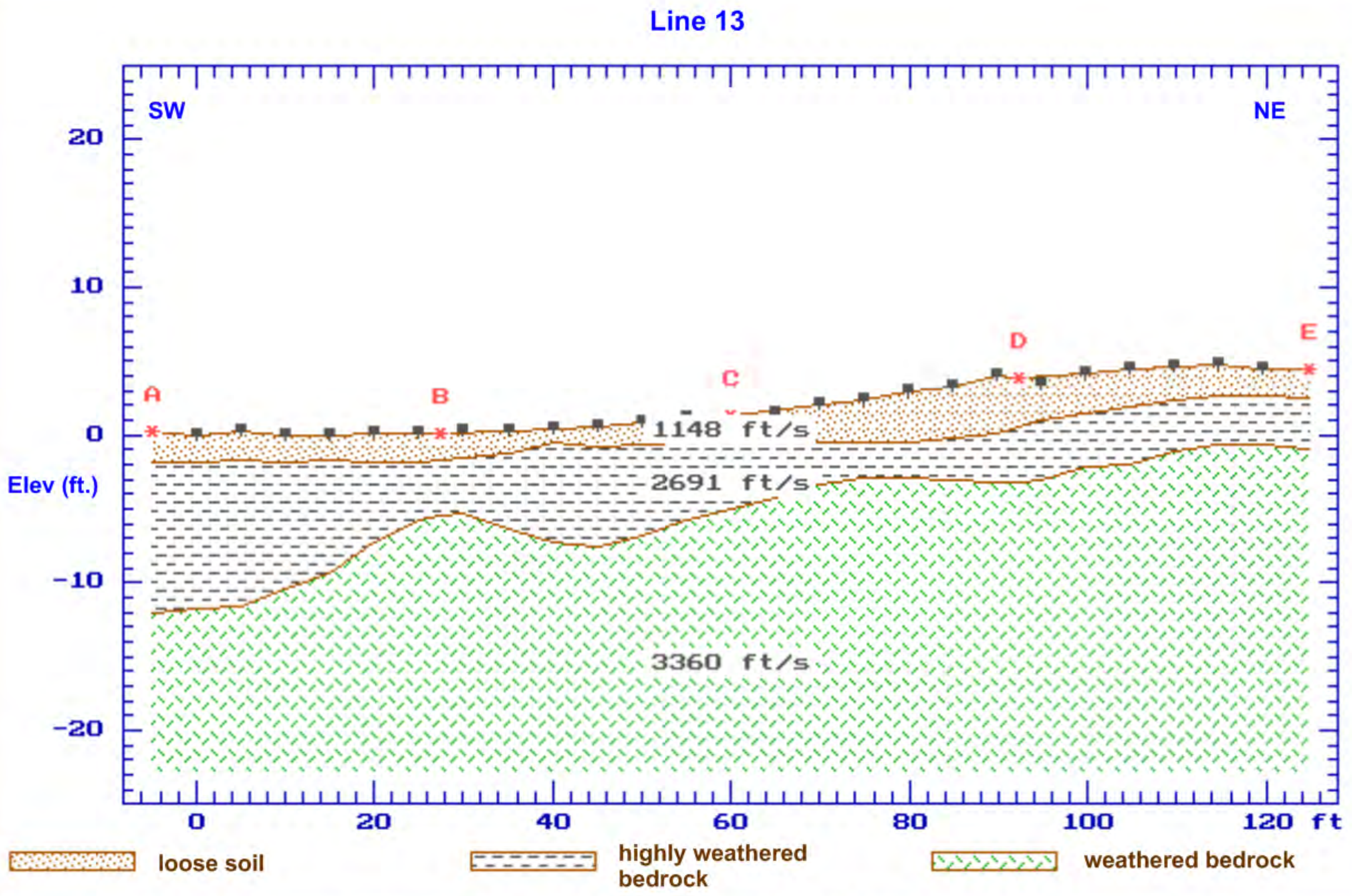
Figure 15-1

Line 12



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California

Figure 16



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 17

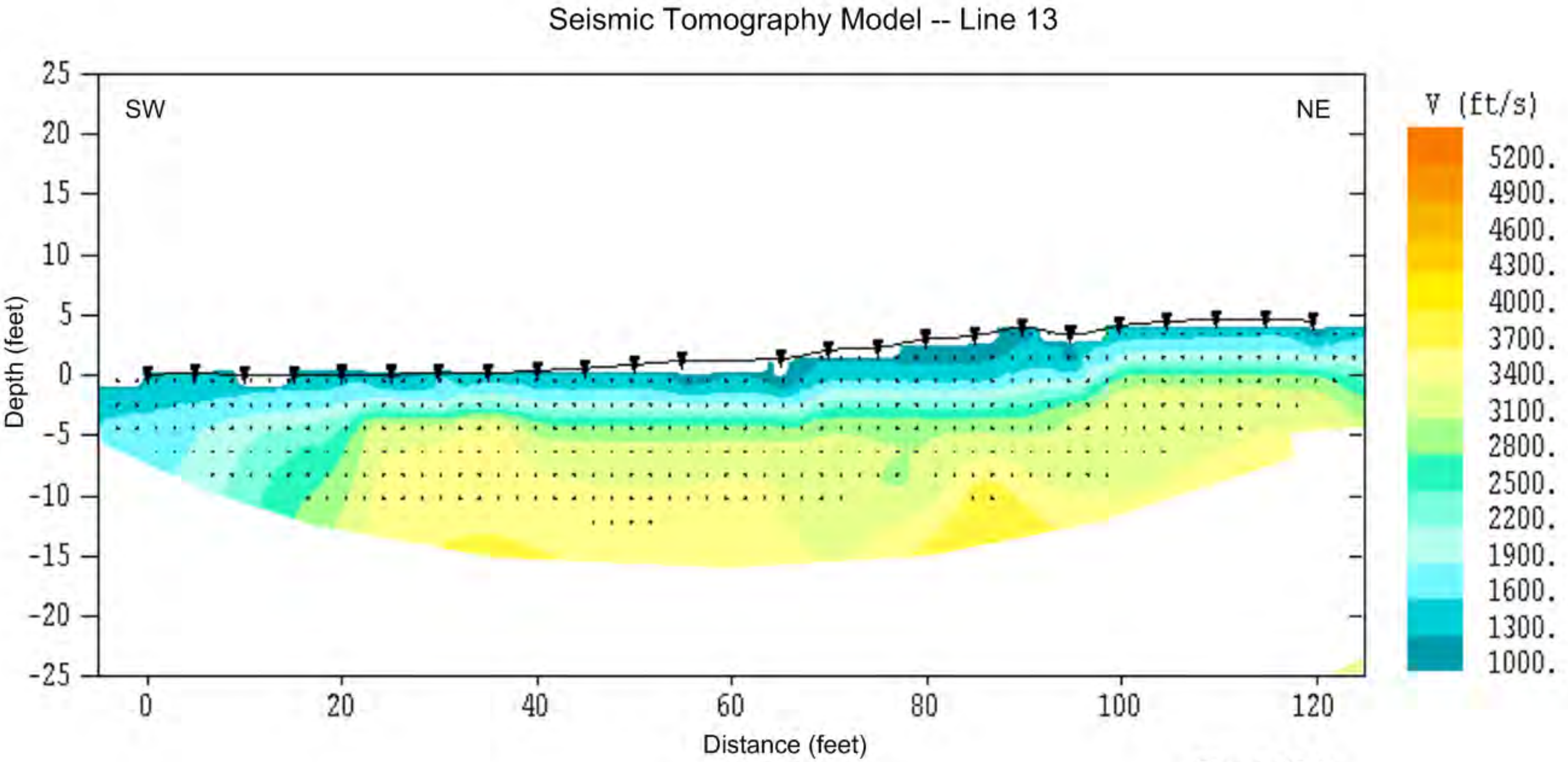

Seismic Tomography Model -- Line 13
SW
NE
V (ft/s)
5200.
4900.
4600.
4300.
4000.
3700.
3400.
3100.
2800.
2500.
2200.
1900.
1600.
1300.
1000.
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
Distance (feet)

Figure 17-1

APPENDIX D

RESULTS OF LABORATORY TESTING BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance with the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of trenches and borings in Appendix B.

Moisture-Density Relationship

Laboratory testing was performed on one sample obtained during the subsurface exploration. The laboratory maximum dry density and optimum moisture content was determined in general accordance with ASTM D 1557. The results of the testing are provided herein.

Direct Shear

Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM Test Method D 3080. The rate of deformation was approximately 0.035 inch per minute. The samples were sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. Testing was performed on remolded soil samples (90% of the maximum dry density per ASTM D 1557). The shear test results are presented herein.

Expansion Index

Expansion Index testing was performed on one representative soil sample. Testing was performed in general accordance with ASTM Test Method D 4829. The results of the testing are provided herein.

Hydro-Collapse

Selected soil samples were tested in order to evaluate their potential for hydro-collapse. Testing was performed in general accordance with ASTM Test Method D 4546. The results of the testing are provided herein

GEOTEK

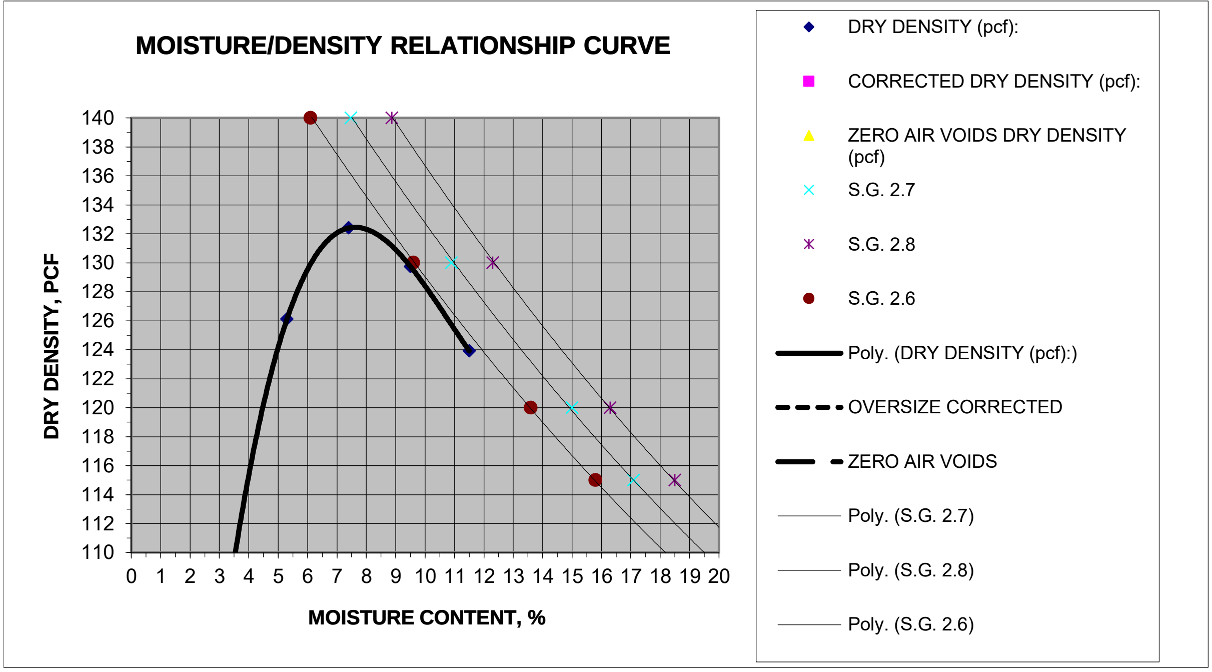
MOISTURE/DENSITY RELATIONSHIP

Client: D R Horton
Project: Winco Site
Location: Moreno Valley
Material Type: Gray Brown Gravelly Silty F-C Sand
Material Supplier: -
Material Source: -
Sample Location: B-3 @ 1 - 5 ft
-
Sampled By: DRW
Received By: DLI
Tested By: DLI
Reviewed By: -

Job No.: 2438-CR
Lab No.: Corona

Date Sampled: 7/17/2020
Date Received: 7/20/2020
Date Tested: 7/26/2020
Date Reviewed: -

Test Procedure: ASTM D1557 **Method:** A
Oversized Material (%): 18.0 **Correction Required:** ☐ yes ☒ no



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf 133.0 **@ Optimum Moisture, %** 8.0
Corrected Maximum Dry Density, pcf **@ Optimum Moisture, %**

MATERIAL DESCRIPTION

Grain Size Distribution:
% Gravel (retained on No. 4)
% Sand (Passing No. 4, Retained on No. 200)
% Silt and Clay (Passing No. 200)

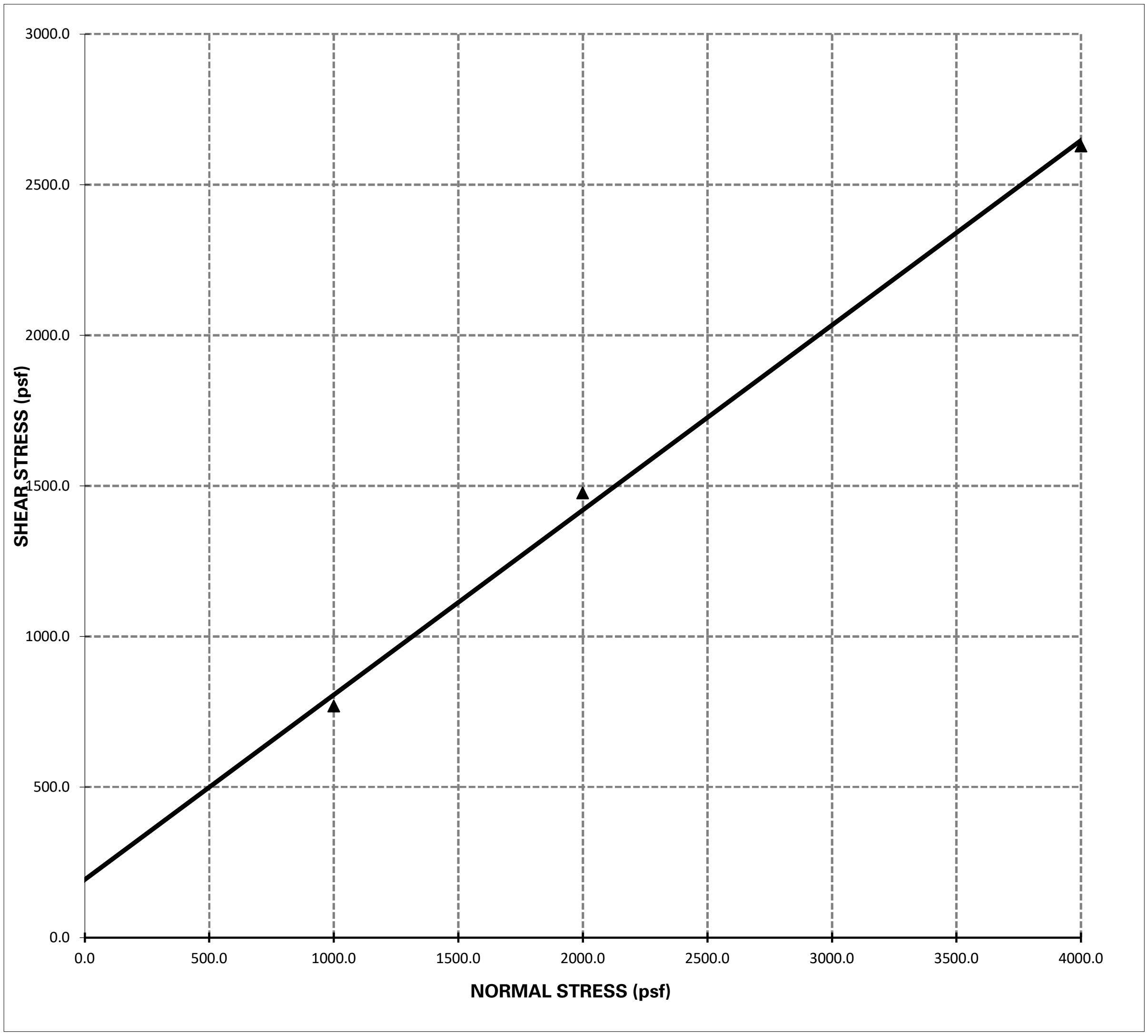
Atterberg Limits:
Liquid Limit, %
Plastic Limit, %
Plasticity Index, %

Classification:
Unified Soils Classification:
AASHTO Soils Classification:

GEOTEK

DIRECT SHEAR TEST

Project Name: Winco Site
Project Number: 2438-CR
Sample Location: B-3 @ 1 - 5 ft
Date Tested: 7/31/2020



Shear Strength: $\Phi =$ 31.5 ° , C = 192.00 psf

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.
2 - The above reflect direct shear strength at saturated conditions.
3 - The tests were run at a shear rate of 0.035 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	D R Horton	***Tested/ Checked By:***	DA Lab No Corona
Project Number:	2438-CR	***Date Tested:***	7/30/2020
Project Location:	Winco Site, Moreno Valley	***Sample Source:***	B-3 @ 1 - 5 ft
		Sample Description:	

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	785.6
B	Weight of ring (gm)	368.4
C	Net weight of sample (gm)	**417.2**
D	Wet Density, lb / ft3 (C*0.3016)	**125.8**
E	Dry Density, lb / ft3 (D/1.F)	**116.5**

SATURATION DETERMINATION

F	Moisture Content, %	8.0
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**48.4**

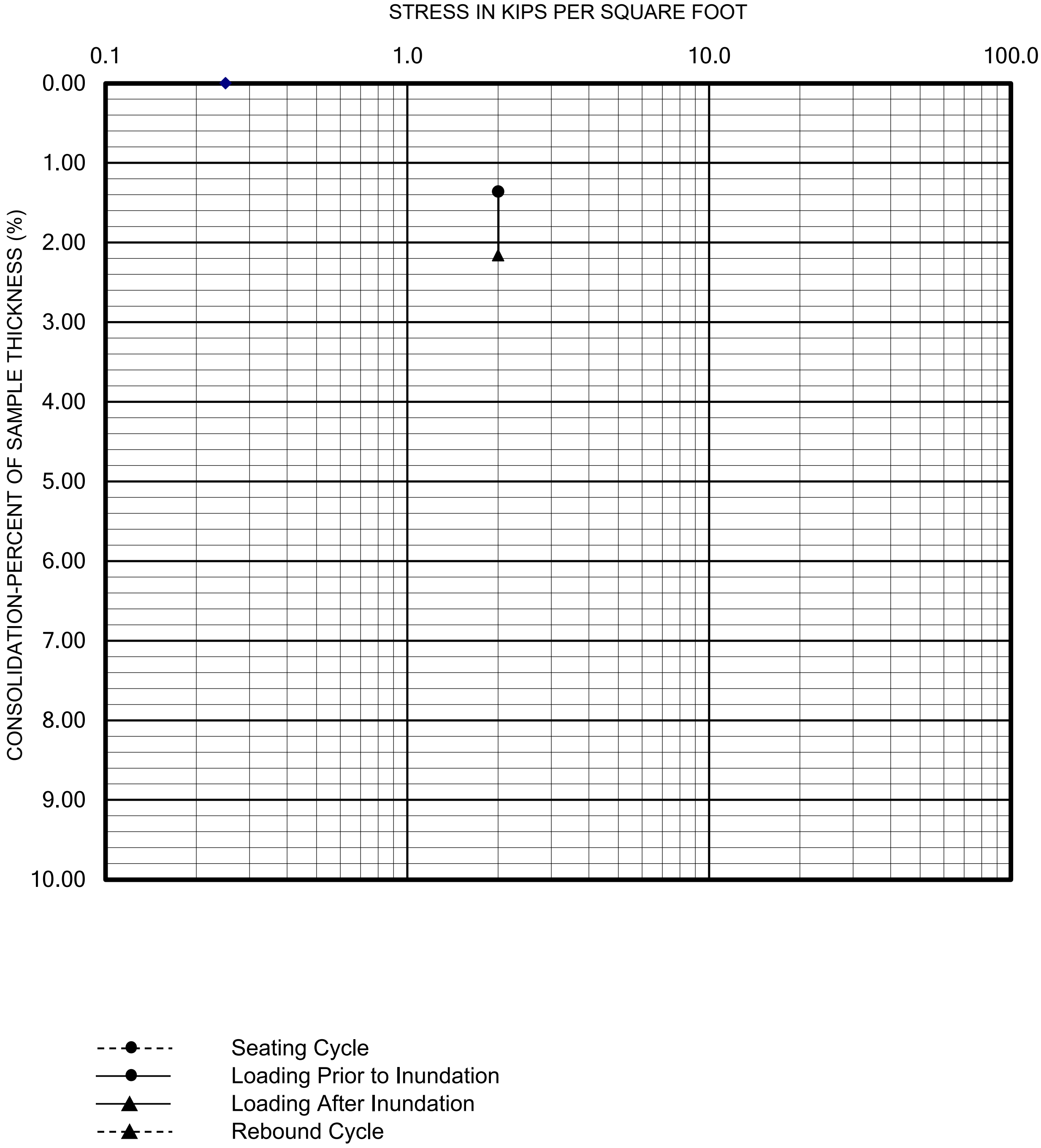
READINGS

DATE	TIME	READING	
7/30/2020	10:57	0.4640	Initial
	11:07	0.4640	10 min/Dry
7/31/2020	11:07	0.4640	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
806.0	**12.9**

EXPANSION INDEX = 0



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

CHECKED BY:	Lab: DI
PROJECT NO.: 2438-CR	Date:

COLLAPSE REPORT

Sample: B-5 @ 5 ft

APPENDIX E

SOIL CORROSIVITY STUDY

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

August 18, 2020 via email: gbogdanoff@geotekusa.com

GEOTEK, INC.
1548 N. Maple St.
Corona, CA 92880

Attention: Ms. Gaby Bogdanoff

Re: Soil Corrosivity Study
Single Family Residential Tract
Development Project
Moreno Valley, CA
HDR #20-0486SCS, GI #2438-CR

Introduction

Laboratory tests have been completed on twelve soil samples provided for the referenced project. The purpose of these tests was to determine if the soils might have deleterious effects on underground utility piping and concrete structures. HDR Engineering, Inc. (HDR) assumes that the samples provided are representative of the most corrosive soils at the site.

The proposed project consists of a residential development with single-family homes with one to two stories and no subterranean levels. The site is located northeast of the intersection of Alessandro Boulevard and Lasselle Avenue in Moreno Valley, California, and the water table is reportedly greater than 100 feet deep.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. HDR's recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, HDR will be happy to work with them as a separate phase of this project.

Laboratory Soil Corrosivity Tests

The electrical resistivity of each sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated samples was measured per ASTM G51. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327, ASTM D6919, and Standard Method 2320-B[1]. Laboratory test results are shown in the attached Table 1.

Soil Corrosivity

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:[2]

Soil Resistivity in ohm-centimeters	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,001 to 10,000	Moderately Corrosive
1,001 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

---

[1] *American Public Health Association (APHA). 2012. Standard Methods of Water and Wastewater. 22nd ed. American Public Health Association, American Water Works Association, Water Environment Federation publication. APHA, Washington D.C.*

[2] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.*

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

Electrical resistivities were in the mildly corrosive category with as-received moisture. When saturated, the resistivities were in the mildly to moderately corrosive categories. The resistivities dropped considerably with added moisture because the samples were dry as-received.

Soil pH values varied from 5.9 to 7.7. This range is moderately acidic to mildly alkaline.[3] These values do not particularly increase soil corrosivity.

The soluble salt content of the samples was low. Chloride and sulfate were found at low concentrations.

The ammonium concentrations were high enough to be aggressive to copper. Nitrate was detected in low concentrations.

Tests were not made for sulfide and oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

This soil is classified as moderately corrosive to ferrous metals and aggressive to copper.

Corrosion Control Recommendations

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

The following recommendations are based on the soil conditions discussed in the Soil Corrosivity section above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

---

[3] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.*

Steel Pipe

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and the possible future application of cathodic protection.

2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:

   a. At each end of the pipeline.

   b. At each end of all casings.

   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

3. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically isolate each buried steel pipeline per NACE SP0286 from:

   a. Dissimilar metals.

   b. Dissimilarly coated piping (cement-mortar vs. dielectric).

   c. Above ground steel pipe.

   d. All existing piping.

   Insulated joints should be placed above grade or in vaults where possible. Wrap all buried insulators with wax tape per AWWA C217.

4. Choose one of the following corrosion control options:

   OPTION 1

   a. Apply a suitable dielectric coating intended for underground use such as:

      i. Polyurethane per AWWA C222 *or*

      ii. Extruded polyethylene per AWWA C215 *or*

   iii. A tape coating system per AWWA C214 *or*
   iv. Hot applied coal tar enamel per AWWA C203 *or*
   v. Fusion bonded epoxy per AWWA C213.

b. Although it is customary to cathodically protect bonded dielectrically coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

OPTION 2

As an alternative to dielectric coating and possible future cathodic protection, apply a ¾-inch cement mortar coating per AWWA C205 or encase in concrete three inches thick, using any type of ASTM C150 cement. Joint bonds, test stations, and insulated joints are still recommended for this alternative.

NOTE: Some steel piping systems, such as for oil, gas, and high-pressure piping systems, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Ductile Iron Pipe

1. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE SP0286.
2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and possible future application of cathodic protection.
3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:
   a. At each end of the pipeline.
   b. At each end of any casings.

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

4. Choose one of the following corrosion control options:

   OPTION 1

   a. Apply a suitable coating intended for underground use such as:

      i. Polyethylene encasement per AWWA C105; *or*

      ii. Epoxy coating; *or*

      iii. Polyurethane; *or*

      iv. Wax tape.

      NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.

   b. Although it is customary to cathodically protect coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

   OPTION 2

   As an alternative to the coating systems described in Option 1 and possible future cathodic protection, concrete encase all buried portions of metallic piping so that there is a minimum of three inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of ASTM C150 cement.

   NOTE: Some iron piping systems, such as for fire water piping, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Cast Iron Soil Pipe

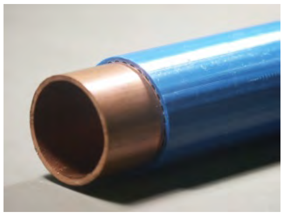
1. Protect cast iron soil pipe with either a double wrap 4-mil or single wrap 8-mil polyethylene encasement per AWWA C105.
2. It is not necessary to bond the pipe joints or apply cathodic protection.
3. Provide six inches of clean sand backfill all around the pipe.

Clean Sand Backfill

1. Clean sand backfill must have the following parameters:
    a. Minimum saturated resistivity of no less than 3,000 ohm-cm; *and*
    b. pH between 6.0 and 8.0.
2. All backfill testing should be performed by a corrosion engineering laboratory.

Copper Tubing

1. Electrically insulate underground copper pipe from dissimilar metals and from above ground copper pipe with insulating devices per NACE SP0286.
2. Electrically insulate cold water piping from hot water piping systems.
3. Protect buried copper tubing by one of the following measures:
    a. Prevention of soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing using PVC pipe with solvent-welded joints.
    b. Installation of a factory-coated copper pipe with a minimum 25-mil thickness such as Kamco's Aqua Shield™, Mueller's Streamline Protec™, or equal. The coating must be continuous with no cuts or defects.
    c. Installation of 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over a suitable primer. Protect wrapped copper tubing by applying cathodic protection per NACE SP0169.



Plastic and Vitrified Clay Pipe

1. No special corrosion control measures are required for plastic and vitrified clay piping placed underground.
2. Protect all metallic fittings and valves with wax tape per AWWA C217, or with epoxy and appropriately sized cathodic protection per NACE SP0169.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.
2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete Structures and Pipe

1. From a corrosion standpoint, any type of ASTM C150 cement may be used for concrete structures and pipe because the sulfate concentration is negligible, from 0 to 0.10 percent.[4,5,6]
2. Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils due to the low chloride concentrations[7] found onsite. Limit the water-soluble chloride ion content in the concrete mix design to less than 0.3 percent by weight of cement.

---

[4] *2015 International Building Code (IBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[5] *2015 International Residential Code (IRC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[6] *2016 California Building Code (CBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[7] *Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65*

Closure

The analysis and recommendations presented in this report are based upon data obtained from the laboratory samples. This report does not reflect variations that may occur across the site or due to the modifying effects of construction. If variations appear, HDR should be notified immediately so that further evaluation and supplemental recommendations can be provided.

HDR's services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
HDR Engineering, Inc.

Marc E. N. Wegner
No. C73862
Exp. 06/30/21

James Keegan

Marc E N Wegner, PE

Enc: Table 1

SCS Template

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID			1 @ 1'	2 @ 1'	3 @ 1'	4 @ 1'	5 @ 1'
Resistivity		**Units**					
as-received		ohm-cm	>4,000,000	>4,000,000	>4,000,000	>4,000,000	>4,000,000
saturated		ohm-cm	6,800	9,200	10,800	6,800	8,800
pH			6.5	6.2	5.9	6.7	6.9
Electrical Conductivity		mS/cm	0.08	0.08	0.06	0.05	0.05
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	46	37	31	25	31
magnesium	Mg^{2+}	mg/kg	11	8.7	8.2	9.5	9.2
sodium	Na^{1+}	mg/kg	16	10	4.3	28	19
potassium	K^{1+}	mg/kg	33	59	34	8.9	9.1
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	192	159	137	183	143
fluoride	F^{1-}	mg/kg	5.4	4.5	2.3	2.8	2.5
chloride	Cl^{1-}	mg/kg	7.6	9.0	6.3	5.5	5.2
sulfate	SO_4^{2-}	mg/kg	15	16	17	7.6	8.0
phosphate	PO_4^{3-}	mg/kg	17	23	15	2.0	3.1
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	0.7	9.7	ND	ND
nitrate	NO_3^{1-}	mg/kg	11	10	9.3	9.5	8.1
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID			6 @ 1'	7 @ 0.5'	8 @ 0.5'	9 @ 0.5'	10 @ 0.5'
Resistivity		**Units**					
as-received		ohm-cm	>4,000,000	>4,000,000	>4,000,000	>4,000,000	>4,000,000
saturated		ohm-cm	5,200	4,800	22,000	6,000	7,600
pH			6.5	6.7	6.2	6.5	7.1
Electrical Conductivity		mS/cm	0.06	0.07	0.04	0.10	0.05
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	36	23	16	46	31
magnesium	Mg^{2+}	mg/kg	10	9.3	5.2	14	7.8
sodium	Na^{1+}	mg/kg	14	48	5.0	28	7.7
potassium	K^{1+}	mg/kg	19	7.6	21	24	14
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	149	149	110	214	207
fluoride	F^{1-}	mg/kg	3.7	3.1	1.6	3.4	3.6
chloride	Cl^{1-}	mg/kg	5.6	13	4.4	18	3.9
sulfate	SO_4^{2-}	mg/kg	8.3	26	7.2	24	7.0
phosphate	PO_4^{3-}	mg/kg	4.7	15	4.6	14	11
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	33	ND	ND
nitrate	NO_3^{1-}	mg/kg	9.9	18	8.1	15	5.4
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID			11 @ 1'	12 @ 1'
Resistivity		**Units**		
as-received		ohm-cm	>4,000,000	>4,000,000
saturated		ohm-cm	9,600	16,800
pH			7.7	6.8
Electrical Conductivity		mS/cm	0.05	0.02
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	44	14
magnesium	Mg^{2+}	mg/kg	6.9	4.8
sodium	Na^{1+}	mg/kg	6.4	9.1
potassium	K^{1+}	mg/kg	9.0	7.0
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	259	104
fluoride	F^{1-}	mg/kg	2.0	2.2
chloride	Cl^{1-}	mg/kg	3.3	2.8
sulfate	SO_4^{2-}	mg/kg	5.5	4.3
phosphate	PO_4^{3-}	mg/kg	ND	ND
Other Tests				
ammonium	NH_4^{1+}	mg/kg	ND	ND
nitrate	NO_3^{1-}	mg/kg	11	6.6
sulfide	S^{2-}	qual	na	na
Redox		mV	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

APPENDIX F

GENERAL GRADING GUIDELINES

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor’s overall level of efforts during grading. The contractor’s personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor’s responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will

Attachment: Appendix D - Geotechnical Evaluation Winco Site [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.

7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative. Typical procedures are similar to those indicated on Plate F-4.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed (see Plates F-1, F-2 and F-3) unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Subdrainage

1. Subdrainage systems should be provided in canyon bottoms prior to placing fill, and behind buttress and stabilization fills and in other areas indicated in the report. Subdrains should conform to schematic diagrams F-1 and F-5, and be acceptable to our representative.

2. For canyon subdrains, runs less than 500 feet may use six-inch pipe. Typically, runs in excess of 500 feet should have the lower end as eight-inch minimum.
3. Filter material should be clean, 1/2 to 1-inch gravel wrapped in a suitable filter fabric. Class 2 permeable filter material per California Department of Transportation Standards tested by this office to verify its suitability, may be used without filter fabric. A sample of the material should be provided to the Soils Engineer by the contractor at least two working days before it is delivered to the site. The filter should be clean with a wide range of sizes.
4. Approximate delineation of anticipated subdrain locations may be offered at 40-scale plan review stage. During grading, this office would evaluate the necessity of placing additional drains.
5. All subdrainage systems should be observed by our representative during construction and prior to covering with compacted fill.
6. Subdrains should outlet into storm drains where possible. Outlets should be located and protected. The need for backflow preventers should be assessed during construction.
7. Consideration should be given to having subdrains located by the project surveyors.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
   a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
   b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
   a) They are not placed in concentrated pockets;
   b) There is a sufficient percentage of fine-grained material to surround the rocks;
   c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal (see Plate G-4). On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

Keyways, Buttress and Stabilization Fills

Keyways are needed to provide support for fill slope and various corrective procedures.

1. Side-hill fills should have an equipment-width key at their toe excavated through all surficial soil and into competent material and tilted back into the hill (Plates F-2, F-3). As the fill is elevated, it should be benched through surficial soil and slopewash, and into competent bedrock or other material deemed suitable by our representatives (See Plates F-1, F-2, and F-3).
2. Fill over cut slopes should be constructed in the following manner:
    a) All surficial soils and weathered rock materials should be removed at the cut-fill interface.
    b) A key at least one and one-half (1.5) equipment width wide (or as needed for compaction), and tipped at least one (1) foot into slope, should be excavated into competent materials and observed by our representative.
    c) The cut portion of the slope should be excavated prior to fill placement to evaluate if stabilization is necessary. The contractor should be responsible for any additional earthwork created by placing fill prior to cut excavation. (see Plate F-3 for schematic details.)
3. Daylight cut lots above descending natural slopes may require removal and replacement of the outer portion of the lot. A schematic diagram for this condition is presented on Plate F-2.
4. A basal key is needed for fill slopes extending over natural slopes. A schematic diagram for this condition is presented on Plate F-2.
5. All fill slopes should be provided with a key unless within the body of a larger overall fill mass. Please refer to Plate F-3 for specific guidelines.

Anticipated buttress and stabilization fills are discussed in the text of the report. The need to stabilize other proposed cut slopes will be evaluated during construction. Plate F-5 shows a schematic of buttress construction.

1. All backcuts should be excavated at gradients of 1:1 or flatter. The backcut configuration should be determined based on the design, exposed conditions, and need to maintain a minimum fill width and provide working room for the equipment.

2. On longer slopes, backcuts and keyways should be excavated in maximum 250 feet long segments. The specific configurations will be determined during construction.
3. All keys should be a minimum of two (2) feet deep at the toe and slope toward the heel at least one foot or two (2%) percent, whichever is greater.
4. Subdrains are to be placed for all stabilization slopes exceeding 10 feet in height. Lower slopes are subject to review. Drains may be required. Guidelines for subdrains are presented on Plate F-5.
5. Benching of backcuts during fill placement is required.

Lot Capping

1. When practical, the upper three (3) feet of material placed below finish grade should be comprised of the least expansive material available. Preferably, highly and very highly expansive materials should not be used. We will attempt to offer advice based on visual evaluations of the materials during grading, but it must be realized that laboratory testing is needed to evaluate the expansive potential of soil. Minimally, this testing takes two (2) to four (4) days to complete.
2. Transition lots (cut and fill) both per plan and those created by remedial grading (e.g. lots above stabilization fills, along daylight lines, above natural slopes, etc.) should be capped with a minimum three foot thick compacted fill blanket.
3. Cut pads should be observed by our representative(s) to evaluate the need for overexcavation and replacement with fill. This may be necessary to reduce water infiltration into highly fractured bedrock or other permeable zones, and/or due to differing expansive potential of materials beneath a structure. The overexcavation should be at least three feet. Deeper overexcavation may be recommended in some cases.

ROCK PLACEMENT AND ROCK FILL GUIDELINES

It is anticipated that large quantities of oversize material would be generated during grading. It's likely that such materials may require special handling for burial. Although alternatives may be developed in the field, the following methods of rock disposal are recommended on a preliminary basis.

Limited Larger Rock

When materials encountered are principally soil with limited quantities of larger rock fragments or boulders, placement in windrows is recommended. The following procedures should be applied:

1. Oversize rock (greater than 8 inches) should be placed in windrows.
    a) Windrows are rows of single file rocks placed to avoid nesting or clusters of rock.
    b) Each adjacent rock should be approximately the same size (within ~one foot in diameter).
    c) The maximum rock size allowed in windrows is four feet
2. A minimum vertical distance of three feet between lifts should be maintained. Also, the windrows should be offset from lift to lift. Rock windrows should not be closer than 15 feet to the face of fill slopes and sufficient space must be maintained for proper slope construction (see Plate F-4).
3. Rocks greater than eight inches in diameter should not be placed within seven feet of the finished subgrade for a roadway or pads and should be held below the depth of the lowest utility. This will allow easier trenching for utility lines.

4. Rocks greater than four feet in diameter should be broken down, if possible, or they may be placed in a dozer trench. Each trench should be excavated into the compacted fill a minimum of one foot deeper than the largest diameter of rock.
   a) The rock should be placed in the trench and granular fill materials (SE>30) should be flooded into the trench to fill voids around the rock.
   b) The over size rock trenches should be no closer together than 15 feet from any slope face.
   c) Trenches at higher elevation should be staggered and there should be a minimum of four feet of compacted fill between the top of the one trench and the bottom of the next higher trench.
   d) It would be necessary to verify 90 percent relative compaction in these pits. A 24 to 72 hour delay to allow for water dissipation should be anticipated prior to additional fill placement.

Structural Rock Fills

If the materials generated for placement in structural fills contains a significant percentage of material more than six (6) inches in one dimension, then placement using conventional soil fill methods with isolated windrows would not be feasible. In such cases the following could be considered:

1. Mixes of large rock or boulders may be placed as rock fill. They should be below the depth of all utilities both on pads and in roadways and below any proposed swimming pools or other excavations. If these fills are placed within seven (7) feet of finished grade, they may affect foundation design.
2. Rock fills are required to be placed in horizontal layers that should **not exceed two feet in thickness, or the maximum rock size present, which ever is less**. All rocks exceeding two feet should be broken down to a smaller size, windrowed (see above), or disposed of in non-structural fill areas. Localized larger rock up to 3 feet in largest dimension may be placed in rock fill as follows:
   a) individual rocks are placed in a given lift so as to be roughly 50% exposed above the typical surface of the fill ,
   b) loaded rock trucks or alternate compactors are worked around the rock on all sides to the satisfaction of the soil engineer,
   c) the portion of the rock above grade is covered with a second lift.
3. Material placed in each lift should be well graded. No unfilled spaces (voids) should be permitted in the rock fill.

Compaction Procedures

Compaction of rock fills is largely procedural. The following procedures have been found to generally produce satisfactory compaction.

1. Provisions for routing of construction traffic over the fill should be implemented.
   a) Placement should be by rock trucks crossing the lift being placed and dumping at its edge.
   b) The trucks should be routed so that each pass across the fill is via a different path and that all areas are uniformly traversed.
   c) The dumped piles should be knocked down and spread by a large dozer (D-8 or larger suggested). (Water should be applied before and during spreading.)
2. Rock fill should be generously watered (sluiced)
   a) Water should be applied by water trucks to the:

        i) dump piles,
        ii) front face of the lift being placed and,
        iii) surface of the fill prior to compaction.
    b) No material should be placed without adequate water.
    c) The number of water trucks and water supply should be sufficient to provide constant water.
    d) Rock fill placement should be suspended when water trucks are unavailable:
        i) for more than 5 minutes straight, or,
        ii) for more than 10 minutes/hour.

3. In addition to the truck pattern and at the discretion of the soil engineer, large, rubber tired compactors may be required.
    a) The need for this equipment will depend largely on the ability of the operators to provide complete and uniform coverage by wheel rolling with the trucks.
    b) Other large compactors will also be considered by the soil engineer provided that required compaction is achieved.

4. Placement and compaction of the rock fill is largely procedural. Observation by trenching should be made to check:
    a) the general segregation of rock size,
    b) for any unfilled spaces between the large blocks, and
    c) the matrix compaction and moisture content.

5. Test fills may be required to evaluate relative compaction of finer grained zones or as deemed appropriate by the soil engineer.
    a) A lift should be constructed by the methods proposed, as proposed

6. Frequency of the test trenching is to be at the discretion of the soil engineer. Control areas may be used to evaluate the contractor’s procedures.

7. A minimum horizontal distance of 15 feet should be maintained from the face of the rock fill and any finish slope face. At least the outer 15 feet should be built of conventional fill materials.

Piping Potential and Filter Blankets

Where conventional fill is placed over rock fill, the potential for piping (migration) of the fine grained material from the conventional fill into rock fills will need to be addressed.
The potential for particle migration is related to the grain size comparisons of the materials present and in contact with each other. Provided that 15 percent of the finer soil is larger than the effective pore size of the coarse soil, then particle migration is substantially mitigated. This can be accomplished with a well-graded matrix material for the rock fill and a zone of fill similar to the matrix above it. The specific gradation of the fill materials placed during grading must be known to evaluate the need for any type of filter that may be necessary to cap the rock fills. This, unfortunately, can only be accurately determined during construction.

In the event that poorly graded matrix is used in the rock fills, properly graded filter blankets 2 to 3 feet thick separating rock fills and conventional fill may be needed. As an alternative, use of two layers of filter fabric (Mirafi 700 x or equivalent) could be employed on top of the rock fill. In order to mitigate excess puncturing, the surface of the rock fill should be well broken down and smoothed prior to placing the filter fabric. The first layer of the fabric may then be placed and covered with relatively permeable fill material (with respect to overlying material) 1 to 2 feet thick. The relative permeable material should be compacted to fill standards. The second layer of fabric should be placed and conventional fill placement continued.

Subdrainage

Rock fill areas should be tied to a subdrainage system. If conventional fill is placed that separates the rock from the main canyon subdrain, then a secondary system should be installed. A system consisting of an adequately graded base (3 to 4 percent to the lower side) with a collector system and outlets may suffice.

Additionally, at approximately every 25 foot vertical interval, a collector system with outlets should be placed at the interface of the rock fill and the conventional fill blanketing a fill slope

Monitoring

Depending upon the depth of the rock fill and other factors, monitoring for settlement of the fill areas may be needed following completion of grading. Typically, if rock fill depths exceed 40 feet, monitoring would be recommend prior to construction of any settlement sensitive improvements. Delays of 3 to 6 months or longer can be expected prior to the start of construction.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractor's responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractor's procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If

zones are found that are considered less compact than other areas, this would be brought to the contractor's attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

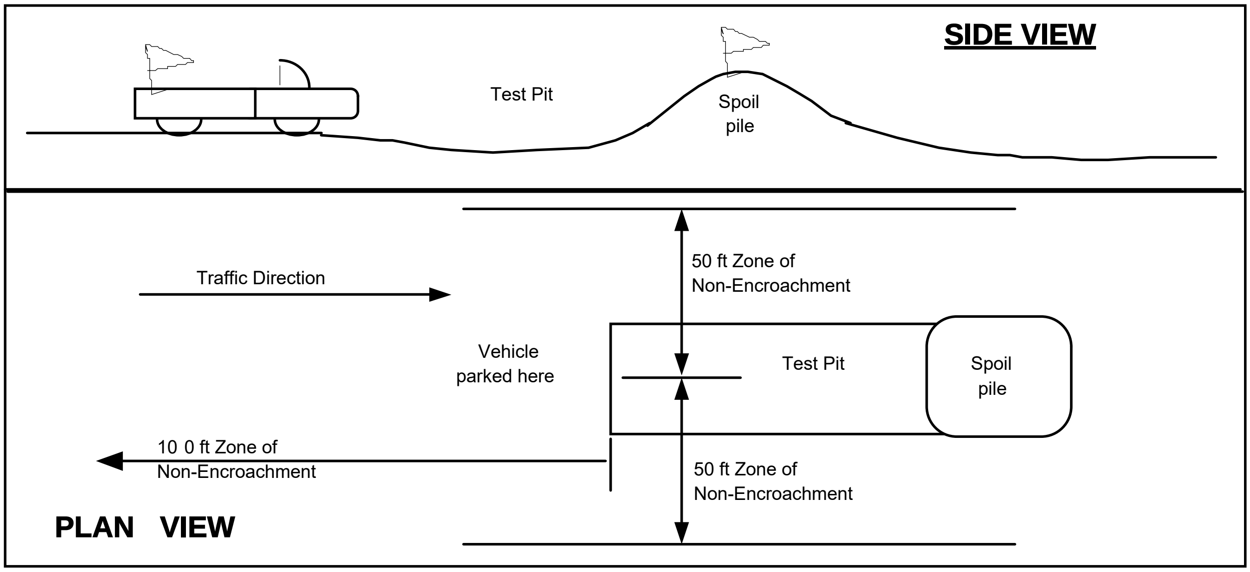
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

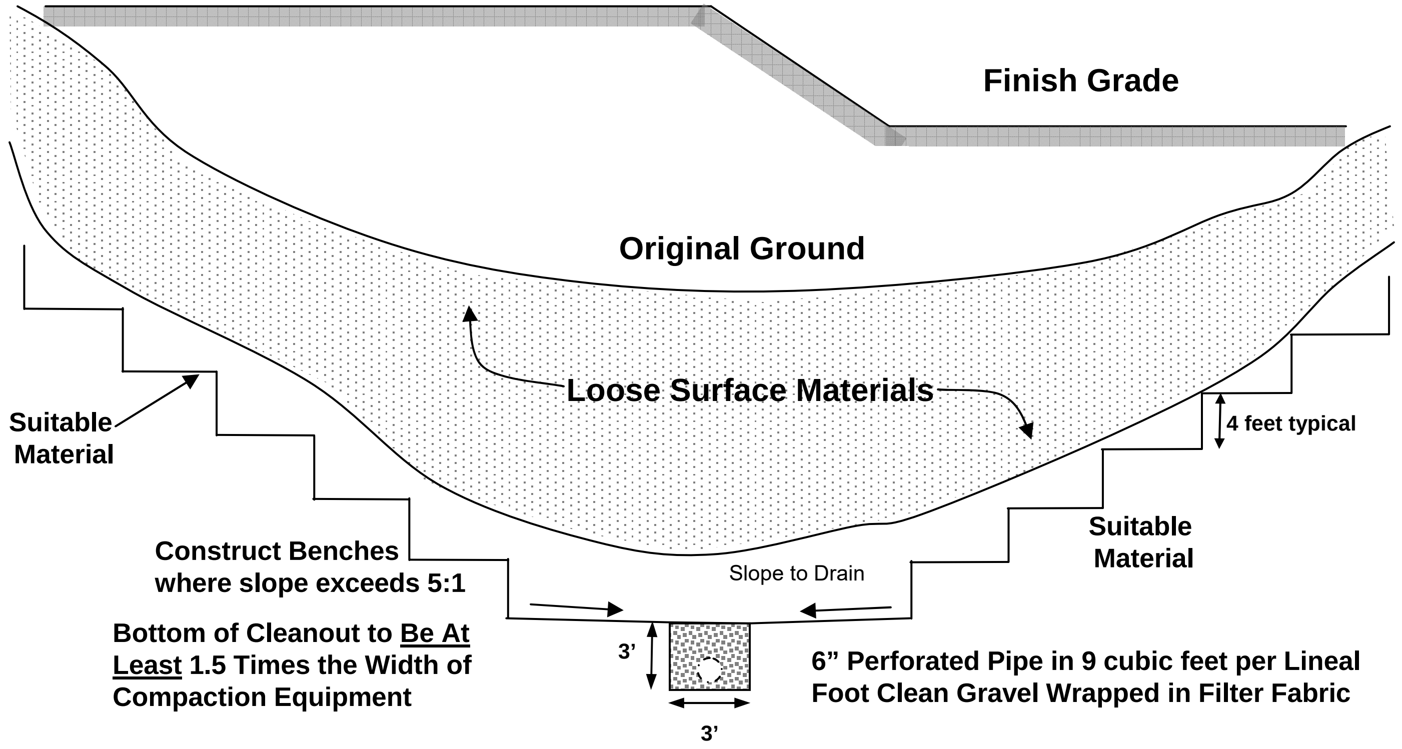
In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

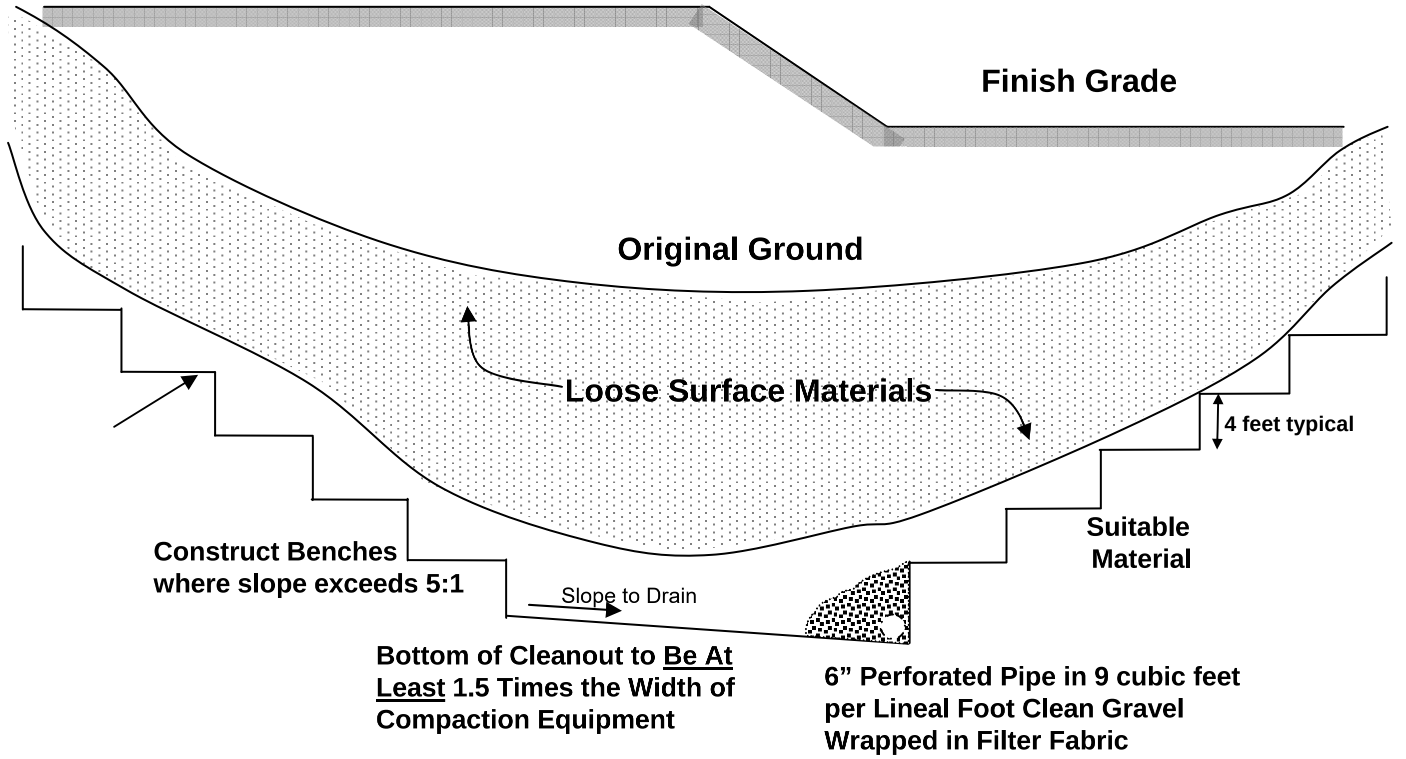
In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technician's attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

ALTERNATES





GEOTEK

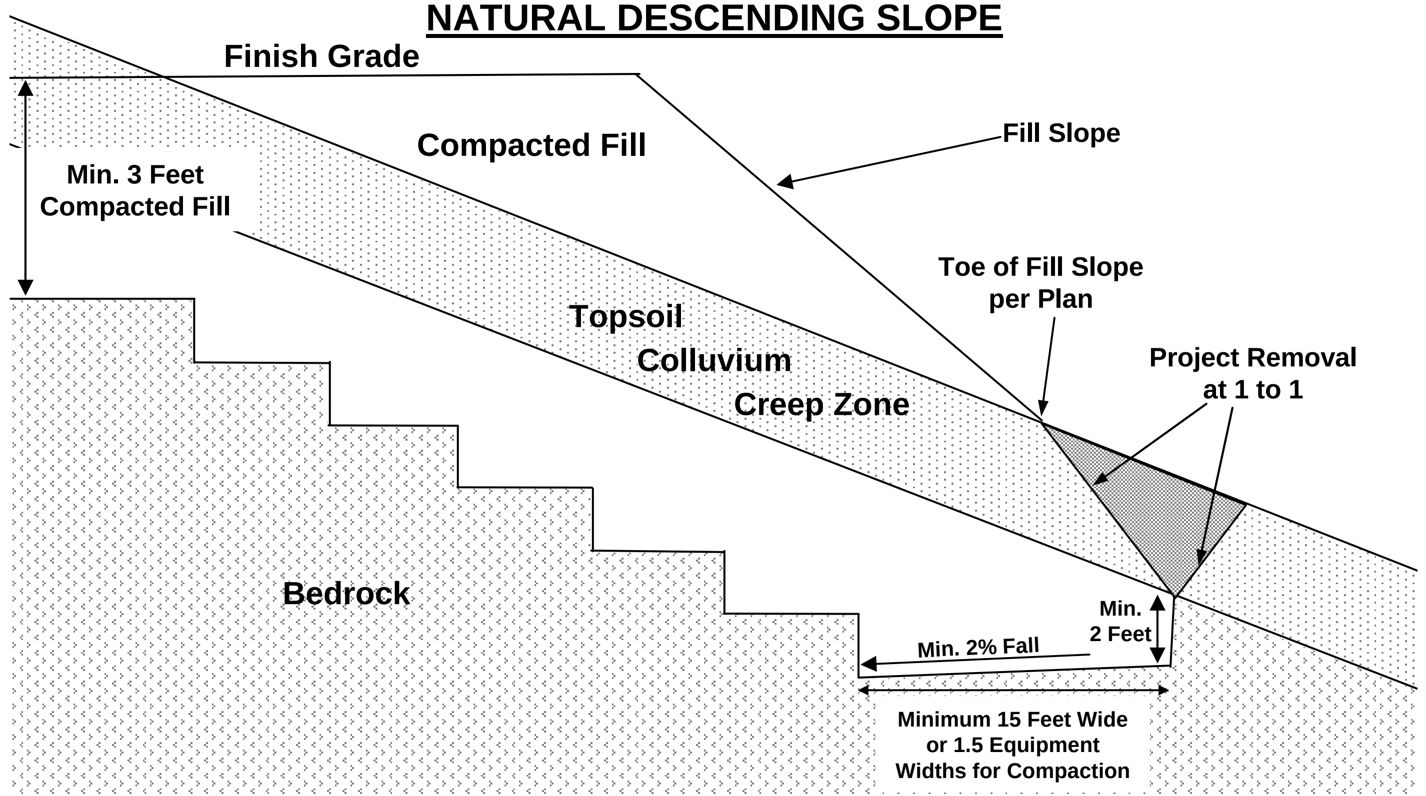
1548 North Maple Street
Corona, California 92880

TYPICAL CANYON CLEANOUT

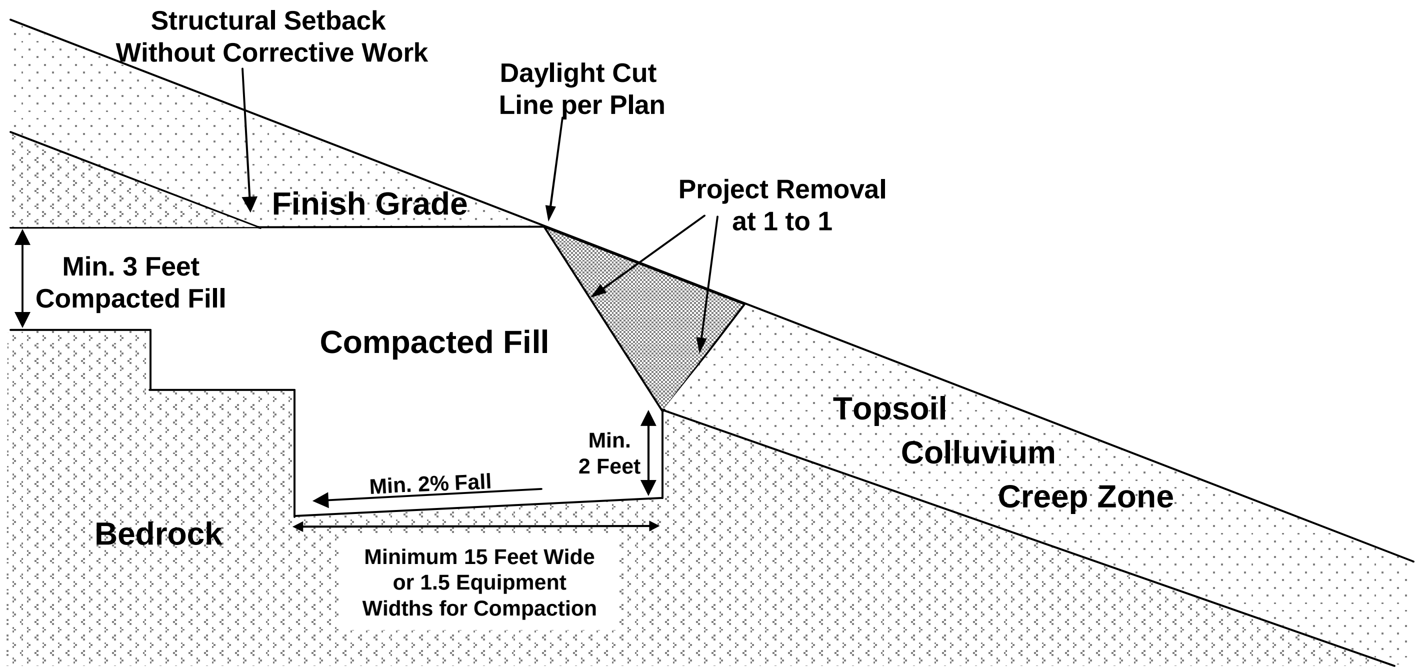
STANDARD GRADING GUIDELINES

PLATE F-1

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



GEOTEK

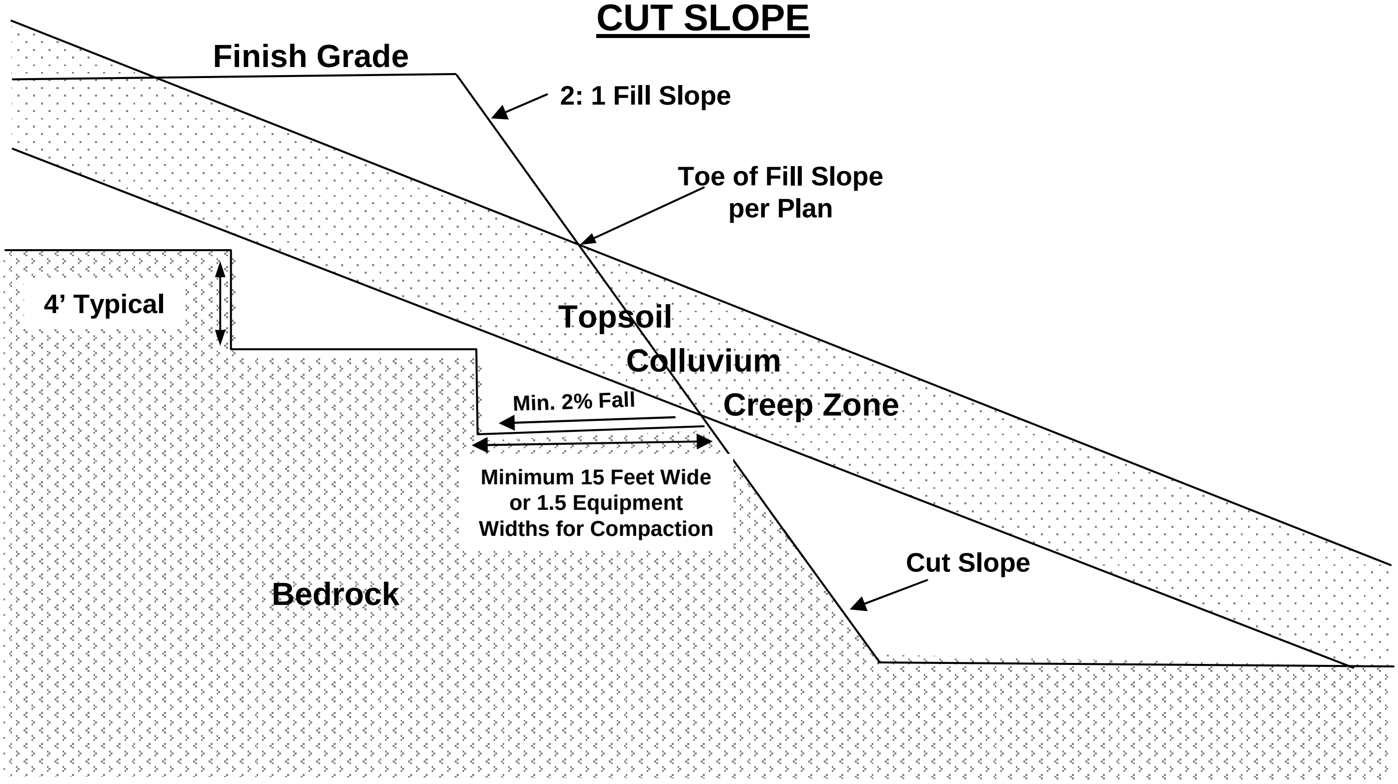
1548 North Maple Street
Corona, California 92880

TREATMENT ABOVE
NATURAL SLOPES

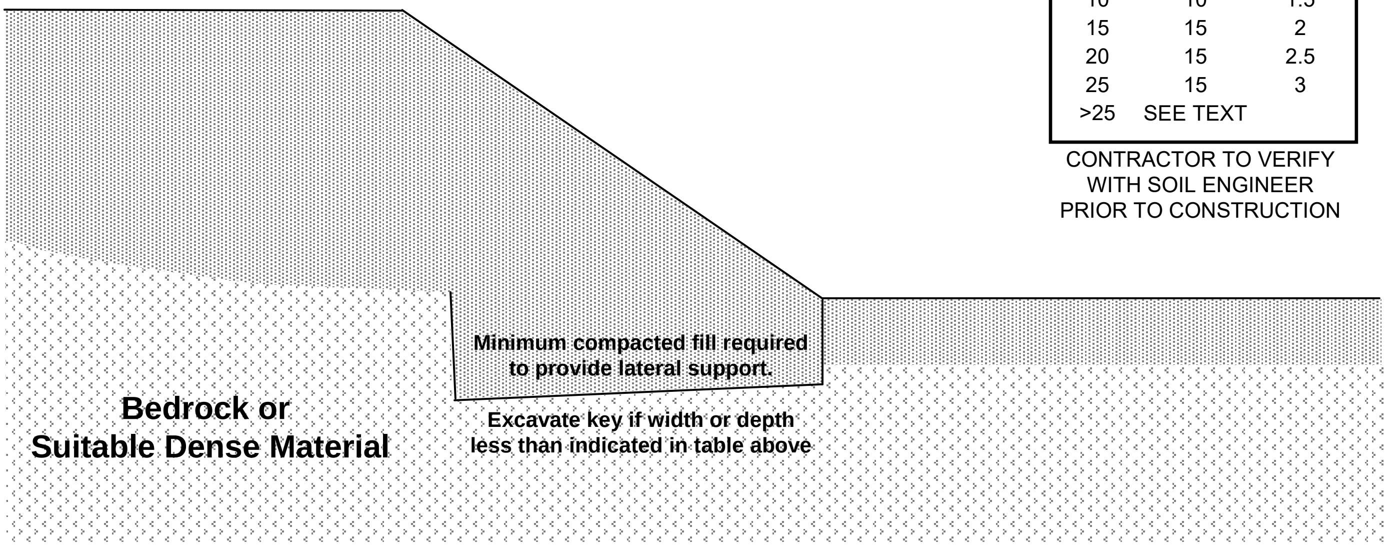
STANDARD GRADING
GUIDELINES

PLATE F-2

TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE



SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY
WITH SOIL ENGINEER
PRIOR TO CONSTRUCTION

GEOTEK

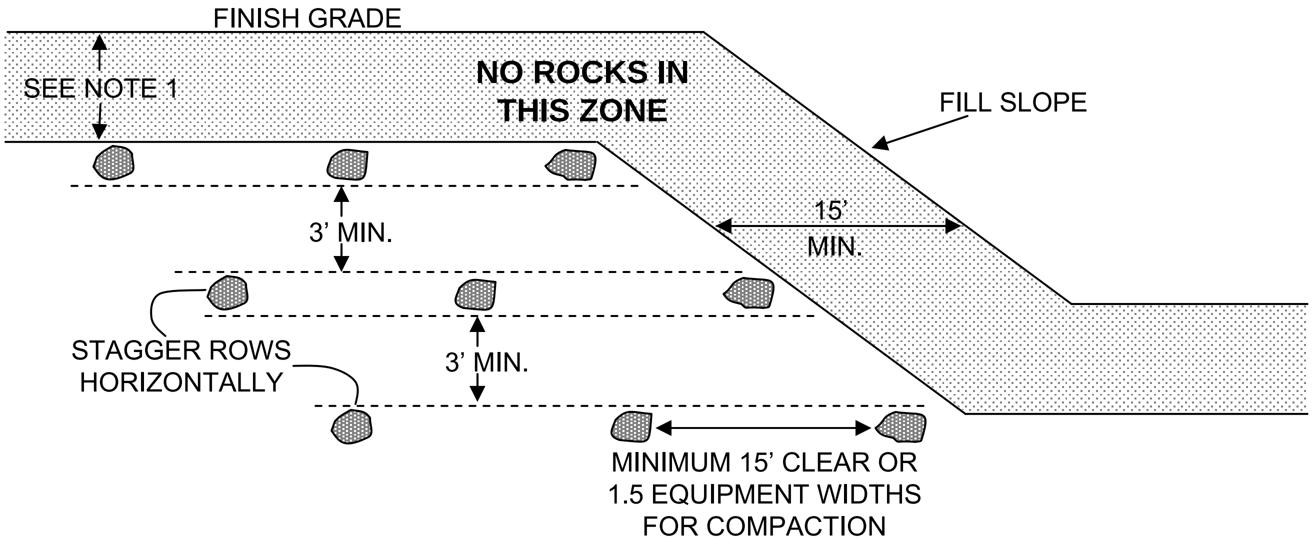
1548 North Maple Street
Corona, California 92880

COMMON FILL
SLOPE KEYS

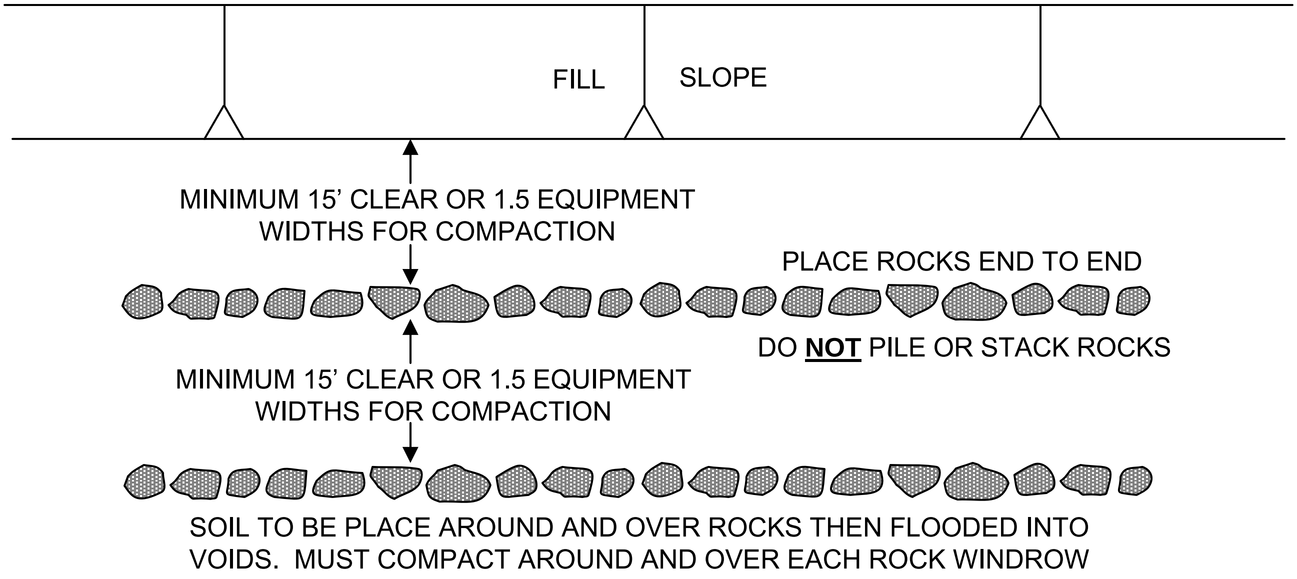
STANDARD GRADING
GUIDELINES

PLATE F-3

CROSS SECTIONAL VIEW



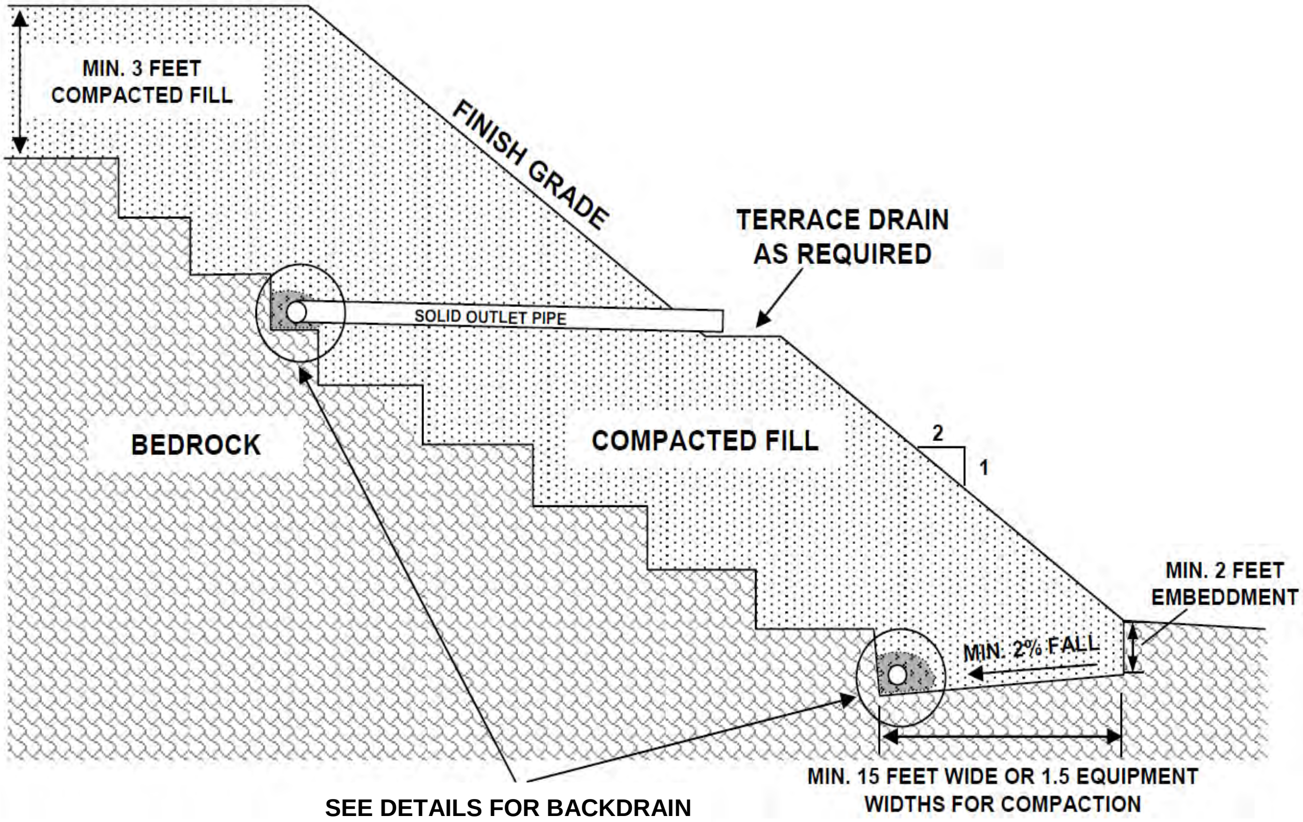
PLAN VIEW



NOTES:

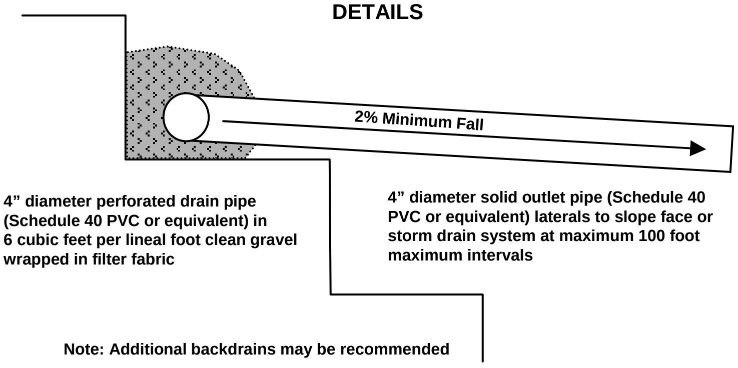
1) SOIL FILL OVER WINDROW SHOULD BE 7 FEET OR PER JURISDUICTIONAL STANDARDS AND SUFFICIENT FOR FUTURE EXCAVATIONS TO AVOID ROCKS
2) MAXIMUM ROCK SIZE IN WINDROWS IS 4 FEET IN DIAMETER
3) SOIL AROUND WINDROWS TO BE SANDY MATERIAL SUBJECT TO SOIL ENGINEER ACCEPTANCE
4) SPACING AND CLEARANCES MUST BE SUFFICIENT TO ALLOW FOR PROPER COMPACTION
5) INDIVDUAL LARGE ROCKS MAY BE BURIED IN PITS.

GEOTEK	1548 North Maple Street Corona, California 92880	ROCK BURIAL DETAILS	STANDARD GRADING GUIDELINES PLATE F-4



SEE DETAILS FOR BACKDRAIN
AND HEEL DRAIN

**BACKDRAIN
DETAILS**



4” diameter perforated drain pipe (Schedule 40 PVC or equivalent) in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric

4” diameter solid outlet pipe (Schedule 40 PVC or equivalent) laterals to slope face or storm drain system at maximum 100 foot maximum intervals

Note: Additional backdrains may be recommended

**HEEL DRAIN
DETAILS**

6” diameter perforated drain pipe in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric, outlet pipe to gravity flow with 2% minimum fall

GEOTEK

1548 North Maple Street
Corona, California 92880

TYPICAL BUTTRESS AND
STABILIZATION FILL

STANDARD GRADING
GUIDELINES

PLATE F-5

PALEONTOLOGICAL ASSESSMENT REPORT

TENTATIVE TRACT MAP 38123 PROJECT, CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

Prepared for: **HELIX Environmental Planning, Inc.**
703 Palomar Airport Road, Suite 200
Carlsbad, CA 92011

Prepared by: **Paleo Solutions, Inc.**
911 S. Primrose Ave., Unit N
Monrovia, CA 91016

Courtney Richards, M.S. – Principal Investigator
Joey Raum, B.S. – Report Author

PSI Report: CA21RiversideHEL01R

October 25, 2021

This page intentionally left blank.

Table of Contents

Figures

Tables

1.0 EXECUTIVE SUMMARY

This report presents the results of the paleontological technical study and resource potential evaluation conducted by Paleo Solutions, Inc. (Paleo Solutions), under contract to HELIX Environmental Planning, Inc. (HELIX), in support of the Tentative Tract Map 38123 Project (Project) located in the City of Moreno Valley, Riverside County, California. This work was required by the City of Moreno Valley to fulfill their responsibilities as the lead agency under the California Environmental Quality Act (CEQA).

The Project involves construction of two residential housing tracts, Windsong and Skylar Place. The Windsong tract occupies approximately 18.6 acres of undeveloped land and will include 102 lots; and the Skylar Place tract occupies approximately 17.2 acres of undeveloped land and will include 75 lots. Additionally, approximately 6.5 acres of Off-site Area, which include small portions of undeveloped land and streets (i.e., Lasselle Street, Bay Avenue, Darco Drive, and Alessandro Boulevard) that are immediately adjacent to the Project area, are included as part of the Project construction buffer to account for street work, half-width improvements, and over excavation (see Figure 2). Further, approximately 2.1 acres of land located southwest of the Project area were originally included in the study (i.e., surveyed and assessed) and were later removed from the Project area. This excess portion, Not a Part, is further divided into two sections: Not a Part - 1, which comprises approximately 1.5 acres that will not be impacted by the Project; and Not a Part – 2, which comprises approximately 0.6 acres of land that is immediately adjacent to the Skylar Place Tract and may be impacted by Project over excavation (see Figure 2). Paleo Solutions conducted an analysis of existing data including a geologic map and literature review, online searches of paleontological databases, and paleontological searches of records maintained by the Natural History Museum of Los Angeles County (LACM) and the Western Science Center (WSC). Paleontological sensitivity assignments for geologic units mapped within the Project area and half-mile buffer were developed following the Potential Fossil Yield Classification (PFYC) system (Bureau of Land Management [BLM], 2016) and best practices in mitigation paleontology (Murphey et al., 2019).

Geologic mapping by D.M. Morton et al. (2002) indicates that the Project area is underlain primarily by very low paleontological potential (PFYC 1) Cretaceous-age Peninsular Ranges batholith, tonalite, undifferentiated (tonalite) (Kt) and lesser amounts of moderate paleontological potential (PFYC 3) Pleistocene-age very old alluvial fan deposits (Qvof) (Figure 3). Also mapped within the vicinity, within the half-mile buffer, are low paleontological potential (PFYC 2) Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf). Aerial imagery (Google Earth, 2021) also indicates that Cretaceous-age tonalite (Kt) is exposed at the Project area surface in portions of the southeastern and central-eastern portions of the Windsong tract and the northern and southeastern portions of the Skylar Place tract.

Additionally, alternative mapping by T.W. Dibblee and J.A. Minch (2003) indicates that the Project area is underlain primarily by very low paleontological potential (PFYC 1) Cretaceous-age plutonic rocks of Peninsular Ranges, quartz diorite (quartz diorite) (qdx) and lesser amounts of low paleontological potential (PFYC 2) Holocene-age alluvial sand, gravel, and clay of valley areas (young alluvium) (Qa). For the purposes of this report, and based on our field observations, the geologic mapping by Morton et al. (2002) is utilized. The LACM and WSC records searches yielded no fossil localities recorded within the Project area, although several localities are recorded from nearby from sedimentary units of similar age to those that occur within the Project area (Bell, 2021; Radford, 2021; see Appendix A). The analysis of existing data was supplemented with a pedestrian field survey, the results of which indicate that although no fossils were observed at the Project area surface, sediments conducive to fossil preservation, particularly early Pleistocene-age very old alluvial fan deposits (Qvof), are exposed at the surface in portions of the Project area.

Prior to construction, a paleontological mitigation plan (PMP) should be prepared. It should provide detailed recommended monitoring locations; a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by a paleontological monitor or other project personnel. A curation agreement with WSC or another accredited repository should also be obtained. Construction excavations that disturb geologic units with moderate paleontological potential (PFYC 3) should be monitored by a professional paleontologist in order to reduce potential adverse impacts on scientifically important paleontological resources to a less than significant level. If it is determined that only Cretaceous-age tonalite (Kt) (PFYC 1) is impacted, the monitoring program should be halted in those areas. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a professional paleontologist as described in the PMP.

2.0 INTRODUCTION

This report presents the results of the paleontological technical study and resource potential evaluation conducted by Paleo Solutions, under contract to HELIX, in support of the Tentative Tract Map 38123 Project located in the City of Moreno Valley, Riverside County, California (Figure 1). This work was required by the City of Moreno Valley to fulfill their responsibilities as the lead agency under CEQA. A Project summary is provided in Table 1.

2.1 Project Description

The Project involves construction of two residential housing tracts, Windsong and Skylar Place. The Windsong tract occupies approximately 18.6 acres of undeveloped land and will include 102 lots; and the Skylar Place tract occupies approximately 17.2 acres of undeveloped land and will include 75 lots. Additionally, approximately 6.5 acres of Off-site Area, which include small portions of undeveloped land and streets (i.e., Lasselle Street, Bay Avenue, Darco Drive, and Alessandro Boulevard) that are immediately adjacent to the Project area, are included as part of the Project construction buffer to account for street work, half-width improvements, and over excavation (Figure 2). Further, approximately 2.1 acres of land located southwest of the Project area were originally included in the study (i.e., surveyed and assessed) and were later removed from the Project area. This excess portion, Not a Part, is further divided into two sections: Not a Part - 1, which comprises approximately 1.5 acres that will not be impacted by the Project; and Not a Part – 2, which comprises approximately 0.6 acres of land that is immediately adjacent to the Skylar Place Tract and may be impacted by Project over excavation (Figure 2).

2.2 Project Location

The Project area is situated in a broad alluvial valley characterized by low-moderate to moderate relief hills and rocky mounds composed of plutonic rocks and a relatively lower lying and flat valley floor composed of alluvial deposits. The Project area is bounded to the north by Bay Avenue, to the east by Darwin Drive, to the south by Alessandro Boulevard, and to the west by Lasselle Street. The area surrounding the Project area consists mostly of residential housing and undeveloped land. Aerial imagery from Google Earth (2021) indicates that the Project area is currently undeveloped and that there is surface disturbance from previous grading activities.

Table 1. Tentative Tract Map 38123 Project Summary

<table>
<tr><td>Project Name</td><td colspan="4">Tentative Tract Map 38123 Project</td></tr>
<tr><td>Project Description</td><td colspan="4">The Project involves construction of two residential housing tracts: Windsong and Skylar Place. The tracts will include 102 and 75 lots, respectively.</td></tr>
<tr><td>Project Area</td><td colspan="4">The Project area located in the City of Moreno Valley, and is bounded to the north by Bay Avenue, to the east by Darwin Drive, to the south by Alessandro Boulevard, and to the west by Lasselle Street</td></tr>
<tr><td>Total Acreage</td><td colspan="4">• Windsong tract: ~18.6 acres
• Skylar Place tract: ~17.2 acres
• Off-site Area (work buffer to accommodate road work, half-width improvements, and over excavation: ~6.5 acres
• Not a Part – 1 (initially surveyed and assessed prior to being removed from Project area): ~1.5 acres
• Not a Part – 2 (initially surveyed and assessed prior to being removed from Project area, although remains a part of work buffer to accommodate over excavation): ~0.6 acres</td></tr>
<tr><td rowspan="2">Location (Public Land Survey System)</td><td>Quarter-Quarter</td><td>Section</td><td>Township</td><td>Range</td></tr>
<tr><td>SWSW</td><td>Sec.09</td><td>T3S</td><td>R3W</td></tr>
</table>

<table>
<tr><td>Landowner</td><td colspan="3">Undetermined</td></tr>
<tr><td>Topographic Map(s)</td><td colspan="3">USGS Sunnymead (2018), California 7.5' topographic quadrangle</td></tr>
<tr><td>Geologic Map(s)</td><td colspan="3">• Geologic map of the Sunnymead/south ½ of Redlands quadrangles, San Bernardino and Riverside counties, California (Dibblee and Minch, 2003)
• Geologic map of the Sunnymead 7.5-minute quadrangle, Riverside County, California (Morton et al., 2002)</td></tr>
<tr><td rowspan="8">Mapped Geologic Unit(s) and Age(s)</td><td>*Geologic Unit and Map Symbol</td><td>Age</td><td>Paleontological Potential (PFYC)</td></tr>
<tr><td colspan="3">Geology as mapped by Morton et al. (2002)</td></tr>
<tr><td>Young alluvial fan deposits (Qyf) (Morton et al., 2002)</td><td>Holocene to late Pleistocene</td><td>Low (PFYC 2)</td></tr>
<tr><td>Very old alluvial fan deposits (Qvof) (Morton et al., 2002)</td><td>Early Pleistocene</td><td>Moderate (PFYC 3)</td></tr>
<tr><td>Peninsular Ranges batholith, tonalite, undifferentiated (Kt) (Morton et al., 2002)</td><td>Cretaceous</td><td>Very Low (PFYC 1)</td></tr>
<tr><td colspan="3">Geology as mapped by Dibblee and Minch (2003)</td></tr>
<tr><td>Young alluvium (Qa) (Dibblee and Minch, 2003)</td><td>Holocene</td><td>Low (PFYC 2)</td></tr>
<tr><td>Plutonic rocks of the Peninsular Ranges, quartz diorite (qdx) (Dibblee and Minch, 2003)</td><td>Cretaceous</td><td>Very Low (PFYC 1)</td></tr>
<tr><td>Surveyor(s)</td><td colspan="3">Daniel Nolan</td></tr>
<tr><td>Survey Date(s)</td><td colspan="3">Surveying took place on March 12, 2021</td></tr>
<tr><td>Permits</td><td colspan="3">No paleontological permits were required for the work conducted.</td></tr>
<tr><td>Previously Documented Fossil Localities within the Project area</td><td colspan="3">Records searches were requested from LACM and WSC. The searches yielded no fossil localities recorded within the Project area, although several localities are recorded from nearby from sedimentary units of similar age to those that likely occur beneath the Project area surface (see Section 6.2; Appendix A).</td></tr>
<tr><td>Newly Documented Fossil Localities within the Project area</td><td colspan="3">No paleontological resources were observed during the field survey, although sediments conducive to fossil preservation were observed.</td></tr>
<tr><td>Recommendation(s)</td><td colspan="3">Prior to construction, a PMP should be prepared. It should provide detailed recommended monitoring locations; a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by a paleontological monitor or other project personnel. A curation agreement with WSC or another accredited repository should also be obtained. Construction excavations that disturb geologic units with moderate paleontological potential (PFYC 3) should be monitored by a professional paleontologist in order to reduce potential adverse impacts on scientifically important paleontological resources to a less than significant level. If it is determined that only Cretaceous-age tonalite (Kt) (PFYC 1) is impacted, the monitoring program should be halted in those areas. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a professional paleontologist as described in the PMP.</td></tr>
</table>

*The geologic units mapped at the Project area surface vary by map author. Both geologic maps agree that the Project area is primarily underlain by Cretaceous-age plutonic rocks (qdx [Dibblee and Minch, 2003], Kt [Morton et al., 2002]). However, the mapped Quaternary units vary in age, and subsequently vary in paleontological potential, and include Holocene-age young alluvium (Qa) (PFYC 2) (Dibblee and Minch, 2003) and early Pleistocene-age very old alluvial fan deposits (Qvof) (PFYC 3) (Morton et al., 2002).

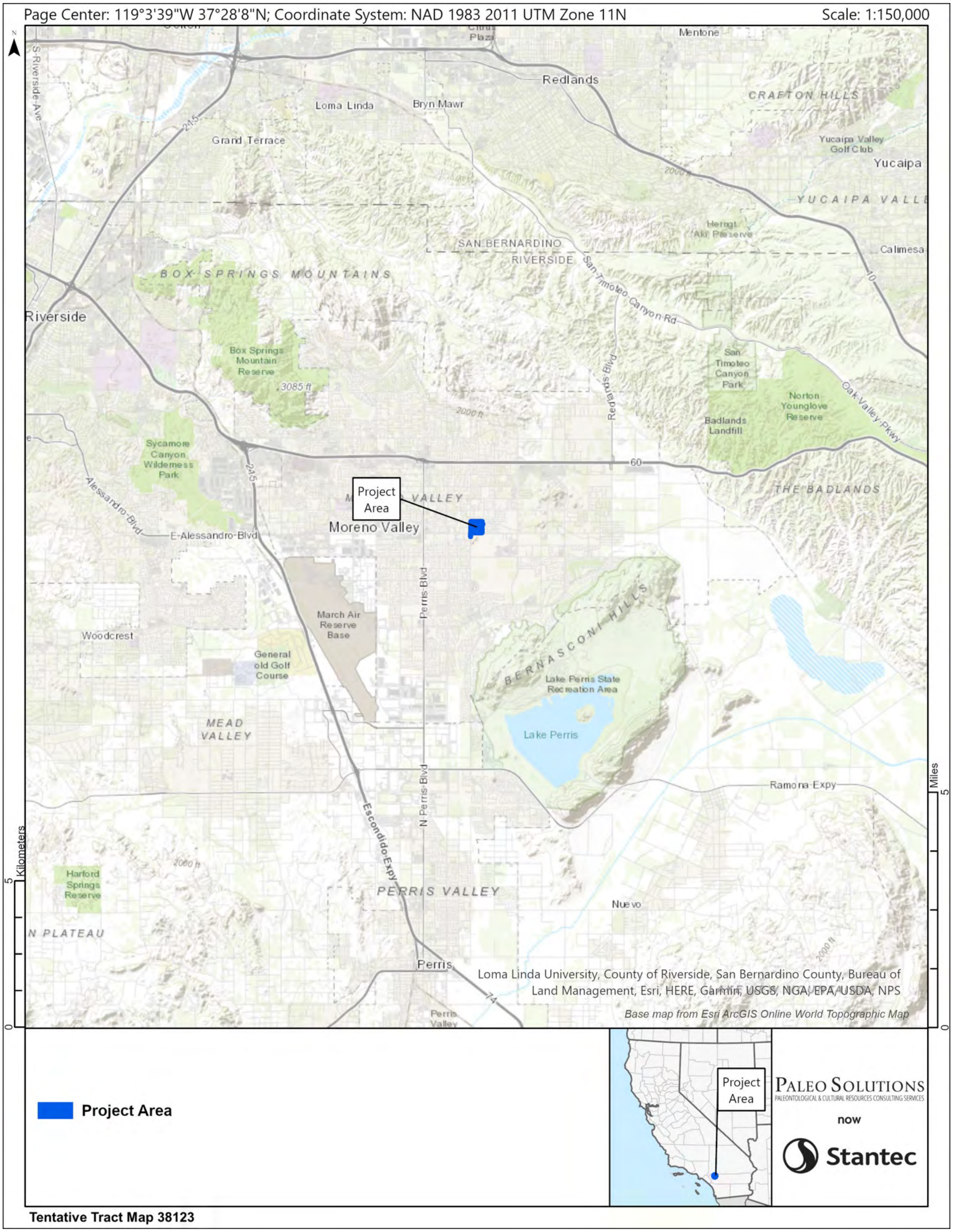


Figure 1. Project Location Map.

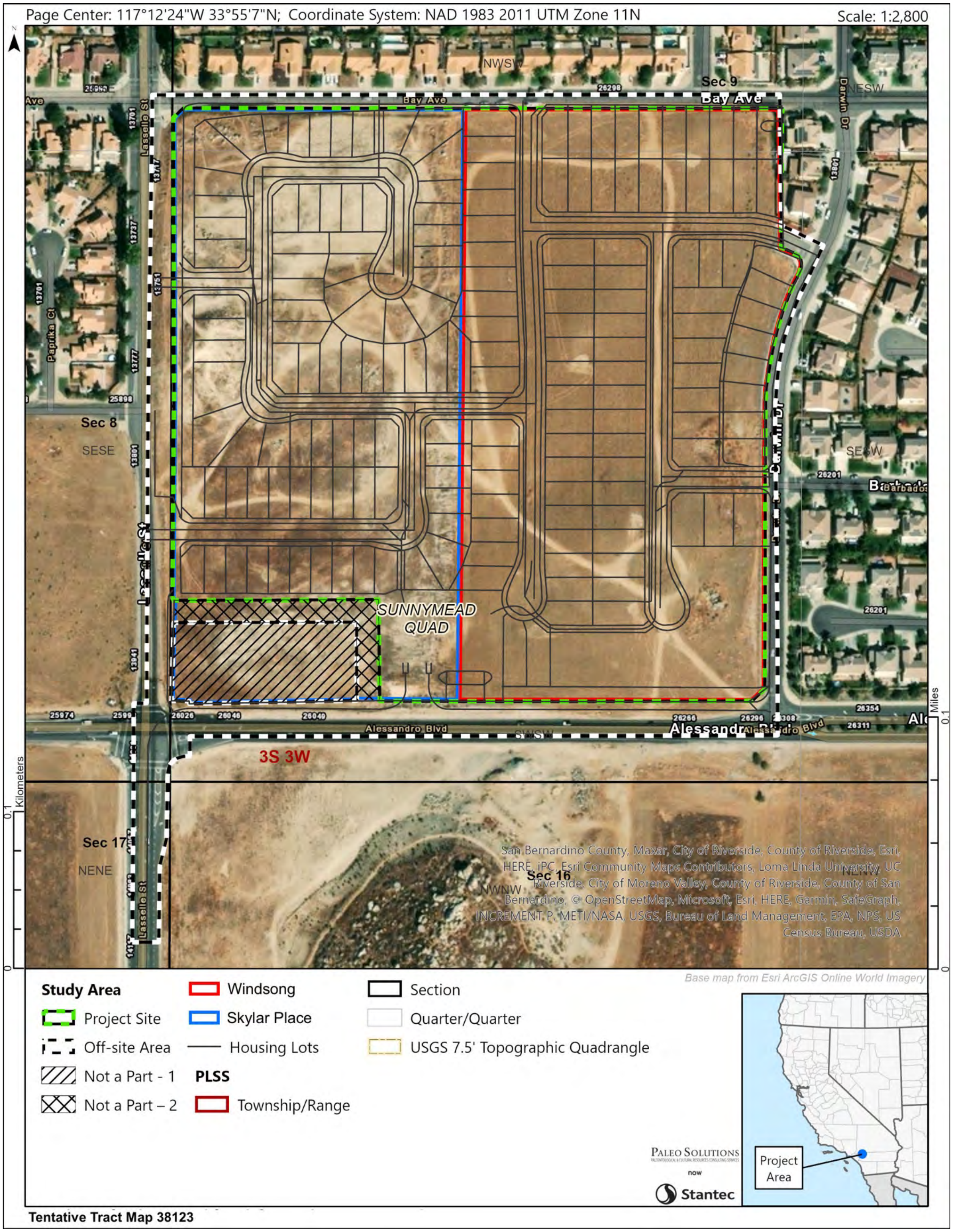


Figure 2. Project Overview Map.

3.0 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

As defined by Murphey and Daitch (2007): “Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on Earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils’ associated sedimentary matrix.

The fossil record is the only evidence that life on Earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are used to:

- Study the phylogenetic relationships amongst extinct organisms, as well as their relationships to modern groups;
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record;
- Reconstruct ancient environments, climate change, and paleoecological relationships;
- Provide a measure of relative geologic dating that forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for isotopic dating;
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time;
- Study patterns and processes of evolution, extinction, and speciation; and
- Identify past and potential future human-caused effects to global environments and climates.”

Per Society of Vertebrate Paleontology (SVP) (2010) guidelines, paleontological resources are considered to be older than recorded human history (i.e., 5,000 years old or older). Fossil resources vary widely in their relative abundance and distribution and not all are regarded as significant. According to the BLM Instructional Memorandum (IM) 2009-011, a “Significant Paleontological Resource” is defined as:

> “Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be of scientific interest if it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on Earth, or has an identified educational or recreational value. Paleontological resources that may be considered not to have scientific significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities” (BLM, 2008).

Attachment: Appendix E - Paleontological Assessment [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Vertebrate fossils, whether preserved remains or track ways, are classified as significant by most state and federal agencies and professional groups (and are specifically protected under the California Public Resources Code). In some cases, fossils of plants or invertebrate animals are also considered significant and can provide important information about ancient local environments.

The full significance of fossil specimens or fossil assemblages cannot be accurately predicted before they are collected, and in many cases, before they are prepared in the laboratory and compared with previously collected fossils. Pre-construction assessment of significance associated with an area or geologic unit must be made based on previous finds, characteristics of the sediments, and other methods that can be used to determine paleoenvironmental and taphonomic conditions.

4.0 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

This section of the report presents the state and local regulatory requirements pertaining to paleontological resources that will apply to this project.

4.1 State Regulations

4.1.1 California Environmental Quality Act (CEQA)

The procedures, types of activities, persons, and public agencies required to comply with CEQA are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations) and further amended January 4, 2013 and December 28, 2018. One of the questions listed in the CEQA Environmental Checklist is: "Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines Appendix G, Section VII, Part F).

4.1.2 State of California Public Resources Code

The State of California Public Resources Code (Chapter 1.7), Sections 5097 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, and define the excavation, destruction, or removal of paleontological "sites" or "features" from public lands without the express permission of the jurisdictional agency as a misdemeanor. As used in Section 5097, "state lands" refers to lands owned by, or under the jurisdiction of, the state or any state agency. "Public lands" is defined as lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

4.2 Local Regulations

4.2.1 Riverside County

The Riverside County General Plan requires consideration of paleontological resources under the Multipurpose Open Space Element of the general plan (County of Riverside, 2015). The Riverside County General Plan recommendations are based on the SVP guidelines (2010) for the mitigation of paleontological resources. The Multipurpose Open Space Element of the general plan (County of Riverside, 2015) provides the following requirements for paleontological sensitive areas within the county:

- OS 19.6: Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, a paleontological resource impact mitigation program (PRIMP) shall be filed with the County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.

- OS 19.7: Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.

- OS 19.8: Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

- OS 19.9: Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the WSC in the City of Hemet.

5.0 METHODS

The paleontological scope of work included an analysis of existing data, a paleontological field survey, and preparation of this technical report summarizing the results. This paleontological analysis of existing data included a geologic map review, a literature search, and two museum records searches. The analysis of existing data was supplemented with a pedestrian field survey. The goal of this report is to evaluate the paleontological potential of the Project area and make recommendations for the mitigation of adverse impacts on paleontological resources that may occur as a result of the proposed Project. Joey Raum, B.S., performed the background research and authored this report. The field survey was conducted by Daniel Nolan, B.S. Robert Fritz, B.S., created the GIS maps. Courtney Richards, M.S., performed the technical review of this report, and oversaw all aspects of the paleontological work as the Principal Investigator.

5.1 Analysis of Existing Data

Paleo Solutions reviewed two geologic maps that include the Project area, and half-mile buffer: the Geologic map of the Sunnymead/south ½ of Redlands quadrangles, San Bernardino and Riverside counties, California by T.W. Dibblee and J.A. Minch (2003) and the Geologic map of the Sunnymead 7.5-minute quadrangle, Riverside County, California by D.M. Morton, J.C. Matti, V.M. Diep, and U. Edwards-Howells (2002). The literature reviewed included published and unpublished scientific papers. Paleontological museum records searches were conducted at LACM and WSC. Alyssa Bell, Ph.D., conducted the LACM search (dated March 11, 2021) and Darla Radford, M.A., conducted the WSC search (March 17, 2021), both of which are included as Appendix A. Additional record searches of online databases, including the University of California Museum of Paleontology (UCMP) and the Paleobiology Database (PBDB), were completed by Paleo Solutions staff.

5.2 Field Survey

The field survey was conducted by Paleo Solutions staff member Daniel Nolan, B.S., on March 12, 2021. The paleontological survey was performed in order to determine the paleontological potential of the geologic deposits underlying the Project area. The survey was conducted after a review of aerial photographs indicated the Project site included areas of undisturbed native sediments. The pedestrian survey included inspection of the Project area with the majority of the focus occurring in areas with native sediment exposures and areas where there will likely be immediate construction impact. Sediment exposures as well as the surrounding areas were photographed and documented. Reference points were acquired using a GPS unit. Sediment lithologies were recorded and analyzed and used to better interpret the Project's paleontological potential, and thus better understand the Project's potential impact.

5.3 Criteria for Evaluating Paleontological Potential

The PFYC system was developed by the BLM (2016). Because of its demonstrated usefulness as a resource management tool, the PFYC system has been utilized for many years for projects across the country, regardless of land ownership. It is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of 1 (very low potential) to 5 (very high potential) and U (unknown potential). This system is intended to aid in predicting, assessing, and mitigating paleontological resources. The PFYC ranking system is summarized in the table below, along with the Riverside County guideline paleontological sensitivity rankings, which are included for a comparison of the two systems.

Table 2. Summary of Paleontological Fossil Yield Classification and Riverside County Sensitivity Systems

BLM PFYC Designation	*Riverside County Paleontological Sensitivity	Assignment Criteria Guidelines and Management Summary (PFYC system)
1 = Very Low Potential	Low Sensitivity	Geologic units are not likely to contain recognizable paleontological resources.
		Units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
		Units are Precambrian in age.
		Management concern is usually negligible, and impact mitigation is unnecessary except in rare or isolated circumstances.
2 = Low Potential**	High B Sensitivity	Geologic units are not likely to contain paleontological resources.
		Field surveys have verified that significant paleontological resources are not present or are very rare.
		Units are generally younger than 10,000 years before present.
		Recent aeolian deposits.
		Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.
		Management concern is generally low, and impact mitigation is usually unnecessary except in occasional or isolated circumstances.
3 = Moderate Potential	High A Sensitivity	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
		Marine in origin with sporadic known occurrences of paleontological resources.
		Paleontological resources may occur intermittently, but these occurrences are widely scattered.
		The potential for authorized land use to impact a significant paleontological resource is known to be low-to-moderate.
		Management concerns are moderate. Management options could include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Opportunities may exist for hobby collecting. Surface-disturbing activities may require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action and whether the action could affect the paleontological resources.

BLM PFYC Designation	*Riverside County Paleontological Sensitivity	Assignment Criteria Guidelines and Management Summary (PFYC system)
4 = High Potential	High A Sensitivity	Geologic units that are known to contain a high occurrence of paleontological resources.
		Significant paleontological resources have been documented but may vary in occurrence and predictability.
		Surface-disturbing activities may adversely affect paleontological resources.
		Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
		Illegal collecting activities may impact some areas.
		Management concern is moderate to high depending on the proposed action. A field survey by a qualified paleontologist is often needed to assess local conditions. On-site monitoring or spot-checking may be necessary during land disturbing activities. Avoidance of known paleontological resources may be necessary.
5 = Very High Potential	High A Sensitivity	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources.
		Significant paleontological resources have been documented and occur consistently.
		Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities.
		Unit is frequently the focus of illegal collecting activities.
		Management concern is high to very high. A field survey by a qualified paleontologist is almost always needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.
U = Unknown Potential	Undetermined Sensitivity	Geologic units that cannot receive an informed PFYC assignment.
		Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is unknown.
		Geologic units represented on a map are based on lithologic character or basis of origin but have not been studied in detail.
		Scientific literature does not exist or does not reveal the nature of paleontological resources.
		Reports of paleontological resources are anecdotal or have not been verified.
		Area or geologic unit is poorly or under-studied.
		BLM staff has not yet been able to assess the nature of the geologic unit.
		Until a provisional assignment is made, geologic units with unknown potential have medium to high management concerns. Field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

6.0 ANALYSIS OF EXISTING DATA

The Project area is located within the northwestern portion of the Peninsular Ranges Geomorphic Province, a region characterized by northwest-trending fault-bounded mountain ranges, broad intervening valleys, and low-lying coastal plains (Yerkes et al., 1965). The Peninsular Ranges extend approximately 920 miles from the Los Angeles Basin to the southern tip of Baja California and vary in width from approximately 30 to 100 miles. Bedrock units within the Peninsular Ranges include pre-Cretaceous- and Cretaceous-age igneous rocks of the Southern California Batholith, Late Cretaceous-age sedimentary rocks, and post-Cretaceous-age sedimentary rocks or sediment (Yerkes et al., 1965; Norris and Webb, 1976). All post-Cretaceous-age rocks lie unconformably on either the Cretaceous-age sedimentary rocks or on basement (Norris and Webb, 1976). Pliocene-age nonmarine rocks and sediments and thick and widespread throughout the northern Peninsular

Ranges, and Quaternary deposits include fluvial and lacustrine sediments within the inland interior of the province (Norris and Webb, 1976).

The Project area is situated in the Perris Block, which is a fault-bounded block comprising part of the northern Peninsular Ranges. The block lies between the Los Angeles Basin, the Santa Ana Mountains, and the San Jacinto Mountains and is bounded by the San Jacinto and Elsinore-Chino Fault zones and the Cucamonga Fault (Woodford et al., 1971). During the Pliocene and Pleistocene, deep isostatic flow caused the Perris Block to oscillate vertically as the Los Angeles Basin sank and the San Jacinto Mountains rose (Woodford et al., 1971). The oscillations resulted in deposition of deep valley continental sediments as well as volcanic rocks, which were emplaced on top of the dominantly crystalline basement, and multiple erosional surfaces (Woodford et al., 1971).

6.1 Geology Map and Literature Review

Geologic mapping by D.M. Morton et al. (2002) indicates that the Project area is underlain primarily by Cretaceous-age tonalite (Kt) and lesser amounts of early Pleistocene-age very old alluvial fan deposits (Qvof) (Figure 3). Also mapped within the vicinity, within the half-mile buffer, are Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf). Aerial imagery (Google Earth, 2021) also indicates that Cretaceous-age tonalite (Kt) is exposed at the Project area surface in portions of the southeastern and central-eastern portions of the Windsong tract and the northern and southeastern portions of the Skylar Place tract.

Additionally, alternative mapping by T.W. Dibblee and J.A. Minch (2003) indicates that the Project area is underlain primarily by Cretaceous-age quartz diorite (qdx) and lesser amounts of Holocene-age young alluvium (Qa). For the purposes of this report, and based on our field observations, the geologic mapping by Morton et al. (2002) is utilized. The geologic units underlying the Project area and half-mile buffer, as mapped by Morton et al. (2002), are discussed in detail below.

6.1.1 Younger Sedimentary Deposits (Qyf) (Holocene to Late Pleistocene)

Younger sedimentary deposits are Holocene to late Pleistocene in age (approximately 129,000 years old to present) and include young alluvial fan deposits (Qyf) (Morton et al., 2002). These younger sediments were deposited in fluvial systems in ancient and modern environments, and sediments generally consist of unindurated alluvial sand, gravel, and clay of valley areas covered with thick soil (Morton et al., 2002). Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf) are mapped east of the Project area, within the half-mile buffer (Morton et al., 2002; Figure 3).

Holocene-age deposits that are less than approximately 5,000 years old are typically too young to contain significant fossil resources (SVP, 2010). Although Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf) comprise, in part, sediments greater than 5,000 years old, they are considered to have a low potential for producing significant paleontological resources based on BLM (2016) guidelines. However, these deposits may overlie sensitive, older (i.e., Pleistocene-age) deposits at variable depths.

6.1.2 Older Sedimentary Deposits (Qvof) (Early Pleistocene)

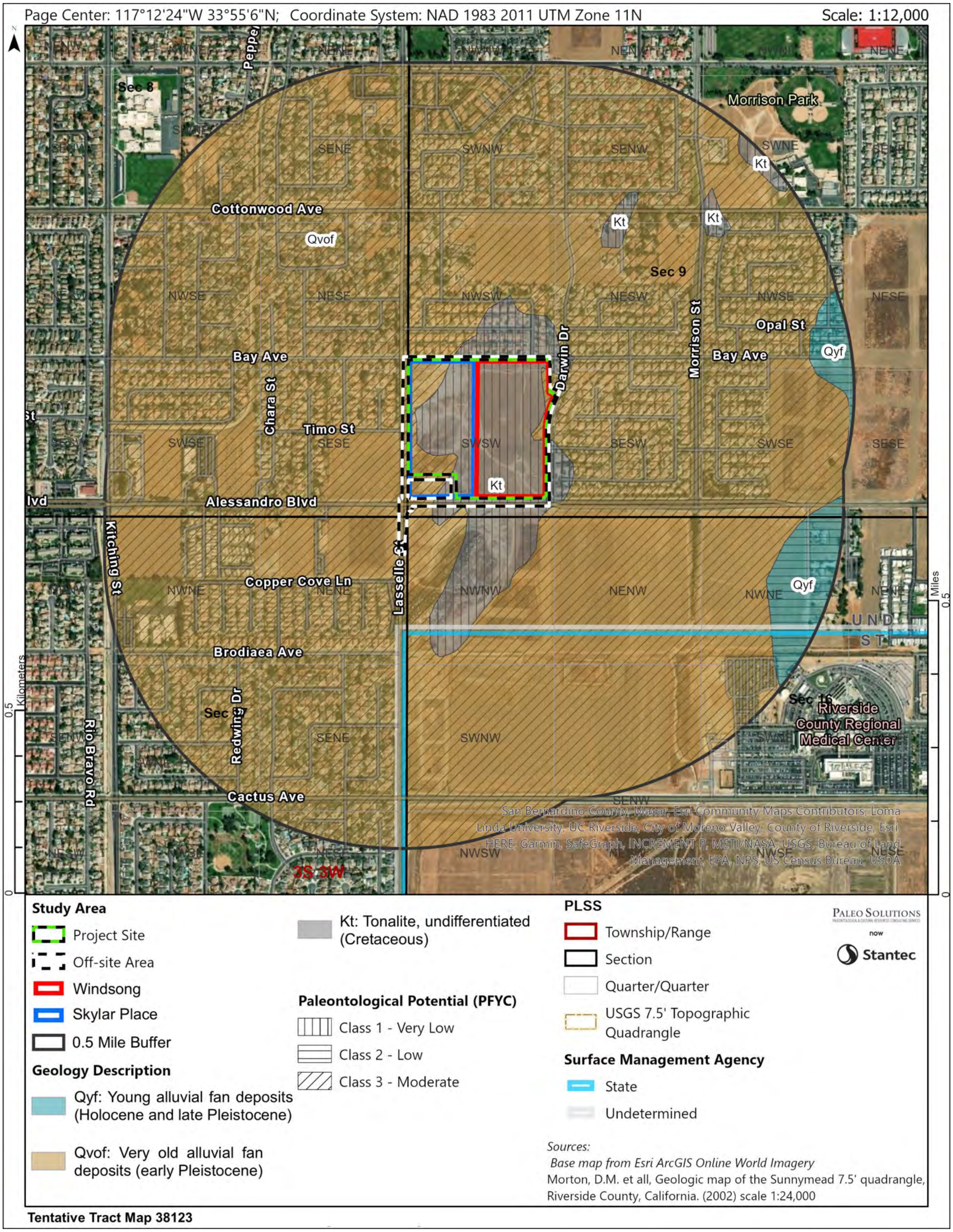
Older sedimentary deposits are early Pleistocene in age (approximately 2.58 million years to 773,000 years old) and include very old alluvial fan deposits (Qvof). These older units were deposited by fluvial systems in ancient terrestrial environments, and sediments generally consist of reddish-brown and well-indurated sand and gravel deposits with upper surfaces that are capped by moderately to well-developed pedogenic soils (Morton et al., 2002). Compared with younger deposits, early Pleistocene-age very old sedimentary units typically have moderately- to well-developed soil horizons, are more topographically developed, and have moderately to well dissected surfaces, except where obscured by erosion. Early Pleistocene-age very old alluvial fan deposits (Qvof) are mapped at the surface of the majority of the western half of the Skylar Place tract and small portions of the eastern half of the Windsong tract (Morton et al., 2002; Figure 3).

Taxonomically diverse and locally abundant Pleistocene animals and plants have been collected from older alluvial deposits throughout southern California and include mammoth (*Mammuthus*), mastodon (*Mammut*), camel (Camelidae), horse (Equidae), bison (*Bison*), giant ground sloth (*Megatherium*), peccary (Tayassuidae), cheetah (*Acinonyx*), lion (*Panthera*), saber tooth cat (*Smilodon*), capybara (*Hydrochoerus*), dire wolf (*Canis dirus*), and numerous taxa of smaller mammals (Rodentia) (Blake, 1991; Jahns, 1954; Jefferson, 1991; Table 3). Numerous vertebrate fossil localities are recorded from Pleistocene-age deposits within the Project vicinity as well as elsewhere in Riverside County including plant, invertebrate, desert tortoise (*Gopherus agassizil*), vole (*Microtus californicus, Mimomys*), pack rat (*Neotoma*), pocket mouse (*Perognathus*), deer mouse (*Peromyscus hagermanensis, Peromyscus complexus*), cotton rat (*Sigmodon minor*), long-tailed shrew (*Sorex leahy*), pocket gopher (*Thomomys gidleyi*), cottontail rabbit (*Sylvilagus hibbardi*), hare (*Lepus*), medium-sized deer (*Odocoileus*), tapir (*Tapirus merriami*), pronghorn (*Antilocapra*), dwarf pronghorn (*Capromeryx*), horse (*Equus bautistensis*), mammoth (*Mammuthus*), and ground sloth (*Megalonyx*) (UCMP, 2021; Table 3). Most notable is the massive fossil collection recovered during excavation for Diamond Valley Lake, which is located approximately 27 miles east-southeast of the Project area. These sediments have yielded tens of thousands of fossils corresponding to the late Irvingtonian and early Rancholabrean North American Land Mammal Ages (Reynolds and Reynolds, 1990a; 1990b). The Diamond Valley Lake Local Fauna (DVLLF) is the largest open, non-asphaltic late Pleistocene fossil assemblage known in the southwestern United States (Springer et al., 2009). The assemblage comprises 2,646 localities and includes nearly 100,000 identifiable fossils representing more than 105 vertebrate, invertebrate, and plant taxa (Springer et al., 2009). Vertebrate fossils are generally well-preserved and relatively complete and provide important data on the relative abundance and diversity of species through time at the given geographical location (Springer et al., 2009). A complete list of DVLLF taxa is provided in Table 3. Early Pleistocene-age very old alluvial fan deposits (Qvof) are, considered to have a moderate potential for producing significant paleontological resources (PFYC 3) using BLM (2016) guidelines.

6.1.3 Plutonic Rocks (Kt) (Cretaceous)

Igneous rocks are crystalline or non-crystalline rocks that form through the cooling and subsequent solidification of lava or magma. Plutonic (intrusive) igneous rocks form below the earth's surface when magma, which is formed by the partial melting of pre-existing plutonic rocks in the earth's crust or mantle due to increases in temperature, changes in pressure, or changes in geochemical composition, slowly cools and solidifies. One plutonic geologic unit is mapped within the Project area and includes Cretaceous-age (approximately 145 million to 66 million years old) tonalite (Kt) (Morton et al., 2002). This unit is mapped at the surface of the eastern half and a portion of the western half of the Skylar Place tract and the majority of the Windsong tract (Morton et al., 2002; Figure 3).

Extreme temperatures in the environments in which intrusive igneous rocks form prevent the preservation of fossils. Cretaceous-age tonalite Kt) is, therefore, considered to have a very low potential for producing significant paleontological resources (PFYC 1) using BLM (2016) guidelines.



San Bernardino County, Maxar, Esri Community Maps Contributors, Loma Linda University, UC Riverside, City of Moreno Valley, County of Riverside, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA

Sources:
Base map from Esri ArcGIS Online World Imagery
Morton, D.M. et all, Geologic map of the Sunnymead 7.5' quadrangle, Riverside County, California. (2002) scale 1:24,000

Figure 3. Project Geology Map.

6.2 Museum Records Search

Paleo Solutions requested a paleontological search of records maintained by the LACM and WSC. The museums responded on March 11 and 17, 2021, respectively, that no vertebrate fossil localities are recorded from within the Project area, although there are several localities recorded from the vicinity from sediments similar to those that underlie the Project area surface (Bell, 2021; Radford, 2021). The results of the records searches are provided as Appendix A and are summarized below.

Localities LACM VP 1207, 6059, and 7261 are documented from unknown Pleistocene-age sedimentary deposits, and locality LACM IP 437 is documented from an unknown formation. Locality LACM 1207 is located one mile north-northwest of Corona and produced fossil bovid (Bovidae) (Bell, 2021; Table 3). Locality LACM VP 6059 is located east-southeast of Lake Elsinore and produced fossil camel (Camelidae) (Bell, 2021; Table 3). Locality LACM VP 7261 is located in the Skinner Reservoir in Auld Valley and produced fossil elephant (Proboscidea) and ungulate (Ungulata) (Bell, 2021; Table 3). Locality LACM IP 437 is located on the west side of Castile Canyon, north of the Soboba Indian Reservation, and produced fossil insect (*Sobobapteron kirkbaye*) and brachiopod (*Terebratalia hemphili*) (Bell, 2021; Table 3).

The WSC records search did not yield any specific fossil localities within the Project vicinity. However, numerous fossils are documented from Pleistocene-age alluvial deposits within three miles of the Project area. Fossils recovered from the Aldi Distribution Project in Moreno Valley, which is located to the northeast of the Windsong and Skylar Place Project, include giant ground sloth (Radford, 2021; Table 3).

Table 3. Paleontological Literature and Records Search Results Summary

Institutional Locality Number/Name	Geologic Unit and Age	Taxon	Common Name	Location	Source
Not Reported	Older sedimentary deposits (Pleistocene)	*Mammuthus* *Mammut* Camelidae Equidae *Bison* *Megatherium* Tayassuidae *Acinonyx* *Panthera* *Smilodon* *Hydrochoerus* *Canis dirus* Rodentia	mammoth mastodon camel horse bison giant ground sloth peccary cheetah lion saber-toothed cat capybara dire wolf rodent	Southern California	Blake, 1991; Jahns, 1954; Jefferson, 1991
UCMP 3247, 3245, 3244, 3243, 3242, 3241, 3240, RV8601, RV9612, V65248, V7006, V99828	Older sedimentary deposits (Pleistocene)	- - *Gopherus agassizil* *Microtus californicus* *Neotoma* *Mimomys* *Perognathus* *Peromyscus hagermanensis* *Peromyscus complexus* *Sigmodon minor* *Sorex leahyi* *Thomomys gidleyi* *Sylvilagus hibbardi* *Lepus* *Odocoileus* *Tapirus merriami* *Antilocapra*	plant invertebrate desert tortoise California vole pack rat vole pocket mouse deer mouse deer mouse cotton rat long-tailed shrew pocket gopher cottontail rabbit hare medium-sized deer tapir pronghorn	Riverside County	UCMP, 2021

Institutional Locality Number/Name	Geologic Unit and Age	Taxon	Common Name	Location	Source
		Capromeryx *Equus bautistensis* *Mammuthus* *Megalonyx*	dwarf pronghorn horse mammoth ground sloth		
Not Reported	Older alluvium (Pleistocene)	*Megalonyx jeffersonii* *Nothrotheriops shastensis* *Paramylodon harlani* *Canis dirus* *Canis latrans* *Urocyon cinereoargenteus* *Ursus americanus* cf. *Arctodus* sp. *Smilodon fatalis* *Lynx rufus* *Panthera leo atrox* *Mammut americanum* *Mammuthus columbi* *Equus occidentalis* *Equus conversidens* *Platygonus compressus* *Camelops hesternus* *Hemiauchenia macrocephala* *Odocoileus hemionus* *Capromeryx minor* *Antilocapra. americana* *Bison antiquus* *Bison latifrons* *Sylvilagus audubonii* *Lepus californicus* cf. *Ammospermophilus* sp. *Eutamias* sp. *Spermophilus beecheyi* *Spermophilus* sp. *Thomomys bottae* *Dipodomys* sp. *Perognathus* sp. *Reithrodontomys* sp. cf. *Peromyscus crinitus* *Peromyscus* sp, *Neotoma fuscipes* *Neotoma lepida* *Microtus californicus* *Mustela frenata* *Mephitis* sp. *Taxidea taxus* *Sorex ornatus* *Scapanus latimanus* *Myotis* sp. *Anas* sp. *Accipiter* sp. *Accipiter cooperi* *Aquila chrysaetos* *Falco* sp. *Meleagris californica* *Callipepla californica* Scolopacidae *Asio* sp. *Asio flammeus* *Colaptes auratus*	Jefferson's ground sloth Shasta ground sloth giant ground sloth dire wolf coyote grey fox black bear short-faced bear saber-toothed cat bobcat North American lion American mastodon Columbian mammoth extinct Western horse extinct small horse extinct flat-headed peccary extinct camel extinct llama mule deer extinct dwarf pronghorn pronghorn extinct ancient bison extinct long-horned bison Audubon's cotton-tailed rabbit jackrabbit antelope ground squirrel chipmunk Beechey's ground squirrel Botta's pocket gopher kangaroo rat large pocket mouse harvest mouse canyon mouse deer mouse dusky-footed wood rat desert wood rat California meadow vole long-tailed weasel striped or hooded skunk badger ornate shrew mole mouse-eared bat duck hawk Cooper's hawk golden eagle falcon or kestrel extinct California turkey California quail indeterminate shore bird owl short-eared owl northern flicker	Diamond Valley Lake	Springer et al., 2009

Institutional Locality Number/Name	Geologic Unit and Age	Taxon	Common Name	Location	Source
		cf. *Hirundo* sp.	swallow		
		Hirundinidae	large-sized swallow		
		Cyanocitta stelleri	Steller's jay		
		Corvus corax	raven		
		cf. *Turdus migratorius*	American robin		
		Corvidae	magpie-sized blackbird		
		cf. *Sturnella neglecta*	Western meadowlark		
		Scaphiopus hammondi	Hammonds's spadefoot toad		
		cf. *Bufo boreas*	western toad		
		cf. *Hyla cadaverina*	California tree frog		
		Rana sp.	true frog		
		Clemmys marmorata	Western pond turtle		
		Gopherus agassizii	desert tortoise		
		Iguanidae	iguana		
		Phrynosoma coronatum	coast horned lizard		
		Cnemidophorus tigris	Western whiptail lizard		
		Crotaphytus collaris	collared lizard		
		Gerrhonotus sp.	alligator lizard		
		Sceloporus occidentalis	Western fence lizard		
		cf. *Sceloporus graciosus*	sagebrush lizard		
		Uta stansburiana	side-blotched lizard		
		cf. *Lampropeltis* sp.	king snake		
		Masticophis sp.	whip snake		
		Pituophis melanoleucus	gopher snake		
		Tantilla sp.	black-head snake		
		Thamnophis sp.	garter snake		
		Crotalus sp.	rattlesnake		
		Crotalus cerastes	sidewinder		
		Caudata	indeterminate salamander		
		Ostracoda	ostracods		
		Isoptera	indeterminate termites		
		Coleoptera	indeterminate beetles		
		Pelecypoda	indeterminate bivalves		
		Deroceras sp.	slug		
		Discus whitneyi	forest disc snail		
		Succinea avara	amber snail		
		Pupilla muscorum	widespread column snail		
		Vertigo sp.	vertigo snail		
		Vallonia cyclophorella	silky vallonia snail		
		Vallonia gracilicosta	multi-rib vallonia snail		
		Fossaria parva	pygmy fossaria snail		
		Physa sp.	freshwater snail		
		Gyraulus circumstriatus	disc gyro snail		
		Gyraulus parvus	ash gyro snail		
		Helisoma tenue	rams-horn snail		
		Valvata humeralis	glossy valvata snail		
LACM IP 1207	Unknown formation (Pleistocene)	Bovidae	bovid	Hill on east side of sewage disposal plant; 1 mile north-northwest of Corona	Bell, 2021
LACM IP 6059	Unknown formation (Pleistocene)	Camelidae	camel	Overflow area just east-southeast of Lake Elsinore	Bell, 2021

Attachment: Appendix E - Paleontological Assessment [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Institutional Locality Number/Name	Geologic Unit and Age	Taxon	Common Name	Location	Source
LACM IP 7261	Unknown formation (Pleistocene)	Proboscidea Ungulata	elephant ungulate	Skinner Reservoir, Auld Valley	Bell, 2021
LACM IP 437	Unknown formation	*Sobobateron kirkbaye* *Terebratalia*	insect brachipod	West side of Castile Canyon, north of Soboba Indian Reservation	Bell, 2021
Not Reported	Pleistocene-age alluvial deposits	-	giant ground sloth	Aldi Distribution Project, Moreno Valley	Radford, 2021

7.0 FIELD SURVEY

The survey area is located at the northwestern corner of Darwin Drive and Alessandro Boulevard and is bound by Lasselle Street to the west and Bay Avenue to the north. The site is situated in an open lot located in a large valley near the base of nearby foothills, which are situated to the north. The site is divided approximately in half, with the Skylar Place tract on the west and the Windsong tract on the east. The terrain consists primarily of gentle rolling slopes. The Skylar Place tract is characterized as being rocky and hilly along the northern half and relatively flat and lower lying along the southern half, with a total topographic differential of approximately 40 feet (Figures 4 and 5). The Windsong tract consists primarily of low relief and rolling hills with a total topographic differential of approximately 30 feet (Figures 6 and 7). Existing ground disturbances include a large concrete slab and other miscellaneous debris (Figure 8). Additionally, most of the Windsong tract is covered in grasses and other vegetation.

7.1 Geology

Sediments observed included early Pleistocene-age very old alluvial fan deposits (Qvof) and Cretaceous-age tonalite (Kt) (Figures 4, 5, and 9 through 16). Alluvial sediments were observed mostly along the eastern side of the central section of the Windsong tract. Early Pleistocene-age very old alluvial fan deposits (Qvof) are mapped in the northwestern and southern sections of the Skylar Place tract; however, these areas were observed to be Cretaceous-age tonalite (Kt) (Figures 11 through 14). Due to the minimal topographic relief, alluvial sediment exposures are limited to ground surface areas devoid of vegetation as well as the bases of low-relief drainages.

Pleistocene-age very old alluvial fan deposits (Qvof) range from less than one foot to approximately four feet thick (Figure 9). These sediments consist of pale reddish-brown, moderately sorted, poorly compacted, subangular, medium- to coarse-grained sand with some subangular granules composed of plutonic rocks (Figure 10).

7.2 Paleontology

No paleontological resources were observed or collected during the survey. However, sediments conducive to fossil preservation, particularly those of the early Pleistocene-age very old alluvial fan deposits (Qvof), were observed.

Figure 4. Overview of the survey area of the Skylar Place tract, showing some vegetation and Cretaceous-age tonalite (Kt) exposures with some existing dirt access roads. View facing to the east.

Figure 5. Overview of the survey area of the Skylar Place tract, showing some vegetation and Cretaceous-age tonalite (Kt) exposures with some existing dirt access roads. View facing to the south.

Figure 6. Overview of the survey area along the southern half of the Windsong tract, showing high vegetation with some existing dirt access roads. View facing to the northwest.

Figure 7. Overview of the survey area along the northern half of the Windsong tract, showing high vegetation with some existing dirt access roads. View facing to the south.

Figure 8. Concrete rubble and debris are scattered occasionally in the Windsong tract, particularly in the flat and low relief areas. View facing to the southwest.

Figure 9. Exposed early Pleistocene-age very old alluvial fan deposits (Qvof) at the surface along the eastern side of the central section of the Windsong tract. View facing to the north.

Figure 10. Exposed early Pleistocene-age very old alluvial fan deposits (Qvof) at the surface along the eastern side of the central section of the Windsong tract. View facing down.

Figure 11. Exposed Cretaceous-age tonalite (Kt) at the surface along the south end of the Skylar Place tract in an area mapped as early Pleistocene-age very old alluvial fan deposits (Qvof). View facing to the north.

Figure 12. Exposed Cretaceous-age tonalite (Kt) at the surface along the northwest side of the Skylar Place tract in an area mapped as early Pleistocene-age very old alluvial fan deposits (Qvof). View facing down.

Figure 13. Exposed Cretaceous-age tonalite (Kt) at the surface along the south end of the Skylar Place tract in an area mapped as early Pleistocene-age very old alluvial fan deposits (Qvof). View facing to the north.

Figure 14. Exposed Cretaceous-age tonalite (Kt) at the surface along the south end of the Skylar Place tract in an area mapped as early Pleistocene-age very old alluvial fan deposits (Qvof). View facing down.

Figure 15. Exposed Cretaceous-age tonalite (Kt) at the surface along the north end of the Windsong tract. View facing to the north.

Figure 16. Exposed Cretaceous-age tonalite (Kt) at the surface along the north end of the Windsong tract. View facing down.

8.0 IMPACT ANALYSIS

Impacts on paleontological resources can generally be classified as either direct, indirect, or cumulative. Direct adverse impacts on surface or subsurface paleontological resources are the result of destruction by breakage and crushing as the result of surface disturbing actions including construction excavations. In areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact surface and subsurface paleontological resources of scientific importance. Without mitigation, these fossils and the paleontological data they could provide if properly recovered and documented, could be adversely impacted (damaged or destroyed), rendering them permanently unavailable to science and society.

Indirect impacts typically include those effects which result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given project area. They also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting. Human activities that increase erosion also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative impacts can result from incrementally minor but collectively significant actions taking place over a period of time. The incremental loss of paleontological resources over time as a result of construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact, because it would result in the destruction of non-renewable paleontological resources and the associated irretrievable loss of scientific information.

Excavations within the Project area that impact early Pleistocene-age very old alluvial fan deposits (Qvof) (PFYC 3) may well result in an adverse direct impact on scientifically important paleontological resources. Excavations into Cretaceous-age tonalite (Kt) (PFYC 1) will not impact scientifically important paleontological resources since these rocks are formed under conditions that are non-conducive to fossil preservation. Based on the stratigraphic relationship of the geologic units mapped in the Project vicinity (see Morton et al., 2002), Holocene- to late Pleistocene-age young alluvial fan deposits (Qyf) (PFYC 2) will not be encountered at depth beneath early Pleistocene-age very old alluvial fan deposits (Qvof) or Cretaceous-age tonalite (Kt) within the Project area.

No indirect or cumulative impacts are anticipated from any of the planned Project activities.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis of existing data indicate that the Project area is underlain by Cretaceous-age tonalite (Kt) and lesser amounts of early Pleistocene-age very old alluvial fan deposits (Qvof). Numerous vertebrate fossils are documented from Pleistocene-age alluvial deposits within the Project vicinity as well as throughout Riverside County and other areas of southern California. Early Pleistocene-age very old alluvial fan deposits (Qvof) are, therefore, considered to have a moderate paleontological potential (PFYC 3). Cretaceous-age tonalite (Kt) is considered to have a very low paleontological potential (PFYC 1) since the environment in which plutonic rocks form is not conducive to fossil preservation.

No fossils were observed during the field survey, although sediments conducive to fossil preservation were observed, particularly sediments of early Pleistocene-age very old alluvial fan deposits (Qvof). Specifically, these sediments were encountered in surface exposures in the Windsong tract. Further, the field survey indicates that Cretaceous-age tonalite (Kt) is exposed at the Project area surface in both Windsong and Skylar Place tracts, including areas of the Skylar Place tract that are mapped as early Pleistocene-age very old alluvial fan deposits (Qvof).

Prior to construction, a PMP should be prepared. It should provide detailed recommended monitoring locations; a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by a paleontological monitor or other project personnel. A curation agreement with WSC or another accredited repository should also be obtained. Construction excavations which disturb early Pleistocene-age very old alluvial fan deposits (Qvof) (PFYC 3), either at the surface or in the subsurface, should be monitored by a professional paleontologist in order to reduce potential impacts on scientifically important paleontological resources to a less than significant level. If it is determined that only Cretaceous-age tonalite (Kt) (PFYC 1) is impacted, the monitoring program should be halted in those areas. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a professional paleontologist as described in the PMP.

REFERENCES

Bell, A. 2021. Paleontological resources for the [Tentative Tract Map 38123] Darwin and Winco Residential Housing Tracts Project, Riverside County, California project area. Search of paleontological records maintained by the Natural History Museum of Los Angeles County. Dated March 11, 2021.

Blake, G.H. 1991. Review of the Neogene Biostratigraphy and Stratigraphy of the Los Angeles Basin and Implications for Basin Evolution: in Biddle, K.T., ed., Active Margin Basins. American Association of Petroleum Geologists, Memoir 52, Chapter 4, p. 135-184.

Bureau of Land Management (BLM). 2008. Assessment and Mitigation of Potential Impacts to Paleontological Resources: BLM Instruction Memorandum No. 2009-011.

Bureau of Land Management (BLM). 2016. Potential Fossil Yield Classification system: BLM Instruction Memorandum No. 2016-124 (PFYC revised from USFS, 2008).

County of Riverside. 2015. County of Riverside General Plan. Available online at: https://planning.rctlma.org/General-Plan-Zoning/General-Plan

Dibblee, T.W., and J.A. Minch. 2003. Geologic map of the Sunnymead/south ½ of Redlands quadrangles, San Bernardino and Riverside counties, California. Dibblee Geological Foundation, Map DF-110, Scale (1:24,000).

Google Earth. 2021. *Intersection of Darwin Drive and Alessandro Boulevard, Moreno Valley, Riverside County, California.* Google Earth. UTM: 11S, 480987.55mE/3753191.11mN. Accessed March 2021.

Jahns, R.H. 1954. Geology of Southern California. State of California, Department of Natural Resources, Bulletin 170, Volume 1.

Jefferson, G.T. 1991. A Catalogue of late Quaternary Vertebrates from California, Part two, Mammals: Natural History Museum of Los Angeles, Technical Report, v.7, 129 pp.

Morton, D.M., J.C. Matti, V.M. Diep, and U. Edwards-Howells. 2002. Geologic map of the Sunnymead 7.5-minute quadrangle, Riverside County, California. USGS Open-File Report OF-2001-450, Scale (1:24,000).

Murphey, P.C. and D. Daitch. 2007. Paleontological overview of oil shale and tar sands areas in Colorado, Utah and Wyoming: U.S. Department of Energy, Argonne National Laboratory Report Prepared for the U.S. Department of Interior Bureau of Land Management, 468 p. and 6 maps (scale 1:500,000).

Murphey, P.C., Knauss, G.E., Fisk, L.H., Deméré, T.A., Reynolds, R.E. 2019. Best Practices in Mitigation Paleontology: Proceedings of the San Diego Society of Natural History, n. 47, 43 p.

Radford, D. 2021. Paleontological resources for the [Tentative Tract Map 38123] Darwin and Winco Residential Housing Tracts Project, Riverside County, California project area. Search of paleontological records maintained by the Western Science Center in Hemet, California. Dated March 17, 2021.

Reynolds, R.E., and Reynolds, R.L. 1990a. A new late Blancan faunal assemblage from Murrieta, Riverside County, California: San Bernardino County Museum Association Quarterly, v. XXXVII, p. 34.

Reynolds, R.E., and Reynolds, R.L. 1990b. Irvingtonian? Faunas from the Pauba Formation, Temecula, Riverside County, California: San Bernardino County Museum Association Quarterly, v. XXXVII, p. 37.

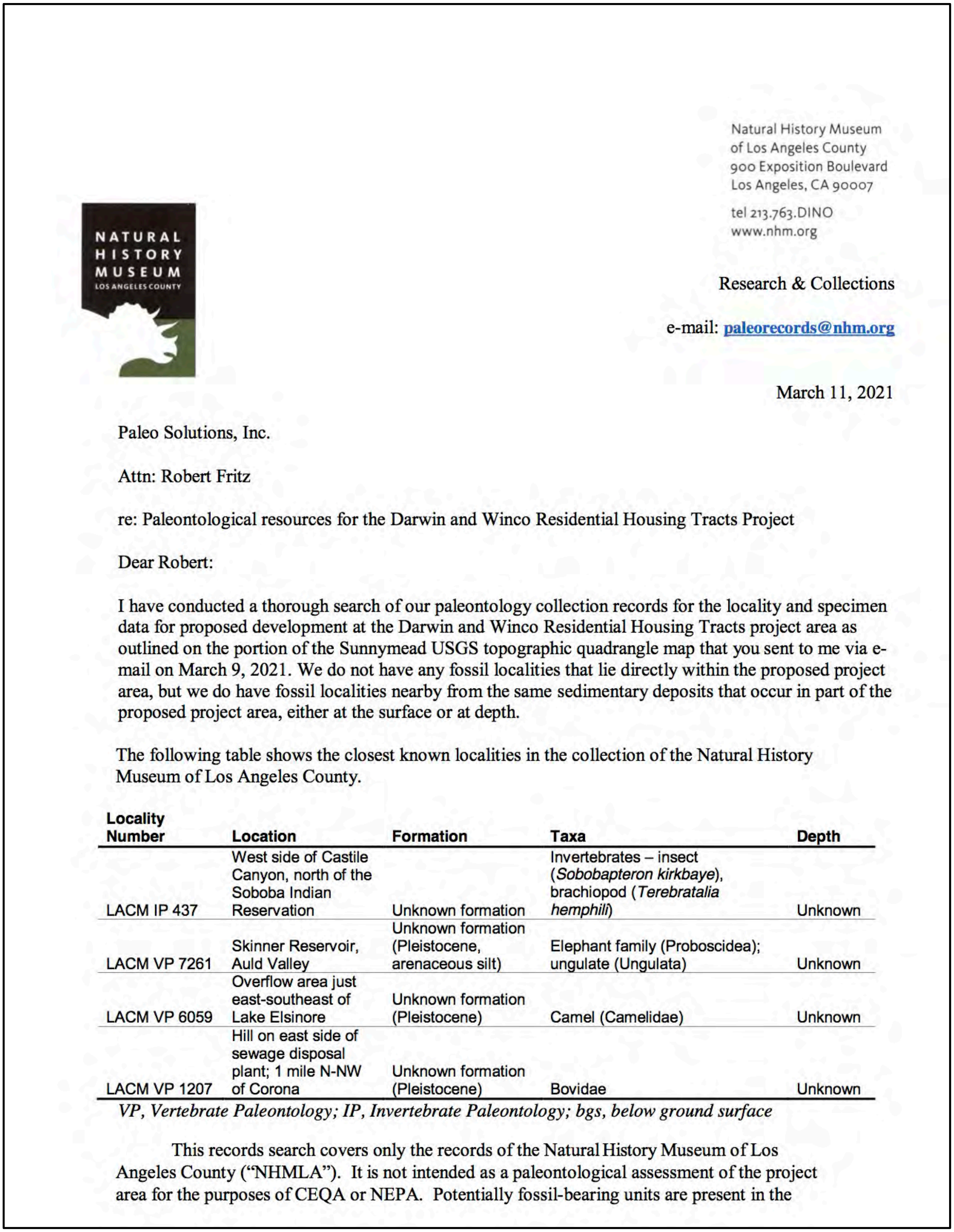
Society of Vertebrate Paleontologists (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. 11 p.

Springer, K., E. Scott, C. Sagebiel, and L.K. Murray. 2009. The Diamond Valley Lake local fauna: Late Pleistocene vertebrates from inland southern California. *in* Papers on geology, vertebrate paleontology, and biostratigraphy in honor of Michael O. Woodburne (L.G. Albright, III, ed.). Museum of Northern Arizona Bulletin 65, Flagstaff, Arizona. 217-235 pp.

University of California Museum of Paleontology (UCMP). 2021. Online search of the University of California Museum of Paleontology database, accessed March 4-6.

APPENDIX A

Museum Paleontological Records Search Results



NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: paleorecords@nhm.org

March 11, 2021

Paleo Solutions, Inc.

Attn: Robert Fritz

re: Paleontological resources for the Darwin and Winco Residential Housing Tracts Project

Dear Robert:

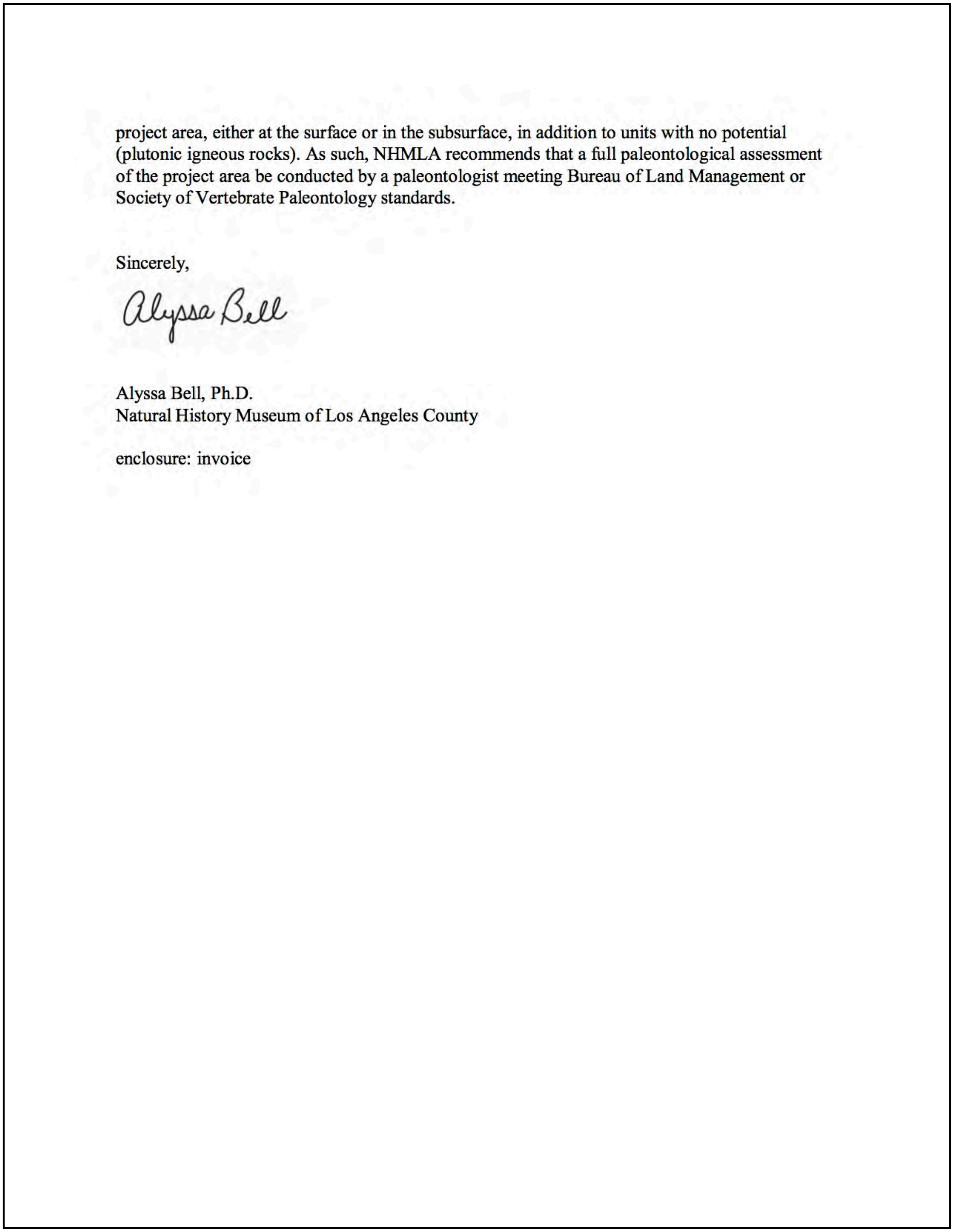
I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the Darwin and Winco Residential Housing Tracts project area as outlined on the portion of the Sunnymead USGS topographic quadrangle map that you sent to me via e-mail on March 9, 2021. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that occur in part of the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County.

Locality Number	Location	Formation	Taxa	Depth
LACM IP 437	West side of Castile Canyon, north of the Soboba Indian Reservation	Unknown formation	Invertebrates – insect (*Sobobapteron kirkbaye*), brachiopod (*Terebratalia hemphili*)	Unknown
LACM VP 7261	Skinner Reservoir, Auld Valley	Unknown formation (Pleistocene, arenaceous silt)	Elephant family (Proboscidea); ungulate (Ungulata)	Unknown
LACM VP 6059	Overflow area just east-southeast of Lake Elsinore	Unknown formation (Pleistocene)	Camel (Camelidae)	Unknown
LACM VP 1207	Hill on east side of sewage disposal plant; 1 mile N-NW of Corona	Unknown formation (Pleistocene)	Bovidae	Unknown

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the Natural History Museum of Los Angeles County ("NHMLA"). It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the



project area, either at the surface or in the subsurface, in addition to units with no potential (plutonic igneous rocks). As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Bureau of Land Management or Society of Vertebrate Paleontology standards.

Sincerely,

Alyssa Bell

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County

enclosure: invoice

WESTERN SCIENCE CENTER

Paleo Solutions
Robert Fritz
911 S. Primrose Avenue, Unit N
Monrovia, CA 91016

March 17, 2021

Dear Mr. Fritz,

This letter presents the results of a record search conducted for the Darwin and Winco Residential Housing Project in the city of Moreno Valley, Riverside County, California. The project site is located at the north east corner of Lasselle Street and Alessandro Boulevard in Section 9, Township 3 South, Range 3 West on the Sunnymead, CA USGS 7.5 minute quadrangle.

The geologic units underlying this project are mapped primarily as tonalite deposits dating to the Cretaceous, with a small segment of very old alluvial fan deposits dating to the early Pleistocene along the eastern border of the project (Morton & Matti, 1997). While tonalite deposits are not considered to be paleontologically sensitive, Pleistocene alluvial units are considered to be of high paleontological sensitivity. The Western Science Center does not have localities within the project area or within a 1 mile radius, but does have numerous fossil localities within 3 miles that presented paleontological finds within similar alluvial mapped units including those associated with the Aldi Distribution Project in Moreno Valley. Fossils recovered from this project include specimen associated with large Pleistocene fauna including Giant Ground Sloth.

Any fossils recovered from the Darwin and Winco Residential Housing Project area would be scientifically significant. Excavation activity associated with development of the project area would impact the paleontologically sensitive early Pleistocene units and it is the recommendation of the Western Science Center that a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils associated with the current study area.

If you have any questions, or would like further information about the Aldi Distribution Project, please feel free to contact me at dradford@westerncentermuseum.org

Sincerely,

Darla Radford
Collections Manager

2345 Searl Parkway ♦ Hemet, CA 92543 ♦ phone 951.791.0033 ♦ fax 951.791.0032 ♦ WesternScienceCenter.org

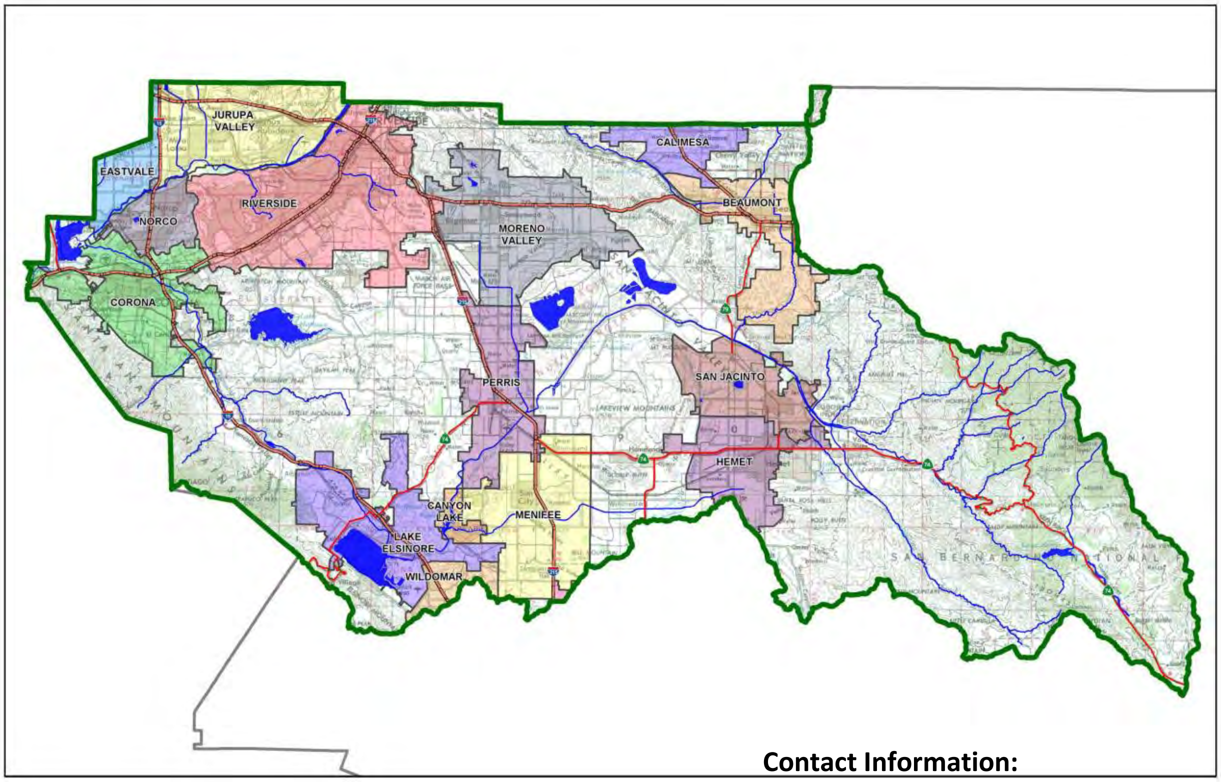
Final Project Specific Water Quality Management Plan

A Template for Projects located within the ***Santa Ana Watershed*** *Region of Riverside County*

Project Title: TR 38123 Moreno Valley

Development No: PEN21-0050/SI

Design Review/Case No: LWQ21-0013



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 03-16-21

Revision Date(s): 06-08-21, 8-31-21, 10-19-21

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

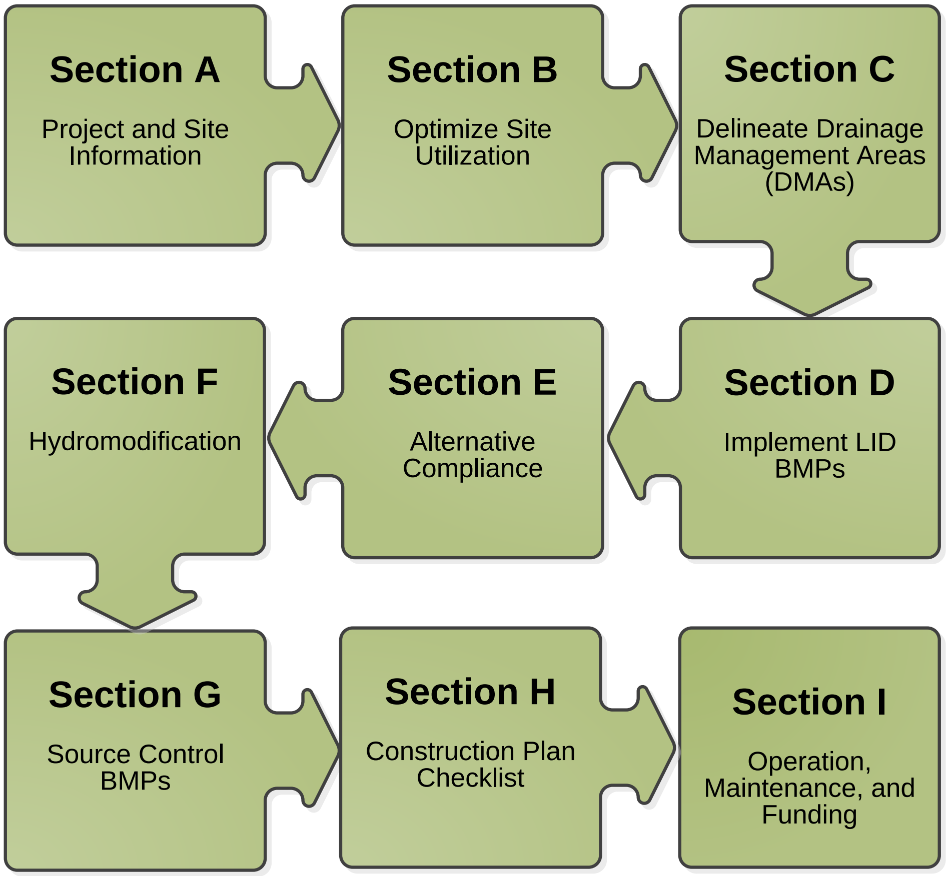
Contact Information:

Prepared for: Megan Whieldon
Email:MKWhieldon@DRhorton.com
2280 Wardlow Circle
Suite 100, Corona, CA 92880
951-739-5485

Prepared by:
Mayers & Associates Civil Engineering,Inc.
19 Spectrum Pointe Drive, Suite 609
Lake Forest, CA, 92630
Dru J. Mayers
dmayers@mayerscivil.com
tele: 949-599-0875

A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for D.R. Horton and the city of Moreno Valley, by Mayers and Associates for the TR 38123 project.

This WQMP is intended to comply with the requirements of City of Moreno Valley Water Quality Ordinance (Municipal Code chapter 8.10, ordinance 827, et seq.) which includes the requirement for the preparation and implementation of a Project Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Moreno Valley Water Quality Ordinance (Municipal Code chapter 8.10, ordinance 827, et seq.)

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Dru J. Mayers	Civil Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

List of Tables

List of Appendices

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Single Family Residential Development
Planning Area:	Low Density Residential (RC-LDR)
Community Name:	Moreno Valley
Development Name:	Tr 38123
PROJECT LOCATION	
Latitude & Longitude (DMS):	33°55’5.25”N, 117°12’24.65”W
Project Watershed and Sub-Watershed:	Santa Ana Watershed
Gross Acres:	36.5 acres
APN(s):	487-470-025 & 487-470-028 & 487-574-001 & 487-574-002
Map Book and Page No.:	Book 11, page 10
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential/Open Space
Proposed or Potential SIC Code(s)	1521
Area of Impervious Project Footprint (SF)	1,700,202
Total Area of <u>proposed</u> Impervious Surfaces within the Project Footprint (SF)/or Replacement	728,665
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the Project limits Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	n/a
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	n/a
What is the Water Quality Design Storm Depth for the project?	85th percentile = 0.66

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Narrative Project Description:

The site is situated at the northern portion of Alessandro Blbd. within an undeveloped terrain at the NE corner of Alessandro Boulevard and Lasselle Street. The subject property is surrounded by residential developments to the north, west and east sides. The south side of the project is surrounded by undeveloped terrain. The site is in the North portion of the Santa Ana River Watershed jurisdiction Regional Water Quality Control Board (RWQCB).

Existing Condition:

The existing terrain is currently vacant raw portion of land covered with grass and shrubs all around the site. The site currently drains southwest corner at an average rate of 3.5% unmitigated towards Alessandro Boulevard. Half portion of the existing site drains to the southwest corner while the other half of the terrain drains towards the southeast corner of Allesandro Boulevard at an average rate of 2.3%. Existing conditions is 100% pervious. There is existing storm drain system onsite along Alessandro Blvd and along Darwin Drive which is on the east side of the property.

Proposed Condition:

Tract 38123 is a residential development that included the construction of multifamily housing, private street, common area landscaping, a park and associated wet and dry utilities.

Paved areas on the site are made up by the private streets that go through out the project. There will be street parking available throughout the tract. In addition to paved areas throughout the project, street widening of exterior streets will also be part of this project.

Landscape surrounds all paved areas and building on site.

Roof coverage was estimated to be 28% of total lot coverage and referenced in table D.3 of report.

The proposed site will be divided into three (3) DMAs (see WQMP site plan). The stormwater treatment facility that is proposed is a bioretention basin. The bioretention basin will be used as the primary treatment method. Upon filtering through 3-5 feet of permeable soil water will drain through a 8" diameter pipe that is wrapped in geotex filter fabric. Once water drains through the filter fabric water flows to a secondary catch basin. Only in case of emergency water will over flow through an emergency spillway onto Alessandro Blvd.

DMA A is 31.3 AC, which is located as a majority of the project and drain to a bioretention basin for DMA A on the south west side of the project. Majority of DMA A consist of a mixture between residential development, site streets and sidewalks.

DMA B is 1.67 AC, which is located north of the project and drains onto Bay Avenue unmitigated due to site grading restrictions. DMA B sits at a grading ridge point where stormwater drains to Bay Avenue and can't be treated with the majority of the project. Majority of DMA B consist of 10 multifamily residential development and will be treated via a modular wetland unit along Bay Avenue. Also portion of Bay Avenue half street improvement will be treated in the modular wetland as well.

DMA C is 4.2 AC, which is located west of the project and drains onto Lasselle Street. Majority of DMA C consist of 14 multifamily residential development and will be treated via a modular wetland unit along

Lasselle Street. Also portion of Bay Avenue half street improvement will be treated in the modular wetland as well.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River Reach 4	None	AGR, GWR, REC 1, REC 2, WARM, WILD	Not a RARE designation
Canyon Lake	Nutrients, Pathogens	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD	Not a RARE waterbody
San Jacinto River Reach 1	None	AGR, GWR, REC 1, REC 2, WARM, WILD	Not a RARE designation
Lake Elsinore	Nutrients, Organic Compounds/Oxygen demanding substances, Sediment/Turbidity, Unknown Toxicity	REC1,REC2, EST, WILD, MAR, MIGR, SPWN	Not a RARE waterbody

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* City of Moreno Valley Grading and Improvement Permits	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The proposed project will be the same as the already existing drainage patterns. The drainage flow is usually to the north to south generally.

Did you identify and protect existing vegetation? If so, how? If not, why?

Existing site plan only contains raw dirt material without any existing vegetation, so this question doesn't apply to our site

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

In the soils report dated August 27th, 2020 the soil where the proposed basins were to be located were deemed to have very low infiltration rates but it is recommended to use biorention basins to allow for an engineered infiltration to the absorbent portion of soil under the surface.

Also included in section 3 of this report is the previously done infiltration test by Terracon dated April 15th, 2008. Results from this infiltration report indicate very low infiltration rates.

Did you identify and minimize impervious area? If so, how? If not, why?

The proposed project has incorporated pervious areas, landscaping and natural open space areas, specifically the added park on the south east corner of the site to reduce impervious areas. The park was an additional add required by the city of Moreno Valley and the breakdown of the park will be determined at a later phase of the project per the cities direction.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Runoff from various impervious areas, such as run-off from roofs and sidewalks will disperse into surrounding landscaping before discharging into the storm drains.

The project will utilize a combination of onsite source control and site design BMPs supplemented with primary treatment control BMPs prior to discharging into the MS4 system.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
A	Mixed Surface	1,362,111	Type D
B	Mixed Surface	72,566	Type D
C	Mixed Surface	183,388	Type D
OFFSITE-1	Mixed Surface	49,784	Type D
OFFSITE-2	Mixed Surface	32,353	Type D

[1] *Reference Table 2-1 in the WQMP Guidance Document to populate this column*

[2] *If multi-surface provide back-up*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				**Type 'C' DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
A	Bioretention basin
B	Bioretention Modular Wetland
C	Bioretention Modular Wetland
OFFSITE-1	Bioretention Modular Wetland
OFFSITE-2	Bioretention Modular Wetland

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: Low infiltration rates at basins don't allow natural infiltration to be feasible.		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 27.8 acres

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 28.1 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 0.87" = 2.22

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 28.1 acres X 2.22 = 62.4 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
62.4 acres	28.1 acres

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 1416 users(354 units x 4 residents/units)

Project Type: Residential

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 28.1 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 0.87 = 141

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 141(28.1 AC) = 3,962 users

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	**Projected number of toilet users (Step 1)**
3,962	1416

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

n/a

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: n/a

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: n/a

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: n/a

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: n/a

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
n/a	n/a

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A	☐	☐	☒	☐	☐
B	☐	☐	☐	☒	☐
C	☐	☐	☐	☒	☐
OFFSITE-1	☐	☐	☐	☒	☐
OFFSITE-2	☐	☐	☐	☒	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***DMA A – Extended retention Basin***		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
A	*315,800*	*Roof*	*1*	*0.89*	*281,694*			
A	*354,385*	*Asphalt and concrete*	*1*	*0 .89*	*316,111*			
A	*691,926*	*Landscape*	*.10*	*0 .11*	*76,429*			
B	*19,550*	*Roof*	*1*	*0.89*	*17,400*			
B	*20,632*	*Asphalt and concrete*	*1*	*0 .89*	*18,362*			
B	*32,384*	*Landscape*	*.10*	*0 .11*	*3,562*			
C	*30,500*	*Roof*	*1*	*0.89*	*27,206*			
C	*106,587*	*Asphalt and concrete*	*1*	*0 .89*	*95,076*			
C	*46,301*	*Landscape*	*.10*	*0 .11*	*5,114*			
Offsite-1	*49,784*	*Asphalt and concrete*	*1*	*0.89*	*44,308*			
Offsite-2	*32,353*	*Asphalt and concrete*	*1*	*0.89*	*28,794*			
	1,700,202				A: 674,234 B: 39,419	0.66	$[F] = \frac{[D]x[E]}{12}$	A:37,894

			C: 127,396 Offsite-1: 44,308 Offsite-2 28,794		A: 37,083 B: 2,168 C: 7,007 Offsite 1: 2,728 Offsite 2: 1,584	B:Flowbased C:Flowbased Offsite-1: Flowbased Offsite-2: Flowbased Refer to Appendix 6 for flowbased calculations

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

List DMAs here.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☒ Detached Residential Development	P	N	P	P	N	P	P	P
☒ Attached Residential Development	P	N	P	P	N	P	P	P[2]
☐ Commercial/Industrial Development	P[3]	P	P[1]	P[1]	P[5]	P[1]	P	P
☐ Automotive Repair Shops	N	P	N	N	P[4, 5]	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P[6]	P	P[1]	P[1]	P[4]	P[1]	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☒	☒	☐	☒	☒	☒

P = Potential

N = Not Potential

[1] A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

[2] A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

[3] A potential Pollutant is land use involving animal waste

[4] Specifically petroleum hydrocarbons

[5] Specifically solvents

[6] Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	N/A
Total Credit Percentage[1]	N/A

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$				$\Sigma=$ [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
N/A		

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*
[2] *Cross Reference Table E.1 above to populate this column.*
[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

---

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

The project is within a HCOC Exemption area, see appendix 7 for HCOC exemption map.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and “housekeeping”, that must be implemented by the site’s occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*****:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*****:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*****:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Makers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, residential owners and operateors (HOA). See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance”, in the

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

	Flo Gard Catch Basin Insert Filter curb Inlet Style, and combination style will be used in catch basins.	CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in CC&R's: "Owner shall not allow anyone to discharge anything to storm drains or to store deposit materials so as to create a potential discharge to storm drains.
Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners and operators.
Landscape/Outdoor Pesticide Use	Preserve, existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaping areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially to hardscape. To inusre successful establishments, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Maintain landscaping using minimum or no pesticides. Provide IPM information to new owners and operators.
Fire Sprinkler Test Water	Provide means to drain fire sprinkler to sanitary sewer.	See CASQA Fact Sheet SC-41.
Plazas, sidewalks and parking lots		Sweep regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into storm drain system. Collect wash water containing any agent or degreaser and discharge to

		sanitary sewer not to a storm drain.
Condensate drain lines	Condensate drain lines may discharge to landscape areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to storm drain system.	Maintain and periodically replace condensate drain lines.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner West Coast Inland Partners until Transfer to HOA.

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

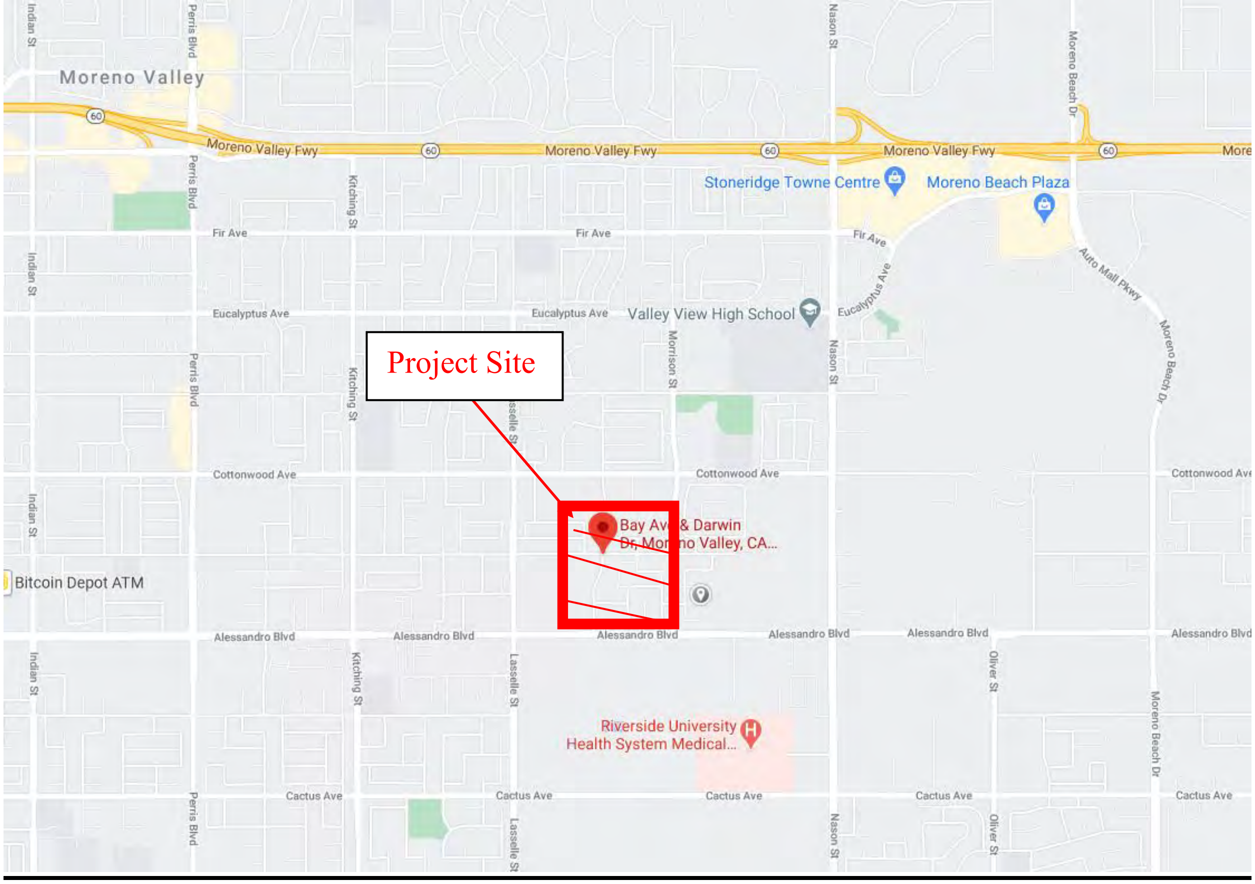
Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

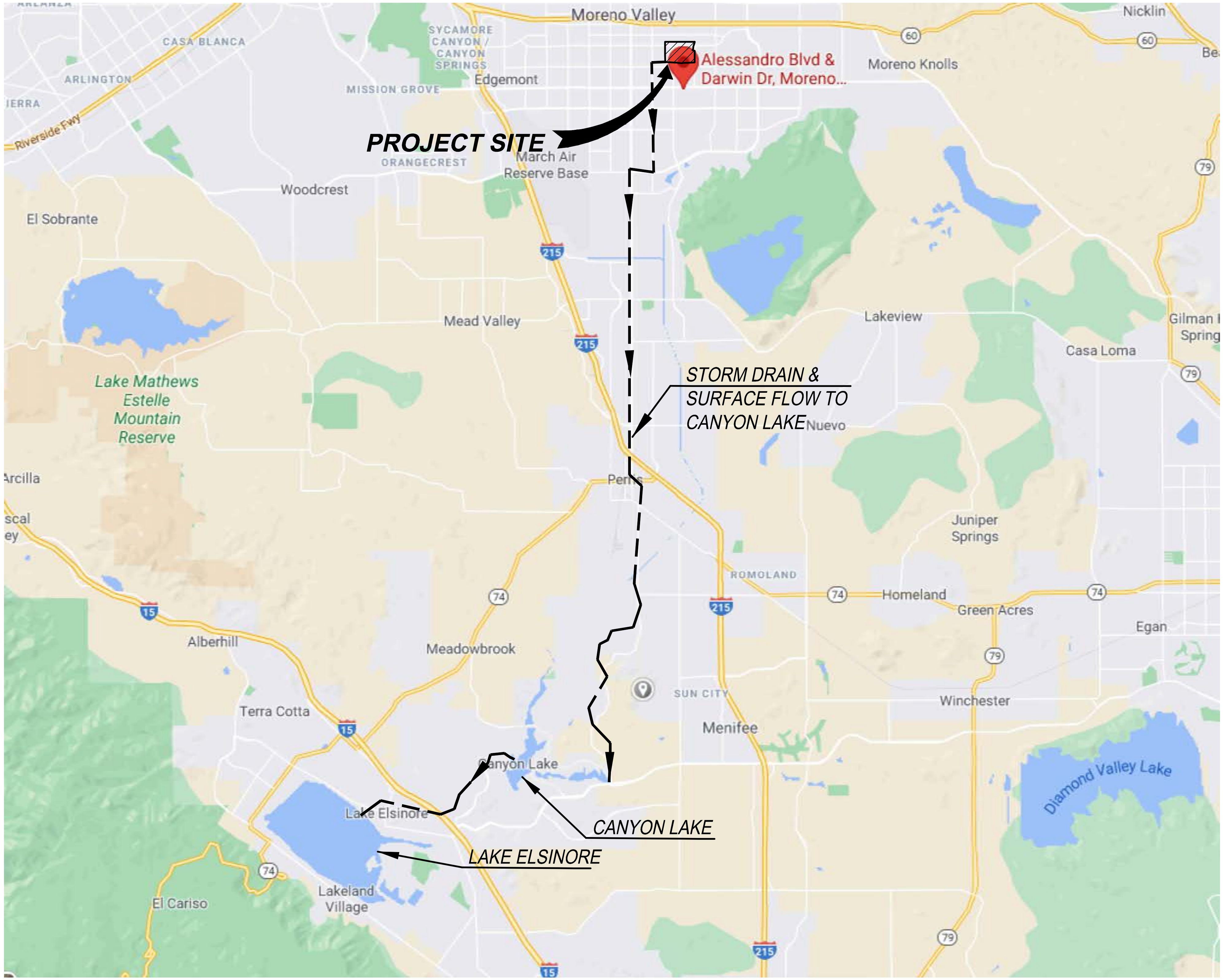
Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Appendix 1
Vicinity Map





PREPARED FOR:

D.R. HORTON

2280 WARDLOW CIRCLE, SUITE 100
CORONA, CA 92880
(951) 739-5485

PREPARED BY:

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

RECEIVING WATERS EXHIBIT
TR 38123
MORENO VALLEY

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

WQMP SITE PLAN

WQMP SUMMARY

VBMP REQUIRED = 36,562 CF OF TREATMENT

VBMP PROVIDED = 1' OF PLANTING SOIL @ 21,763 SF
POROSITY OF 0.3

VBMP PROVIDED FROM PLANTING SOIL LAYER = 6,529 CF

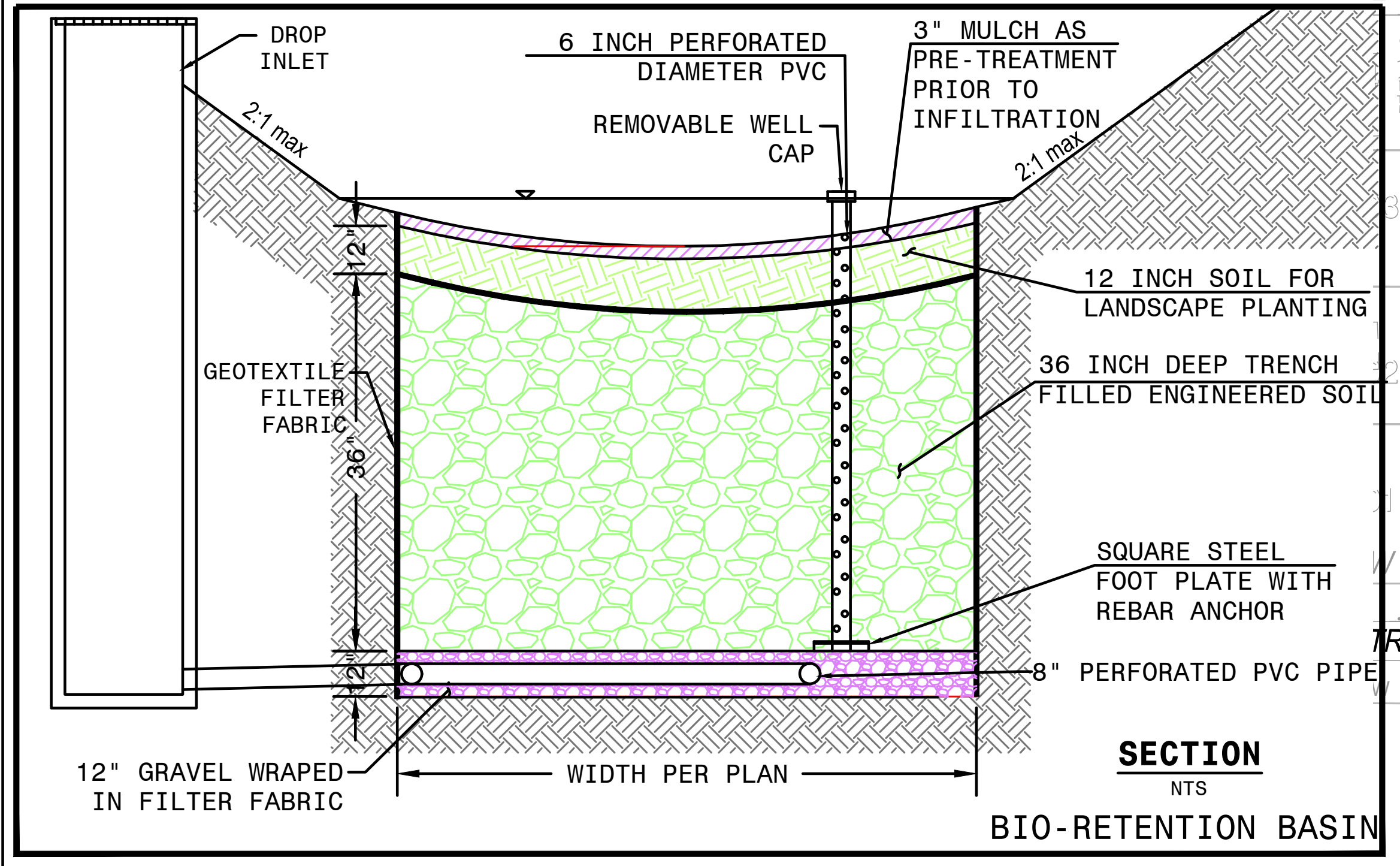
VBMP PROVIDED = 3' OF ENGINEERING SOIL @ 21,763 SF
POROSITY OF 0.3

VBMP PROVIDED FROM ENGINEERING SOIL LAYER = 19,587 CF

TOTAL VBMP PROVIDED BIORETENTION BASIN = 26,116 CF

0.5' PONDING DEPTH = 11,250 CF OF VOLUME OF TREATMENT

TOTAL VBMP TREATMENT PROVIDED = PONDING DEPTH + BIOTREATMENT
TOTAL VBMP TREATMENT PROVIDED = 11,250 CF + 26,116 CF
TOTAL VBMP TREATMENT PROVIDED = 37,366 CF > 36,562 CF HENCE OK
TOTAL BASIN CAPACITY = 395,704 CF



SECTION
NTS
BIO-RETENTION BASIN

LEGEND

🟩	WATER QUALITY BIO-RETENTION BASIN
▨	PROPOSED STREET PAVING
🟥	SELF TREATING AREA (PARK)
→	FLOW DIRECTION
—	DMA BOUNDARY
DMA-X X,XXX SF XX.XX AC	DMA INFORMATION

SOURCE CONTROL BMP'S:

SD10	SITE DESIGN & LANDSCAPE PLANNING
SD11	ROOF RUNOFF CONTROLS
SD12	EFFICIENT IRRIGATION
SD13	STORM DRAIN SIGNAGE/STENCIL
SD21	ALTERNATIVE BUILDING MATERIALS

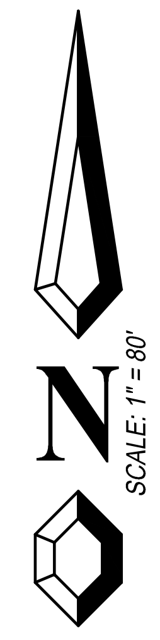
SOURCE CONTROL BMP'S:

NON STRUCTURAL CONTROL BMP'S:

N4	EDUCATION FOR PROPERTY OWNERS, TENANTS AND OCCUPANTS (ENTIRE SITE)

TREATMENT CONTROL BMP'S:

TC32	BIORETENTION



GRAPHIC SCALE
80 0 40 80 160
(IN FEET)
SCALE: 1" = 80'

PREPARED BY:

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

WQMP SITE PLAN
TENTATIVE TRACT MAP NO.
38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA

Dwg. Revision Date: **08/31/2021** BY: **M.M.** PLOT DATE: **10/14/2021**

P:\20-0300-06 MORENO VALLEY TENTATIVE TRACT MAP\IMPROVEMENTS\STORM DRAIN\WQMP\APPENDIX 1 MAPS AND SITE PLANS\UPDATED WQMP SITE PLAN.DWG

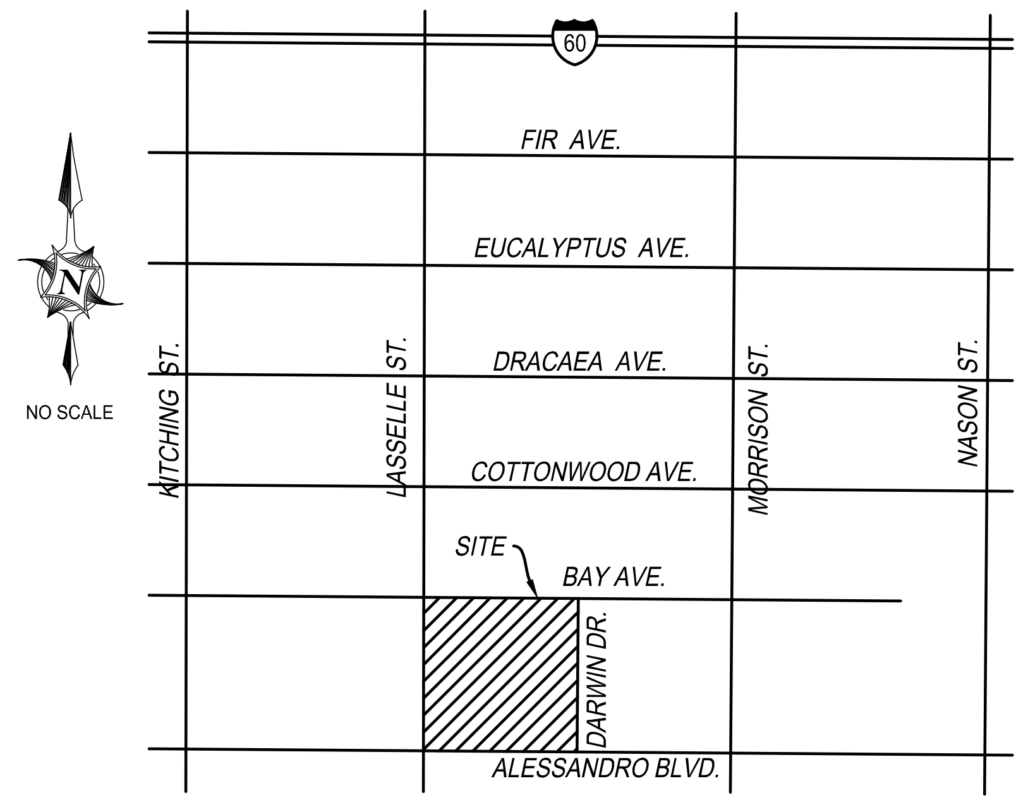
Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Appendix 2: Construction Plans

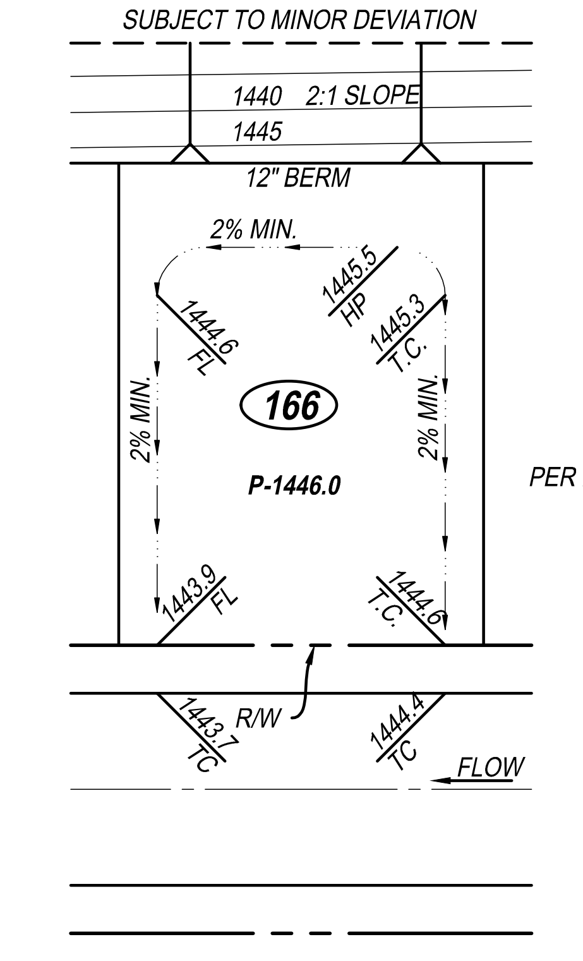
Grading and Drainage Plans

PRELIMINARY GRADING PLAN TR. 38123

THE CITY OF MORENO VALLEY, IN THE COUNTY OF RIVERSIDE, CALIFORNIA

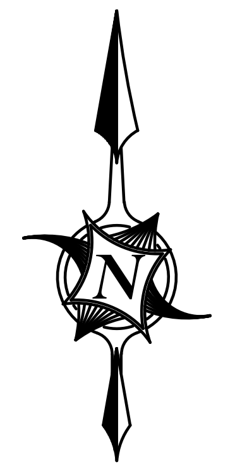


VICINITY MAP

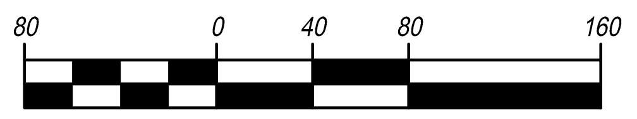


TYPICAL LOT DRAINAGE

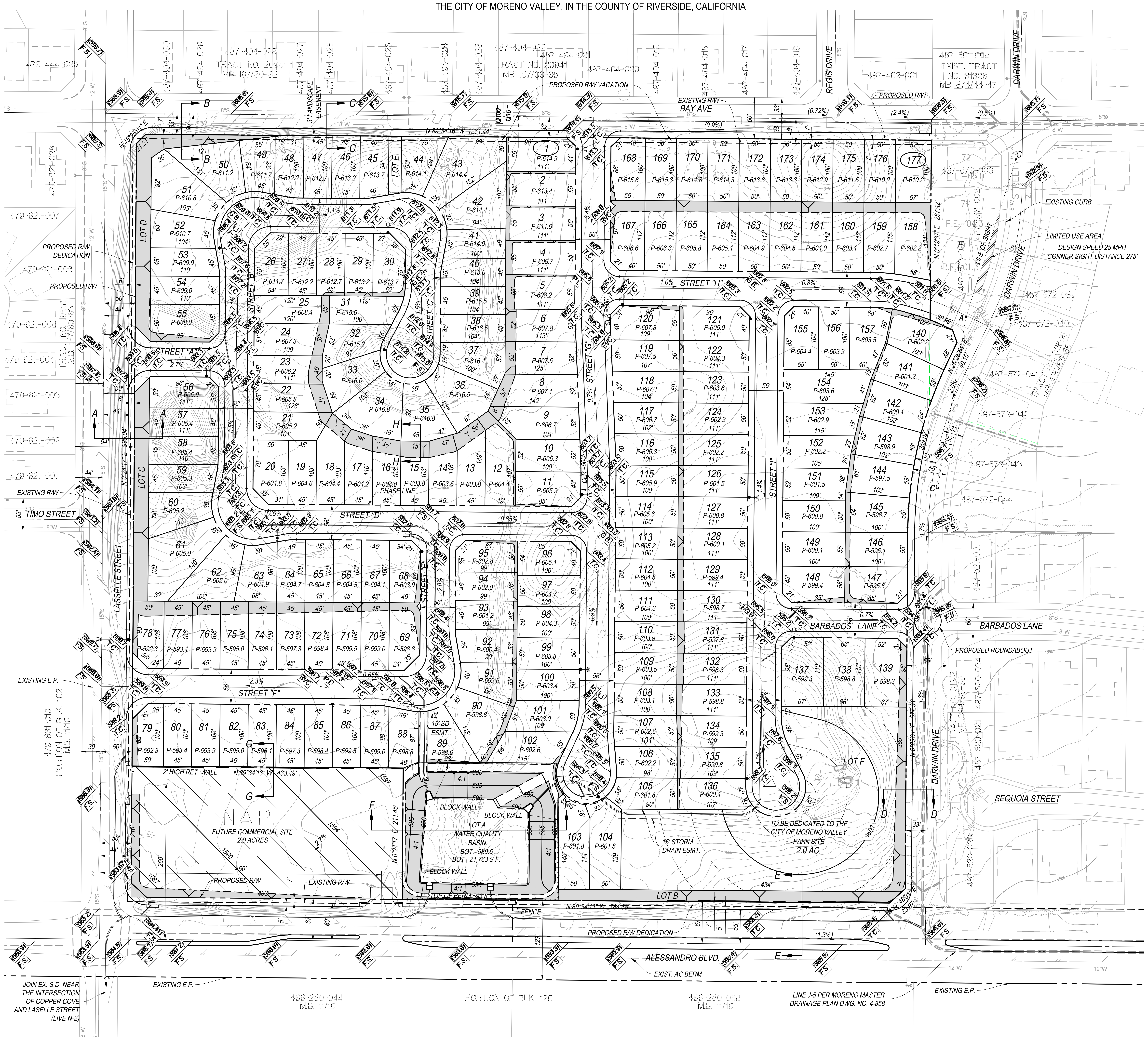
N.T.S.



GRAPHIC SCALE



(IN FEET)
SCALE: 1" - 80'



GENERAL NOTES

1. EXISTING GENERAL PLAN DESIGNATION: RESIDENTIAL
2. EXISTING ZONING: R-5 RESIDENTIAL
3. PROPOSED ZONING: RS-10 (OPEN SPACE COMBINING ZONE - RESIDENTIAL DEVELOPMENT)
4. EXISTING LAND USE: VACANT
5. PROPOSED LAND USE: SINGLE FAMILY RESIDENTIAL
6. GROSS PROJECT ACREAGE: 33.57 ACRES
7. NET PROJECT ACREAGE: 26.25 ACRES
8. MINIMUM RESIDENTIAL LOT SIZE: 4,377 S.F.
9. TOTAL NUMBER OF RESIDENTIAL LOTS: 177
10. PROJECT DENSITY: 5.3 DU / AC
11. UTILITY PURVEYORS:
    WATER: EASTERN MUNICIPAL WATER DISTRICT
    SEWER: EASTERN MUNICIPAL WATER DISTRICT
    GAS: SOUTHERN CALIFORNIA GAS COMPANY
    ELECTRIC: MORENO VALLEY UTILITY
    CABLE: FRONTIER, SPECTRUM, AT&T
    TELEPHONE: VERIZON
    STORM DRAIN: RCFCD AND CITY
12. SCHOOL DISTRICT: MORENO VALLEY UNIFIED SCHOOL DISTRICT.
13. THE SUBJECT TRACT IS NOT WITHIN THE 500 YEAR FLOOD PLAIN, ZONE X. FEMA FLOOD INSURANCE PANEL NO. 06065C0765G. ZONE X IS AN AREA OF MINIMAL FLOOD HAZARD.
14. THOMAS BROTHERS MAP: 2005 SAN BERNARDINO AND RIVERSIDE COUNTIES PAGE 717 J-5
15. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
16. MINIMUM FRONT YARD SETBACK: TWENTY (20) FEET.
17. MINIMUM SIDE YARD SETBACK: FIVE (5) FEET - TEN (10) FEET ON CORNER LOTS.
18. MINIMUM REAR YARD SETBACK: FIFTEEN (15) FEET.
19. COMMUNICATION CONDUIT SHALL BE PROVIDED ALONG THE PROJECT FRONTAGE PER CITY STANDARD NO. MVSI-186-0.
20. SOURCE OF TOPOGRAPHY: TOPOGRAPHIC AND A.L.T.A./A.C.S.M. LAND TITLE SURVEY OF LOTS 4 & 5 BLOCK 103, MAP 1 BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO. PREPARED BY ROBERT WADA & ASSOCIATES DATED: APRIL 6, 2006.

LEGEND

TENTATIVE MAP BOUNDARY.	
BEGIN/END VERTICAL CURVE.	
POINT OF INTERSECTION.	PI
FINISHED SURFACE.	FS
CENTERLINE RADIUS.	CLR=300'
STREET CENTERLINE ELEVATION.	580
STREET GRADE.	2%
LOT NUMBER.	48
PAD ELEVATION.	P-631.0
FIRST AND LAST RESIDENTIAL LOT NUMBER. . .	⬭
EXISTING WATERLINE.	W
EXISTING STORM DRAIN.	SD
PROPOSED WATERLINE.	W
PROPOSED STORM DRAIN.	
PROPOSED SEWER AND MANHOLES.	S
CROSS GUTTER.	
EXISTING LOT NUMBER.	PARCEL 4
SLOPE (2:1 MAX)	

EARTHWORK QUANTITIES

	CUT (C.Y.)	FILL (C.Y.)
RAW VOLUMES	130,900	146,380
SUBSIDENCE		5,703
ALLUVIAL REMOVALS		7,683
BULK OF STREET OVER X 5%		(980)
CUT LOT OVER X BULK 5%		(3,526)
BLASTING BULK 22%		(24,360)
TOTALS:	130,900 C.Y.	130,900 C.Y.

LEGAL DESCRIPTION

BEING A RESUBDIVISION OF PARCEL 1 OF TENTATIVE PARCEL MAP NO. 38098, MORE PARTICULARLY DESCRIBED AS LOTS 3, 4, AND 6, AND A PORTION OF LOT 5 OF BLOCK 103 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO., IN THE CITY OF MORENO VALLEY, FILED IN MAP BOOK 11, PAGE 10, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, TOGETHER WITH LOTS K AND M OF TRACT NO. 32505, IN THE CITY OF MORENO VALLEY, FILED IN MAP BOOK 435, PAGES 63 THROUGH 66, INCLUSIVE, RECORDS OF SAID COUNTY AND STATE.

APPLICANT/OWNER/DEVELOPER

D·R·HORTON® DHI
America's Builder

2280 WARDLOW CIR.
CORONA, CA. 92880
(951) 272-9000

ASSESSOR'S PARCEL NUMBER

487-470-028, 487-470-025, 487-574-001, 487-574-002

DATE OF MAP

AUGUST 19, 2021

ENGINEER/CONTACT PERSON

THIS MAP WAS PREPARED UNDER THE DIRECTION OF DRU J. MAYERS,
A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA.

DRU J. MAYERS
RCE 38474

DATE

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

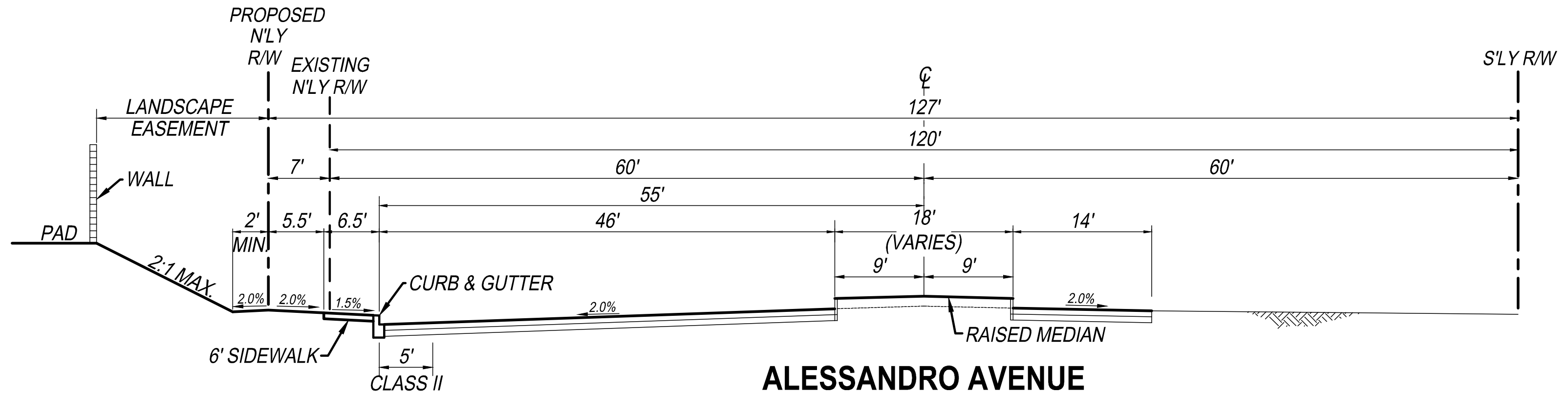
PRELIMINARY GRADING PLAN
TRACT 38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA

PEN21-0136

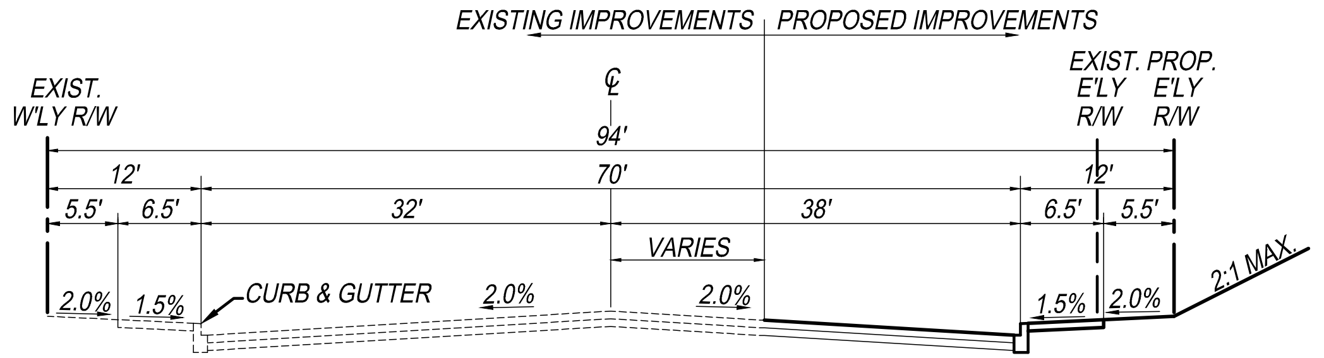
SHEET 1 OF 2

Dwg. Revision Date: **09/16/2021** BY: **J.C.** PLOT DATE: **10/21/2021**



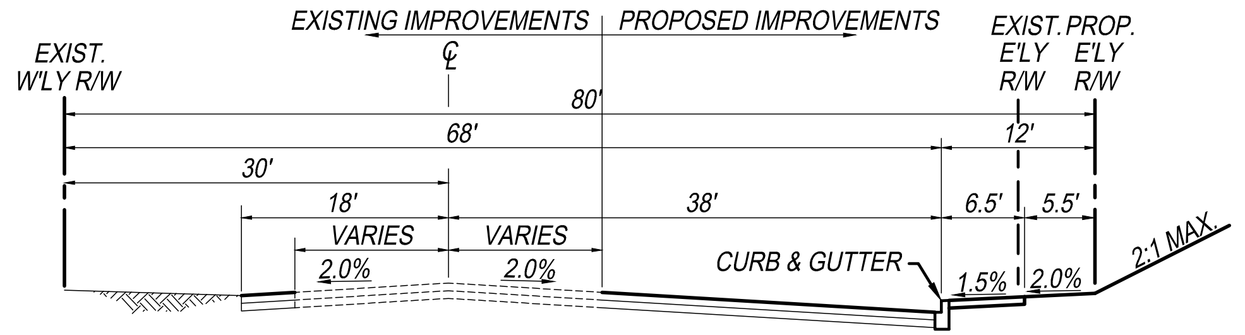
ALESSANDRO AVENUE

DIVIDED MAJOR ARTERIAL STD. NO. MVSI-101A-0
TYPICAL SECTION
N.T.S.



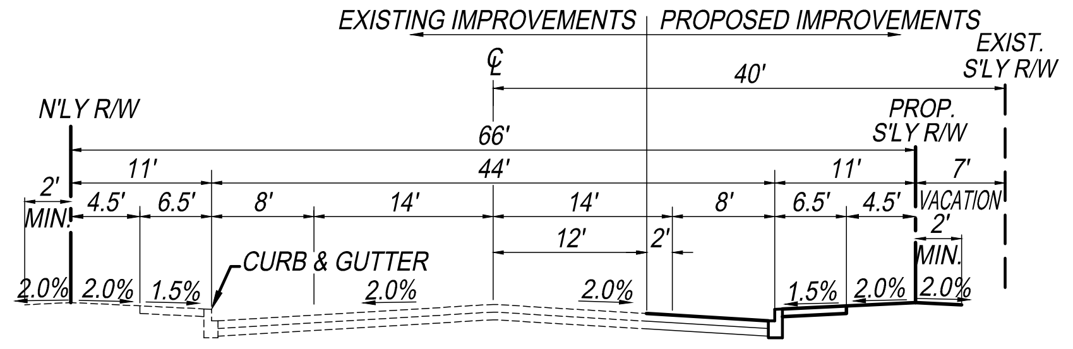
LASSELLE STREET

ARTERIAL STD. NO. MVSI-104A-0
TYPICAL SECTION
(BETWEEN BAY AVE. AND TIMO ST.)
N.T.S.



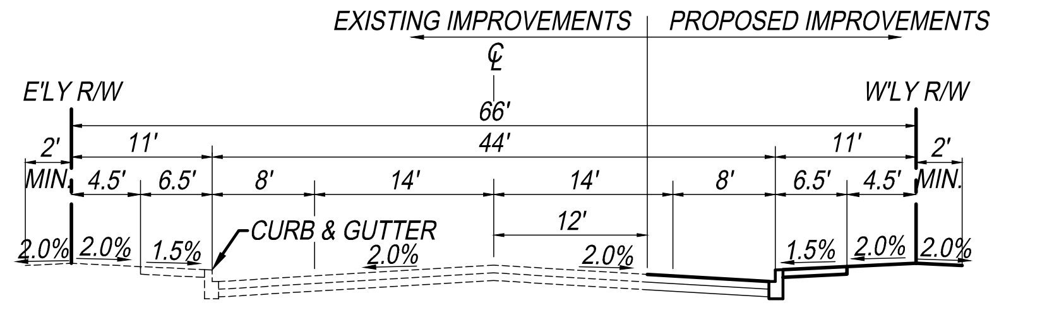
LASSELLE STREET

ARTERIAL STD. NO. MVSI-104A-0
TYPICAL SECTION
(BETWEEN TIMO ST. AND ALESSANDRO BLVD.)
N.T.S.



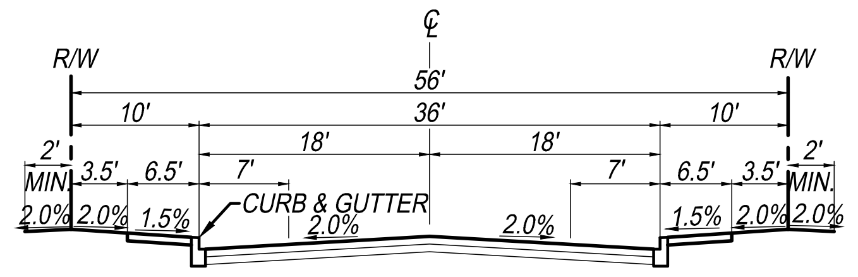
BAY AVENUE

COLLECTOR STD. NO. MVSI-106B-0
TYPICAL SECTION
N.T.S.



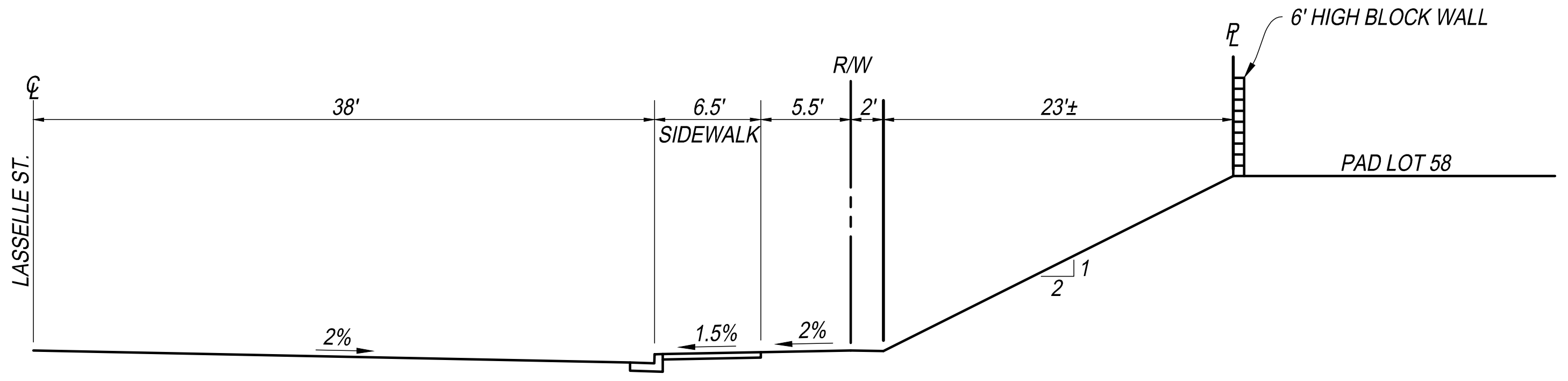
DARWIN DRIVE

COLLECTOR STD. NO. MVSI-106B-0
TYPICAL SECTION
N.T.S.



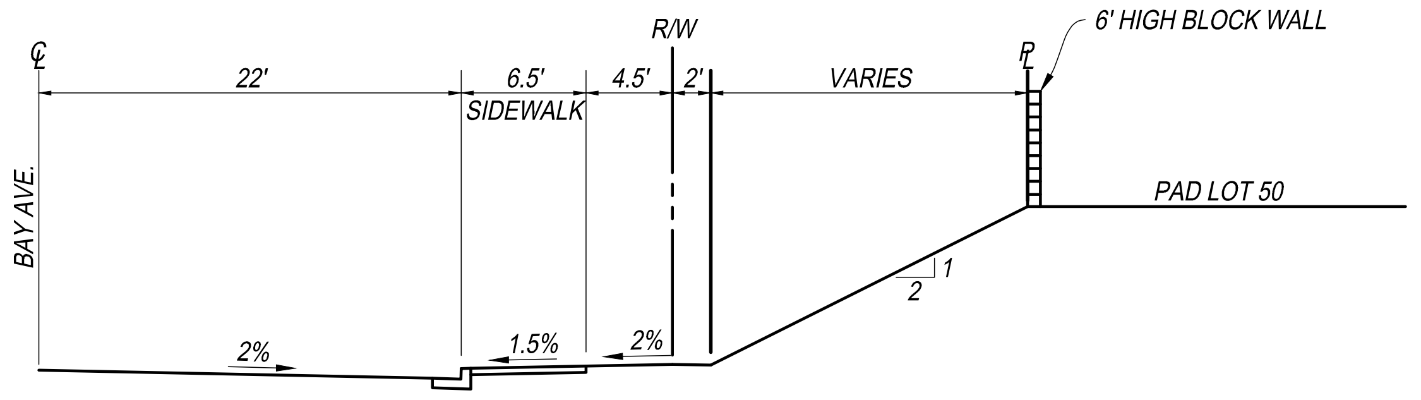
STREET "A" THRU "I" & BARBADOS LANE

SHORT LOCAL STREET STD. NO. MVSI-108B-0
TYPICAL SECTION
N.T.S.



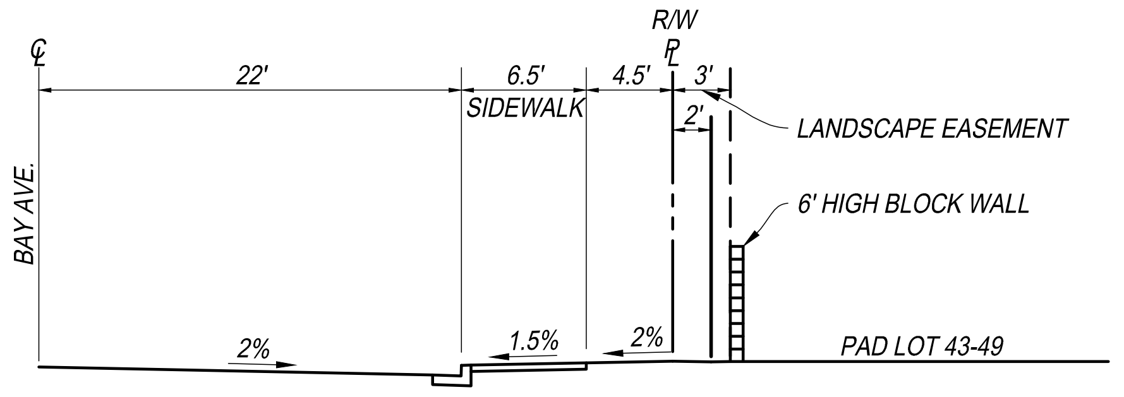
SECTION "A-A"

N.T.S.



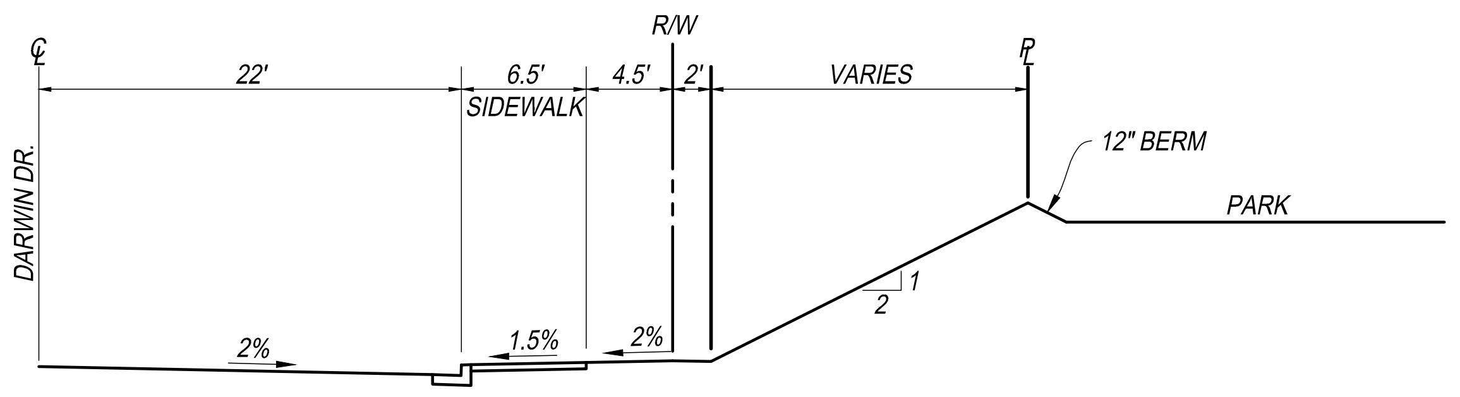
SECTION "B-B"

N.T.S.



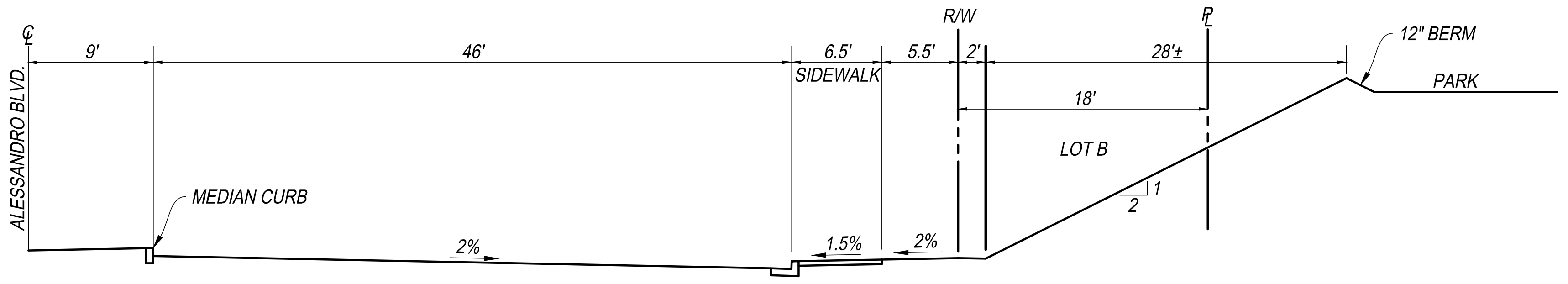
SECTION "C-C"

N.T.S.



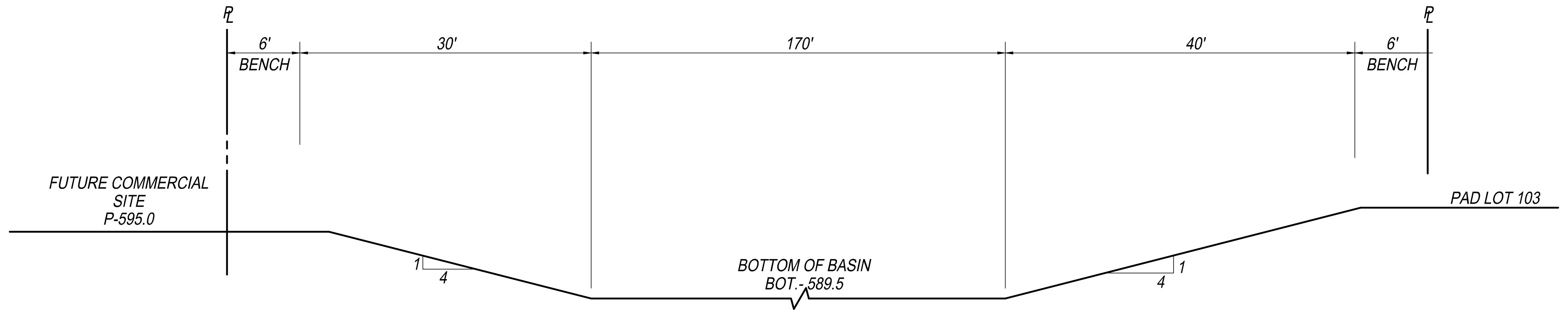
SECTION "D-D"

N.T.S.



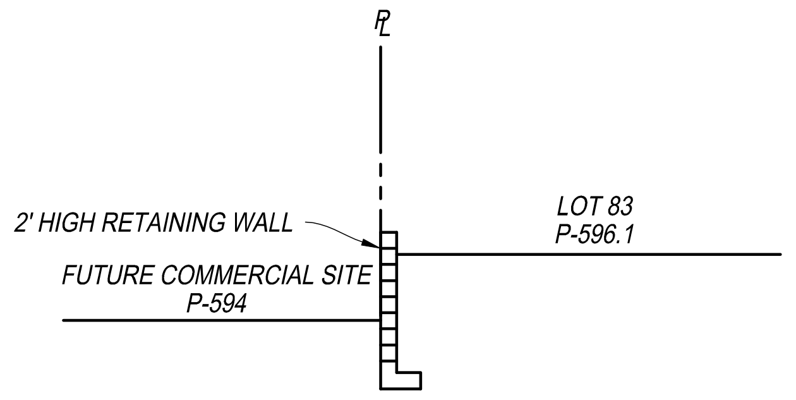
SECTION "E-E"

N.T.S.



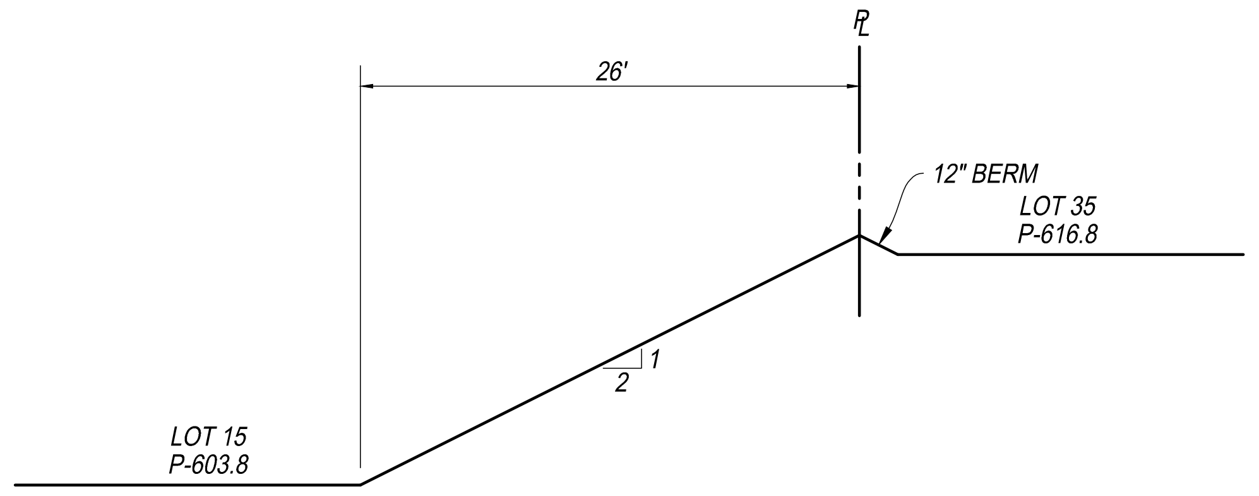
SECTION "F-F"

N.T.S.



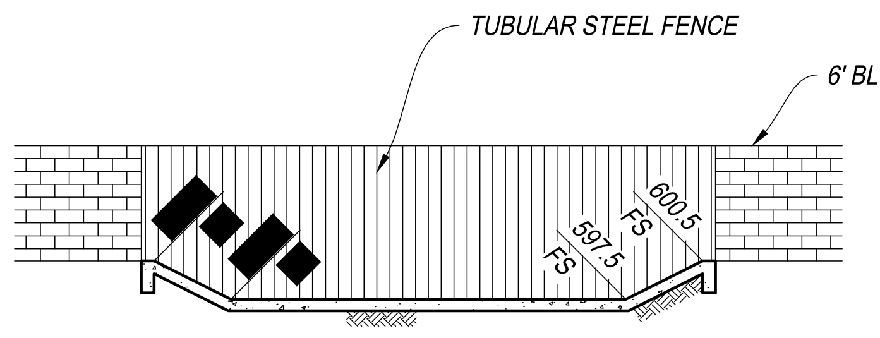
SECTION "G-G"

N.T.S.

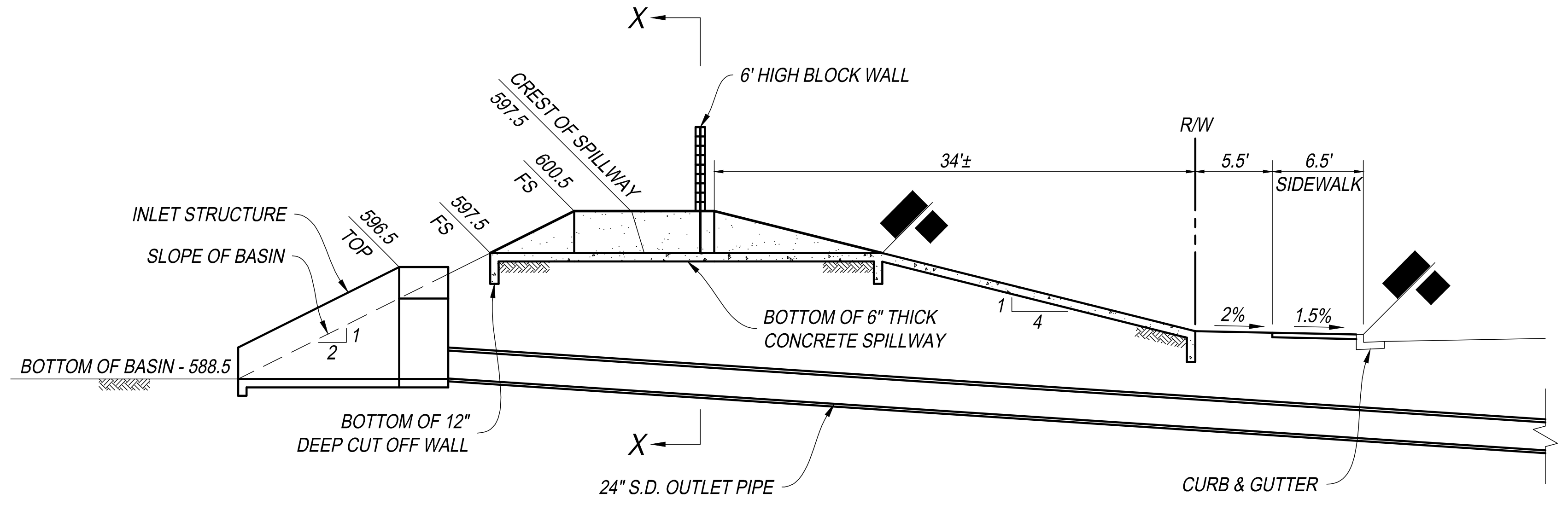


SECTION "H-H"

N.T.S.



SECTION "X-X"



SPILLWAY CROSS SECTION

LOT A BASIN

PRELIMINARY GRADING PLAN
TRACT 38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA
PEN21-0136
SHEET 2 OF 2

Dwg. Revision Date: **09/16/2021** BY: **J.C.** PLOT DATE: **10/21/2021**

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

Terracon
16662 Millikan Avenue
Irvine, California 92606
(949) 660-9718 Fax: (949) 660-9732

April 15, 2008

WinCo Foods, LLC
650 North Armstrong Place
Boise, Idaho 83704

Attention: Mr. Ty Morrison

Re: Double-Ring Infiltrometer Tests
Proposed WinCo Foods Store
NEC of Alessandro Boulevard and Lasselle Street
Moreno Valley, California
Terracon Project No. 60085004

As requested by Winco Foods, Terracon Consultants, Inc. (Terracon) has performed the infiltrometer/infiltration tests for the above reference project. The work was performed in general accordance with our Proposal No. D6008013, dated March 24, 2008, as authorized by Mr. Morrison. This report includes a brief description of the tests performed and test results including incremental infiltration rate with elapsed time plots.

Our scope of work included the following items:

- Three double-ring infiltrometer (ASTM D3385) tests;
- Two hand auger borings to depths varying between about 1.2 to 2.5 feet below ground surface at two test locations;
- Visual classification of materials encountered at the test locations; and
- Evaluation of test data and report preparation.

Double ring infiltration tests were performed at three locations as shown on the attached Site Diagram, Figure 1. At two test locations, pits were excavated by a skid steer loader to depths ranging between about 1.2 to 2.5 feet below ground surface. The test at the first location was conducted at the existing ground level. The double-ring infiltrometer tests were performed in general accordance with the procedures described in ASTM Test Method D3385.

Our personnel located the test locations by pacing distances and approximating right angles from the existing site features shown on the provided topographic layout plan. The ground surface elevations at the test locations were interpolated from the contour lines shown on the topographic layout plan and are shown on the Test Pit Logs attached to this report. The test locations shown on the Site Diagram and the ground elevations shown on the Test Pit Logs are approximate and should be considered accurate only to the degree implied by the method of location.

At the conclusion of the tests, the excavator backfilled the test pits with the original excavated materials. The soils were tracked into the excavation using the skid loader. The soils were not compacted to achieve a particular density, as we understand the material will be re-excavated during construction of the proposed infiltration basin.

The results of the infiltration tests, as well as the soil descriptions from the hand auger borings are presented as attachments of this report. Subsurface soil encountered in the test locations primarily consist of silty sand. Groundwater was not encountered in either of the hand auger borings.

Average infiltration rates are presented in the table below. The infiltration rates shown are for materials encountered at the base of each test site. Soil stratification and environmental factors (siltation, vegetation, etc) may affect the actual infiltration rate.

Test Location	Infiltration Rate, cm/hr (in/hr)
Test SB-1	0.64 (0.25)
Test SB-2	0.67 (0.26)
Test SB-3	0.53 (0.21)

If you have any questions regarding the test procedure and/or results or this report, please contact us at (949) 660-9718.

Sincerely,
Terracon

Jinny Park, EIT
Staff Engineer

Iqbal U. Mahmood, Ph.D., P.E.
Senior Geotechnical Engineer

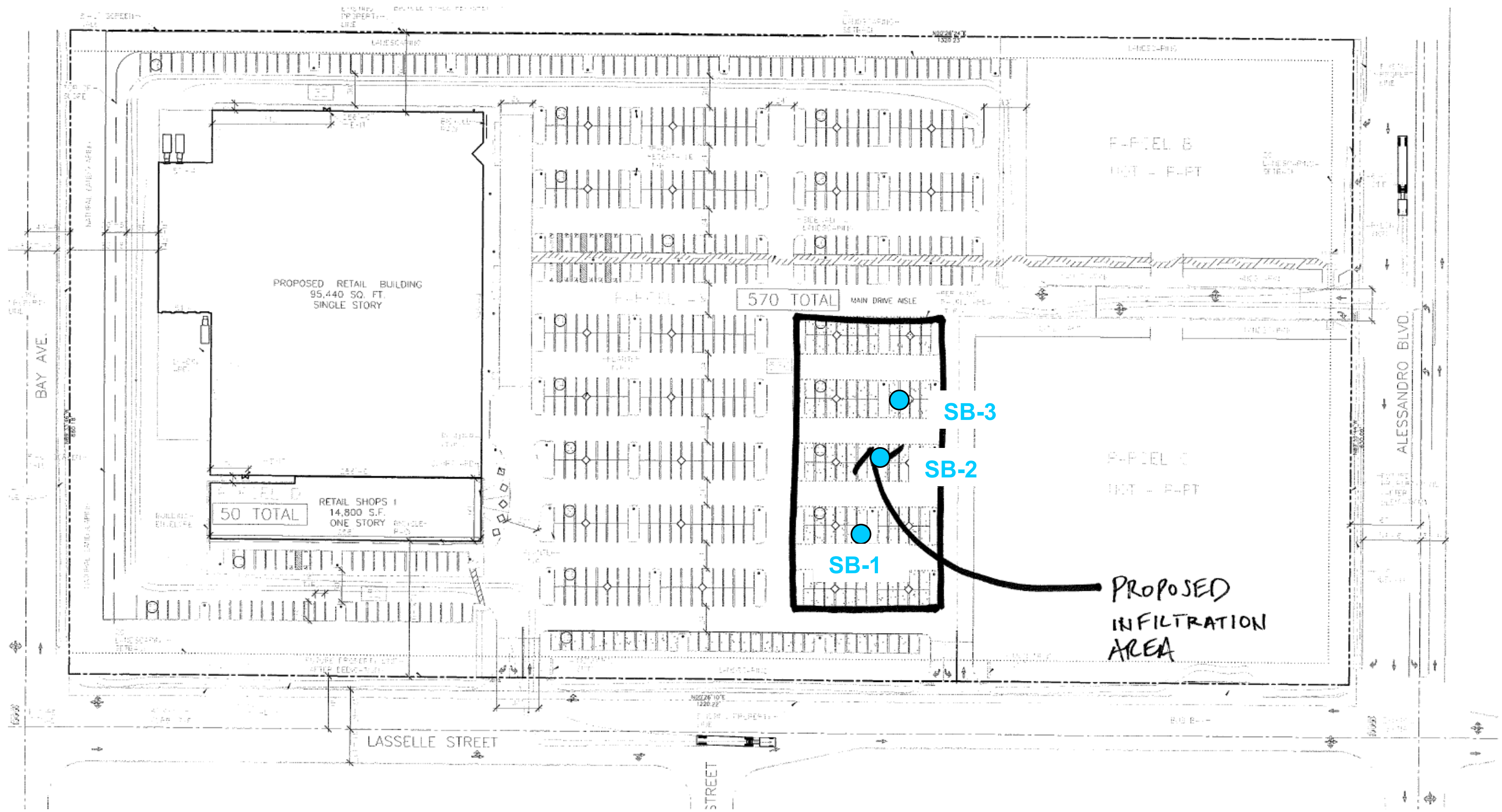
IQBAL U. MAHMOOD
No. 050306
EXP. 6/30/09

Reviewed and Approved by:

for

Michael E. Anderson, P.E.
Principal / Authorized Project Reviewer

Enclosures: Agreement for Services



LEGEND:

● B-3 SOIL SAMPLING LOCATION

N

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
NOT INTENDED FOR CONSTRUCTION PURPOSES.

SITE DIAGRAM
Winco Moreno Valley
Northeast Corner of Alessandro Blvd and Lasselle Stree
Moreno Valley, California
For Winco Foods, LLC

Project Mngr: IUM	Terracon 16662 Millikan Avenue Irvine, California 92606 949.660.9718 Fax: 949.660.9732	**Project No.**	60085004
Designed By: MAR		**Scale:**	Not to scale
Checked By: IUM		**Date:**	4/16/08
Approved By: IUM		**Drawn By:**	IP
File Name: \60085004\Figure 1		**Fi**	

LOG OF TEST PIT NO. SB-02

CLIENT **Winco Foods, LLC**	SITE **Alessandro Blvd and Lasselle Street** **Moreno Valley, CA**
ELEVATION **1586.8 feet**	PROJECT **WinCo Foods Store**

				SAMPLES				TESTS			
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	GRAPHICS	TYPE	RECOVERY, in.	N- FIELD BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LAB TESTING
▨	SILTY SAND - brown, dry, very hard, fine to coarse grained, top soil is calcified. - slightly damp, no calcification.	1 2	SM								
	Total depth of 2.5 feet. No groundwater encountered. Backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None	▼
WL	▼	▼
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	4-9-08
BORING COMPLETED	4-9-08
RIG Steer Loader	Logged by: MAR
JOB # 60085004	PLATE A-1

BOREHOLE SAMPLE BOTTOM BORING LOGS.GPJ TERRACON.GDT 4/16/08

LOG OF TEST PIT NO. SB-03

CLIENT **Winco Foods, LLC**	SITE **Alessandro Blvd and Lasselle Street Moreno Valley, CA**
ELEVATION **1588.3 feet**	PROJECT **WinCo Foods Store**

				SAMPLES				TESTS			
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	GRAPHICS	TYPE	RECOVERY, in.	N-FIELD BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, tsf	LAB TESTING
▨	SILTY SAND - brown, dry, very hard, fine to coarse grained, top soil is calcified. - slightly damp, no calcification.	1	SM								
	Total depth of 1.2 feet. No groundwater encountered. Backfilled with soil cuttings.										

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	∇ None	▼
WL	▼	▼
BORING LOCATION	See Boring Location Plan	

Terracon

BORING STARTED	4-9-08
BORING COMPLETED	4-9-08
RIG Steer Loader	Logged by: MAR
JOB # 60085004	PLATE A-2

BOREHOLE SAMPLE BOTTOM BORING LOGS.GPJ TERRACON.GDT 4/16/08

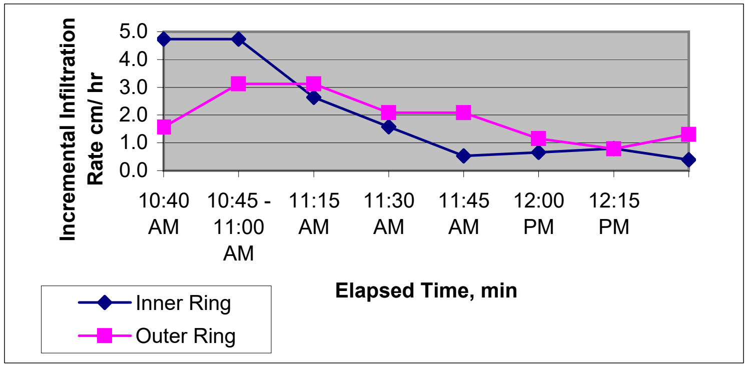
DOUBLE RING INFILTRATION TEST SUMMARY

Proposed WinCo Foods Store
Terracon Project No. 60085004, Report No. 1

Test No.: SB-1
Location: SW corner of lot
Depth (Elev.): 2.5' below grade
Technician: Mike Riggle
Date: 4/9/2008
Weather: Partly Cloudy
Liquid Type: Water

	Ring Size, cm.	Ring Penetration, cm.	Liquid Depth, cm.
Inner ring:	31.1	3.8	19.1
Outer ring:	58.4	5.1	19.1

Trial No.	**Time**	**Elapsed Time, min.**	**Incremental Time, min.**	**Inner Ring Volume, ml.**	**Outer Ring Volume, ml.**	**Infiltration Rate, cm/hr Inner Ring**	**Infiltration Rate, cm/hr Outer Ring**	**Temperature, °F**
	10:25 AM	0:00	-	-	-	-	-	69
1	10:40 AM	:15	15	900	750	4.7	1.6	69
2	10:45 - 11:00 AM	:30	15	900	1,500	4.7	3.1	69
3	11:15 AM	:45	15	500	1,500	2.6	3.1	69
4	11:30 AM	1:00	15	300	1,000	1.6	2.1	69
5	11:45 AM	1:15	15	100	1,000	0.5	2.1	69
6	12:00 PM	1:30	30	250	1,100	0.7	1.1	69
7	12:15 PM	1:45	15	150	375	0.8	0.8	69
8	12:30 PM	2:00	15	75	625	0.4	1.3	69
9	12:45 PM	2:15	15	150	1,125	0.8	2.3	69



Depth (ft)	**Soil Description**	**Moisture Content (%)**	**% Fines**
0"-8"	SILTY SAND- brown, dry, very hard, grades of fines to coarse grained sand, calcification of top soil.	4	
8"-30"	slightly damp, no signs of calcification.	8	

Comments:
Trial number 9 shows signs of seepage along outer ring, results are skewed.

Terracon
16662 Millikan Avenue
Irvine, California 92606

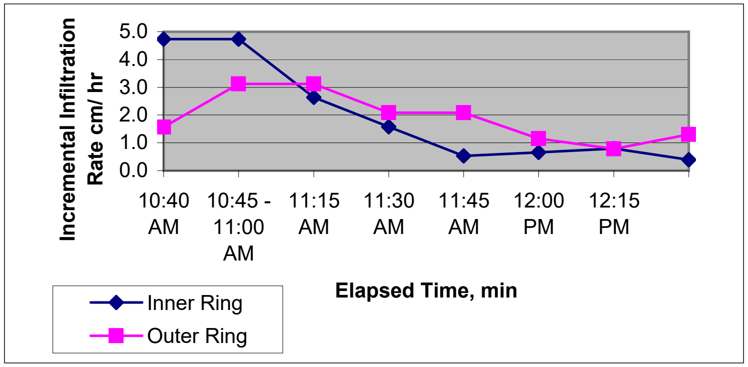
DOUBLE RING INFILTRATION TEST SUMMARY

Proposed WinCo Foods Store
Terracon Project No. 60085004, Report No. 1

Test No.: SB-2
Location: SW corner of lot
Depth (Elev.): 2.5' below grade
Technician: Mike Riggle
Date: 4/9/2008
Weather: Partly Cloudy
Liquid Type: Water

	Ring Size, cm.	Ring Penetration, cm.	Liquid Depth, cm.
Inner ring:	31.1	3.8	19.1
Outer ring:	58.4	5.1	19.1

Trial No.	Time	Elapsed Time, min.	Incremental Time, min.	Inner Ring Volume, ml.	Outer Ring Volume, ml.	Infiltration Rate, cm/hr Inner Ring	Infiltration Rate, cm/hr Outer Ring	Temperature, °F
	10:25 AM	0:00	-	-	-	-	-	69
1	10:40 AM	:15	15	900	750	4.7	1.6	69
2	10:45 - 11:00 AM	:30	15	900	1,500	4.7	3.1	69
3	11:15 AM	:45	15	500	1,500	2.6	3.1	69
4	11:30 AM	1:00	15	300	1,000	1.6	2.1	69
5	11:45 AM	1:15	15	100	1,000	0.5	2.1	69
6	12:00 PM	1:30	30	250	1,100	0.7	1.1	69
7	12:15 PM	1:45	15	150	375	0.8	0.8	69
8	12:30 PM	2:00	15	75	625	0.4	1.3	69
9	12:45 PM	2:15	15	150	1,125	0.8	2.3	69



Depth (ft)	Soil Description	Moisture Content (%)	% Fines
0"-8"	SILTY SAND- brown, dry, very hard, grades of fines to coarse grained sand, calcification of top soil.	4	
8"-30"	slightly damp, no signs of calcification.	8	

Comments:
Trial number 9 shows signs of seepage along outer ring, results are skewed.

Terracon
16662 Millikan Avenue
Irvine, California 92606

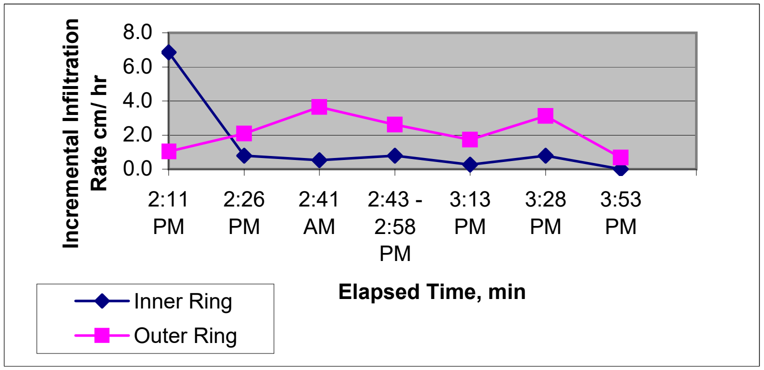
DOUBLE RING INFILTRATION TEST SUMMARY

Proposed WinCo Foods Store
Terracon Project No. 60085004, Report No. 1

Test No.: SB-3
Location: SW corner of lot
Depth (Elev.): 14" below grade
Technician: Mike Riggle
Date: 4/9/2008
Weather: Partly Cloudy
Liquid Type: Water

	Ring Size, cm.	Ring Penetration, cm.	Liquid Depth, cm.
Inner ring:	31.1	3.8	20.3
Outer ring:	58.4	5.1	20.3

Trial No.	Time	Elapsed Time, min.	Incremental Time, min.	Inner Ring Volume, ml.	Outer Ring Volume, ml.	Infiltration Rate, cm/hr Inner Ring	Infiltration Rate, cm/hr Outer Ring	Temperature, °F
	1:56 PM	0:00	-	-	-	-	-	69
1	2:11 PM	:15	15	1,300	500	6.8	1.0	69
2	2:26 PM	:30	15	150	1,000	0.8	2.1	69
3	2:41 AM	:45	15	100	1,750	0.5	3.6	69
4	2:43 - 2:58 PM	1:00	15	150	1,250	0.8	2.6	69
5	3:13 PM	1:15	15	50	825	0.3	1.7	69
6	3:28 PM	1:30	15	150	1,500	0.8	3.1	69
7	3:53 PM	1:45	15	0	325	0.0	0.7	69



Depth (ft)	Soil Description	Moisture Content (%)	% Fines
0"-8"	SILTY SAND- brown, dry, very hard, grades of fines to coarse grained sand, calcification of top soil.	4	
8"-14"	slightly damp, no signs of calcificati	8	

Comments:
Trial number 6 shows signs of seepage along outer ring, results are skewed.

Terracon
16662 Millikan Avenue
Irvine, California 92606

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

UPDATED GEOTECHNICAL EVALUATION

PROPOSED SINGLE-FAMILY RESIDENTIAL DEVELOPMENT

APN 487-470-025, WINCO SITE

NORTHEAST OF ALESSANDRO BOULEVARD AND LASSELLE AVENUE INTERSECTION

CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

D.R. HORTON LOS ANGELES HOLDING COMPANY, INC.
2280 WARDLOW CIRCLE, SUITE 100
CORONA, CALIFORNIA 92880

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92880

PROJECT NO. 2438-CR

AUGUST 27, 2020

GEOTEK

GEOTEK
GeoTek, Inc.
1548 North Maple Street, Corona, California 92880
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

August 27, 2020
Project No. 2438-CR

D.R. Horton Los Angeles Holding Company, Inc.
2280 Wardlow Circle, Suite 100
Corona, California 92880

Attention: Ms. Megan Whieldon

Subject: Updated Geotechnical Evaluation
Proposed Single-Family Residential Development
APN 487-470-025, Winco Site
Northeast of Alessandro Boulevard and Lasselle Avenue Intersection
City of Moreno Valley, Riverside County, California

Dear Ms. Whieldon:

We are pleased to provide the results of our updated geotechnical evaluation for the subject project located northeast of the Alessandro Boulevard and Lasselle Street intersection in the city of Moreno Valley, Riverside County, California. This report presents the results of our evaluation and discussion of our findings.

In our opinion, site development appears feasible from a geotechnical viewpoint. Final site development and grading plans should be reviewed by this firm as they become available, as it will be necessary to provide appropriate recommendations for intended specific site development as those plans become refined.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

EDWARD H. LaMONT
No. 1892

GABY M. BOGDANOFF
NO. 3133

Gaby Bogdanoff

Edward H. LaMont
CEG 1892, Exp. 07/31/22
Principal Geologist

Gaby M. Bogdanoff
GE 3133, Exp. 06/30/22
Project Engineer

KYLE R. MCHARGUE
9790

Kyle R. McHargue
PG 9790, Exp. 02/28/22
Project Geologist

Distribution: (1) Addressee via email

G:\Projects\2401 to 2450\2438CR DR Horton Alessandro and Lasselle Ave Winco Site Moreno Valley\Rock Hardness Investigation\2438CR Updated Geotechnical Evaluation Winco Project.doc

TABLE OF CONTENTS

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS

ENCLOSURES

Figure 1 – Site Location Map
Figures 2a & b – Exploration Location Maps

Appendix A – Exploratory Boring Logs, Seismic Refraction Traverses, and Laboratory Test Results by EGA Consultants (2006)
Appendix B – Logs of Exploratory Trenches and Borings by GeoTek
Appendix C – Seismic Refraction Survey Results by GeoTek
Appendix D – Results of Laboratory Testing by GeoTek
Appendix E – Soil Corrosivity Study
Appendix F – General Grading Guidelines

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the general geotechnical conditions on the site and provide updated geotechnical recommendations as deemed appropriate. Services for this study included the following:

- Research and review of available geologic and geotechnical data, and general information pertinent to the site,
- Review of the referenced *Geotechnical Investigation,* prepared by EGA Consultants (2006),
- Perform a reconnaissance of the site,
- Excavation of eleven exploratory trenches and five exploratory borings to assess general subsurface soil conditions of the property,
- Site evaluation of rock hardness via a seismic refraction survey, performed by a subconsultant,
- Collection of relatively undisturbed and bulk samples of the onsite materials including samples for corrosion evaluation,
- Laboratory testing of selected soil samples,
- A corrosion study for the property,
- Review and evaluation of site seismicity, and
- Compilation of this updated geotechnical evaluation report which presents our findings, conclusions, and recommendations for the site development.

The intent of this report is to aid in the evaluation of the site for future development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report will likely need to be updated based on our review of final site development plans. These should be provided to GeoTek for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The site consists of a rectangular-shaped property located northeast of the Alessandro Boulevard and Lasselle Street intersection in the city of Moreno Valley, Riverside County, California. The site encompasses approximately 17.6 acres of vacant undeveloped land and is identified with Riverside County Assessor's Parcel Number (APN) 487-470-025. The general location of the site is shown in Figure 1.

Based on review of available maps, information provided within the referenced reports and observations at the time of our recent site reconnaissance, the site consists of vacant land with a light to moderate growth of dry weeds and brush and some dispersed trees and bushes. A 10-foot ± tall stockpile of soil was observed near the northeastern region of the site (area of Boring B-13 by EGA Consultants and Trench T-5 by GeoTek). The site also has some visible trash and litter.

The site presents various knobs of exposed granitic bedrock predominantly located within its northern half portion. Generally, site elevations range from approximately 1,626 feet above mean sea level (amsl) located in the north-northeast edge of the site and lowest ground elevation of 1,585 feet amsl towards the southwestern corner. Surface drainage is to the south-southwest.

The site is bounded by Alessandro Boulevard and vacant land to the south, Lasselle Street, single-family homes and vacant land to the west, a vacant parcel to the east, and Bay Avenue and single-family homes to the north.

2.2 PROPOSED DEVELOPMENT

According to the referenced *Lotting Study Plan and Cut/Fill Plan,* both prepared by Proactive Engineering Consultants West, Inc., plot date July 31, 2020, site development includes the grading and construction of 90 single-family residential lots, a water quality basin, an open space, underground utilities, and street improvements. Cuts and fills up to 18 and 15 feet, respectively, are anticipated to be required to reach design grades. Also, cut and fill slopes up to about 7 feet in height and at 2:1 (h:v) maximum gradients as well as retaining walls are expected. Plans for utility construction were not available at the time of this review. However,

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

it is our assumption that the deepest utility proposed will be the sewer line at a depth of approximately 8 feet below street grade.

A water quality basin is also proposed within the southeastern portion of the property. Cuts on the order of 5 feet are expected to be required to reach the proposed basin bottom. However, it is currently unknown whether the basin will be utilized for infiltration or storage. As such, infiltration testing was not included as a part of this evaluation.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Final site development plans should be reviewed by GeoTek when they become available. Additional geotechnical field exploration, analyses, and recommendations may be necessary upon review of site development plans.

Copies of the Lotting Study Plan and Cut/Fill Plan are presented as Figures 2a and 2b.

3. REPORT REVIEW

GeoTek reviewed previous reporting by EGA Consultants, LLC. (EGA) titled *Geotechnical Investigation, for 17.7 Acre Proposed Mixed Use Commercial and Residential Property, Located at Northeast Corner of Alessandro Boulevard and Lasselle Street, Moreno Valley, California*, dated May 10, 2006. The study included hollow-stem auger borings and a seismic refraction rippability assessment. Twenty borings were excavated to a maximum depth of 36 feet below existing ground surface. The seismic refraction survey consisted of three 156-foot long seismic traverses.

EGA described the subsurface soil conditions at the site as being fill and/or topsoil underlain by igneous bedrock. The fill/topsoil was encountered in the majority of the borings to average depths of 2 to 3 feet with exception of the area of Boring B-13 (located in the northeast portion of the site) where the fill extended to 13 feet below grade. The fill soils consisted generally of light brown and gray, dry, loose silty sands. Underlying the fill/topsoil materials was igneous bedrock in all test borings by EGA. The bedrock was described as Cretaceous-age bedrock consisting primarily of very coarse grained crystalline tonalite, that is well-foliated and massive. The expansion index of the fill and the granitic bedrock was determined to be "very low" according to EGA.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Groundwater was not encountered by EGA to an explored depth of 36 feet below existing ground surface. EGA stated that the regional groundwater level is estimated to be greater than 50 feet below grade.

EGA stated that no traces of active faults have been mapped onsite. Additionally, secondary seismic hazards such as liquefaction was considered "nil". EGA also stated that expansive clays and landsliding do not appear to be evident at the subject site.

Based on the data from their seismic refraction traverses, EGA concluded that the upper 10 feet to 20 feet of site strata is considered weathered and rippable using conventional grading equipment (specified as D9R dozer with a multi- or single-shank ripper). EGA also stated that there were areas of non to marginally rippable bedrock, particularly at seismic line "S-1". EGA concluded that some light blasting may be required to achieve desired grade.

A copy of the boring logs, seismic refraction lines, and laboratory test results by EGA (2006) are presented in Appendix A of this report.

GeoTek received reporting by Leighton and Associates (Leighton) on the adjacent property to the east titled *Geotechnical investigation for Due-Diligence Purposes, 20-Acre, 74-Lot tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California*, dated April 22, 2005. Leighton's field investigation consisted of four hollow-stem auger borings, ten backhoe test pits, four D9R bulldozer test pits and a seismic refraction rippability study. The borings were excavated to a depth of 20 feet below grade, and the backhoe test pits were excavated to a maximum depth of 10 feet. The seismic refraction survey consisted of five seismic refraction lines about 250-foot long each.

Leighton's described the site subsurface conditions as granitic bedrock overlain by a thin veneer of alluvial and colluvial soils. The lower-lying areas, particularly in the central portions of the site have thicker accumulations of alluvial soils. The alluvial soils encountered were generally 2-3 thick and consisted of loose to very dense gravelly sand to silty sand. Also encountered was medium stiff to very stiff sandy silt. Locally deeper alluvium encountered in the central portion of the site ranged from approximately 4 to 10 feet in thickness. Granitic bedrock of tonalite composition was encountered below the alluvium and at the ground surface at some areas throughout the site.

The alluvial soils in the upper 5 to 10 feet were described as slightly compressible with a low collapse potential. Leighton recommended partial removal and recompaction of these soils. Representative sample of subsurface soils indicated an expansion index of 7 and 13 (very low), soluble sulfate content was described as negligible, and corrosivity testing indicated the onsite soils is considered severely corrosive to ferrous metals.

Groundwater was not encountered by Leighton to an explored depth of 20 feet below existing ground surface. A water seepage was reportedly encountered by Leighton in one of their trenches which was likely caused by recent rains and low topographic relief of the area. Leighton stated that the historic high groundwater level is estimated to be about 110 feet below the existing ground surface.

Leighton stated that no traces of active or potentially active faults have been mapped onsite and the potential for fault-induced ground rupture at the site is considered very low. Additionally, secondary seismic hazards such as liquefaction and seismically induced settlement were described as very low and minor, respectively.

Leighton used backhoe test pits, bulldozer test pits and a seismic refraction survey to assess rippability onsite of the onsite bedrock. The backhoe test pits generally encountered refusal on hard materials after 2 to 3 feet below ground surface. The bulldozer test pits utilized a D9R dozer with 32-inch rippers. The dozer was generally able to excavate to 10 feet below ground surface. However, at deeper depths it required heavy ripping and cross-ripping. Also, along the western half of the southern boundary the bulldozer test pit encountered refusal at 2 feet below grade. The seismic refraction survey conducted for Leighton concluded that granitic material was weathered and/or fractured to a depth of approximately 40 to 60 feet throughout the site. In light of the dozer test pits, Leighton concluded that cuts on the order of 5 to 10 feet deep in the elevated areas of the site can generally be made without the need for blasting; although floaters may be difficult to excavate. Additionally, deeper cuts are expected to require blasting, particularly the southwest corner of the site.

4. FIELD EXPLORATION, LABORATORY TESTING, AND CORROSION TESTING

4.1 FIELD EXPLORATION

GeoTek investigated the project site via exploratory trenches and borings which were performed between July 14, 2020 and July 17, 2020. The trenching exploration consisted of eleven trenches to depths ranging from 2 to 18 feet and were excavated to log the subsurface materials and examine the rippability and/or hardness of localized areas throughout the site.

The boring exploration consisted of drilling five exploratory borings to approximately 18 to 20 feet below grade. The trenches were excavated utilizing a Western SK500 excavator, and the borings were drilled with a track-mounted hollow-stem auger drill rig.

Also, a seismic refraction survey was conducted on July 28, 2020 by a subconsultant (Subsurface Surveys & Associates, Inc.). The seismic refraction survey involved the recording and measuring of man-made energy waves from six seismic refraction and tomography lines placed in site areas where deep excavations are proposed. The seismic survey summary report is included in Appendix C.

The approximate locations of our site explorations are shown on the Exploration Location Maps, Figures 2a and 2b. Logs of the borings by EGA, in addition to the borings, trenches and seismic refraction lines by GeoTek are provided in Appendices A and B, respectively.

4.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively bulk soil and bedrock samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the subsurface materials encountered and to evaluate the soil/bedrock physical properties for use in the engineering design and analysis. Our test results along with a brief description and relevant information regarding testing procedures are included in Appendix D.

4.3 CORROSION TESTING

GeoTek collected a total of 12 samples across the site from the upper one foot. The samples were taken to the laboratory to be evaluated for their corrosion potential. The locations of the samples obtained for the site are shown on the Exploration Location Map, Figures 2a and 2b. The results of corrosion tests are presented in Appendix E.

5. GEOLOGIC AND SOILS CONDITIONS

5.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends from the point of contact with the Transverse Ranges geomorphic province, southerly to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are mostly found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province, and the San Jacinto fault borders the province adjacent the Colorado Desert province.

More specific to the subject property, the site is located in an area geologically mapped by others to be underlain by granitic bedrock of quartz diorite to granodiorite (Dibblee, T.W. and Minch, J.A., 2003). The regional geologic maps noted the general trend of foliations in the bedrock had a northwest-southeast orientation and a 50-degree to 50-degree inclination to the northeast. Locally, one trend of foliations in the bedrock had a northeast-southwest orientation with no defined inclination.

No active faults are shown in the immediate site vicinity on the maps reviewed for the area. The site is not located within an Earthquake Fault Zone (Alquist-Priolo) as designated by the State of California. The Riverside County website (https://gis.countyofriverside.us/) has designated the site as "not in a fault zone", "not in a fault line", having "low" potential for liquefaction, and "susceptible" to subsidence.

5.2 EARTH MATERIALS

A brief description of the earth materials reported to be on the site by EGA (2006) and encountered in our explorations is presented in the following sections.

5.2.1 Undocumented Fill

Undocumented fill materials were observed stockpiled within the north-central portion of the site (area of trench T-5 and boring B-13, Figure 2). The fill stockpile has a height of about 10 feet. Our trench T-5 and boring B-13 by EGA also noted that the undocumented fill extends to approximately 13 feet below grade. Trench T-3 excavated west of this area also noted about 5 feet of fill below grade. These materials consist of silty sand which has various shades of brown and gray in color, slightly moist to moist, and is in loose condition, based on our field observations. The fill materials apparently were originated from the previous use of the property as a borrow site back in the 1990's.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

5.2.2 Alluvium

Alluvium was encountered in our exploratory trenches T-6, T-7, T-8 and T-11 and boring B-5, which were excavated within the southwestern portion of the site. These materials consist of silty sand and extended from the ground surface to depths of about 2 to 7 feet. The alluvium was brown and red in color, dry to moist, and loose to medium dense, based on our field observations.

5.2.3 Granitic Bedrock

Granitic bedrock was observed at the property as rock outcrops or encountered in site explorations at typical depths of 0 to 7 feet and in some areas as deep as approximately 13 feet. Also, bedrock materials were found at or near the ground surface in the seismic refraction lines placed at the site by our firm. The regional geologic map shows the bedrock is foliated, generally in a northwest/southeast orientation with inclinations ranging from 50 degrees to 80 degrees to the northeast.

The on-site bedrock consists of tonalite and quartzite which is moderately to highly weathered within its upper portions and is recovered as grayish brown, brownish gray and gray fine to coarse sand when excavated. The bedrock becomes less weathered with depth. All our exploratory trenches (with exception of trench T-10) experienced refusal due to hard granitic bedrock at depths between 2 and 16 feet. However, highly weathered and fractured bedrock was encountered in trench T-10 near the southeastern end of the site which was excavated to a maximum depth of 18 feet without experiencing refusal.

The seismic refraction survey generally identified three zones of subsurface materials. The uppermost zone comprises mostly soil and colluvium and is estimated to extend up to 5 feet below grade. The middle zone was noted to correspond to highly weathered to weathered bedrock to depths ranging from 5 to 24 feet with velocities ranging from 2,691 to 4,910 fps. The bottom zone was noted to comprise less weathered bedrock with velocities ranging from 5,705 to 7,925 fps. Tomographic models conducted for selected seismic lines confirm that the seismic velocity (hardness) of the rock increases with depth. No evidence of hardrock floaters were noted on the topographic models, although some anomalies were noted.

To estimate the approximate depth to rippable bedrock and rippable trenching (utility construction) using the seismic refraction data collected at the site, we have utilized cut-off velocities of 5,000 fps and 3,800 fps, respectively. We have also used our field observations during the excavation of the recent site trenches and borings. Based on the above and per the proposed grades shown on the referenced *Cut/Fill Site Plan* (Proactive, 2020) and assuming a maximum wet utility depth of 8 feet below street grade and over-excavation of about 5 feet deep for cut lots into bedrock, we estimate that grading operations within the northwestern, elevated portions of the site will encounter marginally rippable bedrock. Hard, marginally rippable bedrock is anticipated to exist in that area at general depths ranging from 5 to 15 feet. While these materials may still be rippable with a Caterpillar D-9 Ripper, excavations may be slow and blasting or other excavation techniques could be more cost-effective.

Similarly, very difficult to non-rippable trenching was encountered in the areas of Lines 9 and 10 and Trenches T-2 and T-3 starting at 5 to 10 feet below existing grade. All these areas are also located within the northwestern portion of the site.

The seismic refraction traverses performed by EGA (2006) within the northwestern region also indicated marginally rippable bedrock near the southern end of traverse 1 at or very near the ground surface and marginally rippable bedrock starting at depths of about 5 to 10 feet for traverses 2 and 3.

Results of the seismic refraction survey are provided in Appendix C.

The surficial site materials were tested and found to have a “very low” expansion potential.

Detailed logs of the subsurface conditions of the site are presented in Appendices A and B.

5.3 SURFACE WATER AND GROUNDWATER

5.3.1 Surface Water

Surface water was not noted during our field work. If encountered during earthwork construction, surface water on this site is the result of precipitation or possibly some minor surface run-off from immediately surrounding properties. Overall site area drainage is generally to the south-southwest, as directed by site topography. Provisions for surface drainage will need to be accounted for by the project civil engineer.

5.3.2 Groundwater

Groundwater was not encountered in any of our exploratory borings or trenches excavated to a maximum depth of 20 feet. Groundwater was not encountered by EGA to an explored depth of 36 feet below existing ground surface. EGA stated that the regional groundwater level is estimated to be greater than 50 feet below the existing ground surface.

The California Department of Water Resources, Water Data Library, indicates that the groundwater depth for a well (State Well No. 03S03W15F001S) is greater than 100 feet below ground surface. The well is located approximately 1.5 southeast of the site. Based on the above, groundwater is not anticipated to be a factor during the site grading. However, seasonal perched groundwater may be encountered during grading within the lower elevations of the site.

GeoTek should review grading plans once available to determine if groundwater is anticipated to adversely affect the proposed developments.

5.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is known to exist at this site nor is the site situated within a State of California designated *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007; CGS, 1986).

The County of Riverside has designated the site as "not in a fault zone" and "not in a fault line."

5.4.1 Seismic Design Parameters

The site is located at approximately 33.9192 Latitude and -117.2077 Longitude. Site spectral accelerations (S_a and S_1), for 0.2 and 1.0 second periods for a Class "C" site, were determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. Due to the presence of shallow bedrock, a Site Class C is considered appropriate. The results are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	1.755g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.687g
Site Coefficient for Site Class "C", F_a	1.2
Site Coefficient for Site Class "C", F_v	1.4
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	2.107g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.962g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.404g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.641g
Site Modified Peak Ground Acceleration, PGA_M	0.891g

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

5.4.2 Surface Fault Rupture

The site is in a seismically active region; however, no active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone (Bryant and Hart, 2007). No faults are identified on geologic maps readily available and reviewed by this firm for the immediate study area. The nearest known active fault zone is the Elsinore Fault - Glen Ivy Section located approximately 8.5 miles southwest of the site. Therefore, the potential for surface rupture at the site is considered negligible.

5.4.3 Liquefaction and Seismically Induced Settlement

The County of Riverside has designated the site having "low" liquefaction potential, and "susceptible" to subsidence.

Liquefaction is not considered to be a hazard at the subject site due the presence of shallow bedrock materials. Also, the potential for seismically induced settlement at the property is considered to be nil because of the minimal thickness of soil atop bedrock.

5.4.4 Other Seismic Hazards

Evidence of ancient landslides or slope instabilities at this site was not observed during our investigation. Thus, the potential for landslides is considered negligible.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

Development of the site appears feasible from a geotechnical viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

6.2 EARTHWORK CONSIDERATIONS

6.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Moreno Valley, the 2019 California Building Code (CBC), and recommendations contained in this report. The General Grading Guidelines included in Appendix F outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix F.

Final site grading plans should be reviewed by this office when they become available. Additional recommendations will likely be offered subsequent to review of these plans.

6.2.2 Site Clearing

Site preparation should start with removal of any existing improvements, deleterious materials, and vegetation within the planned development areas of the site. These materials should be properly disposed of off-site.

6.2.3 Remedial Grading

All undocumented fill, topsoil, loose alluvium, and highly weathered bedrock should be removed to expose competent native materials. Competent native materials are defined as either alluvium which is not visibly porous having and in-place compaction of at least 85 percent of the soil's maximum dry density (per ASTM D 1557) or firm, unyielding bedrock. A representative of this firm should observe and approve the bottom of all excavations.

Based on the data available, removals generally on the order of two to three feet (and up to five feet within alluvial areas) from existing grade or to a minimum of three feet below proposed grades, whichever is greater, should be performed below structural areas in fill. Actual depths of removal/over-excavation should be determined in the field based on observation and in-place density testing. As a minimum, removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of five feet laterally, whichever is greater. The bottom of the removals should be graded to drain toward the front of the lot at a gradient of at least two percent.

In order to facilitate footing excavation and installation of house services, consideration should be given to overexcavate cut lots to a minimum depth of five feet below proposed grades. We recommend that the entire lot be over-excavated. The bottom of the overexcavation should be graded to drain toward the front of the lot at a gradient of at least two percent.

To prevent potential differential settlement, the cut portions of transition (i.e. cut/fill) lots should be overexcavated a minimum of five feet below proposed grades or to a depth of one-half of the maximum fill thickness on the lot, whichever is greater. The horizontal extent of over-excavation could comprise the entire lot or extend at least five feet outside the structural area, or a distance equal to the depth of overexcavation below the bottom of the structural elements, whichever is greater. Overexcavation bottoms should be graded to drain toward the front of the lot (two percent minimum).

We also recommend that utility alignments be overexcavated to at least one foot below the depth of the lowest underground utility.

The approved removal/over-excavation bottom exposed should then be scarified to a depth of about six inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density, per ASTM D 1557.

6.2.4 Engineered Fill

The onsite materials are considered suitable for reuse as engineered fill provided the materials are free from vegetation, roots, and rock/hard lumps greater than six inches in maximum dimension.

The undercut areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in six- to eight-inch loose lifts, moisture conditioned to the optimum moisture content, and compacted to a minimum relative compaction of 90 percent as determined by ASTM D 1557. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

Our site excavations observed that the bedrock generally breaks into silty sand soils less than six inches in maximum dimension. However, if oversized materials (greater than six inches) are generated from cuts into bedrock, the oversized rock should be placed scattered (windrows) on site as detailed in Appendix F. Alternatively, oversized rock could be disposed of offsite or stockpiled on site and crushed for future use.

6.2.5 Excavation Characteristics

The preliminary *Site Cut/Fill Plan* (Proactive, 2020) indicates that the deepest cuts (up to 18 feet) are proposed to be conducted within the northwestern region of the site. The results of the seismic refraction survey (Appendix C) and our trenching and boring exploration suggest that bedrock materials marginally rippable with a Caterpillar D9R Ripper may be encountered within this zone starting at general depths of about 5 to 15 feet.

Similarly, the data suggests that very difficult to non-rippable trenching conditions may be experienced within the future utility areas located within the cited zone starting at depths of 5 to 10 feet, due to hard unweathered bedrock. Localized blasting, chipping to dislocate and remove corestones, or other special techniques may be warranted.

The seismic refraction traverses performed by EGA (2006) within the northwestern region also indicated marginally rippable bedrock near the southern end of traverse 1 at or very near the ground surface and marginally rippable bedrock starting at depths of about 5 to 10 feet for traverses 2 and 3.

Excavation of undocumented fill, alluvial deposits, and granitic bedrock (with exception of the northwestern region) to the design elevations is expected to be generally feasible with heavy-duty grading equipment in good operating condition. All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for cuts less than ten feet in height.

6.2.6 Slope Construction

An engineering geologist should observe all cut slopes. Cut slopes should expose competent bedrock. If adverse structure or incompetent materials are exposed and identified in the cut slopes, stabilization fills may be recommended.

Fill slopes constructed at maximum gradients of 2:1 (h:v), in accordance to industry standards, are anticipated to be both grossly and surficially stable. Where fill is to be placed against sloping terrain with gradients of 5:1 (h:v) or steeper, the sloping ground surface should be benched to remove loose and disturbed surface soil to assure that the new fill is placed in direct contact with competent bedrock and to provide horizontal surfaces for fill placement. A 10- to 15-foot wide keyway should be constructed at the toe of the fill slope areas extending at least 2 to 3 feet vertically into competent natural material.

The base of the keyways and benches should be sloped back into the hillside at a gradient of at least two percent. The base of the benches should be evaluated by a representative of GeoTek prior to processing. Upon approval, the exposed materials should be moistened to at least the optimum moisture content and densified to a relative compaction of at least 90 percent (ASTM D 1557).

Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction and then roll the final slope to provide a dense, erosion resistant surface.

6.2.7 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at 1:1 (h:v) inclinations for short durations during construction and where cuts do not exceed ten feet in height. We anticipate that temporary cuts to a maximum height of four feet can be excavated vertically.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined per ASTM D 1557). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than six inches are removed.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

6.2.8 Shrinkage and Bulking

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of five to ten percent may be considered for the surficial soils. Bedrock materials may bulk up to ten percent. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction.

Subsidence is not considered to be a factor with the underlying site materials.

6.3 DESIGN RECOMMENDATIONS

6.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2019 CBC, are presented herein. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Based on the results of laboratory testing, the on-site materials are classified as having "very low" (0≤EI≤20) expansion potential per ASTM D 4829. Additional laboratory testing should be performed at the completion of site grading to verify the expansion potential of the near-surface soils.

A summary of our preliminary foundation design recommendations is presented in the table below:

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALY REINFORCED SHALLOW FOUNDATIONS	
Design Parameter	"Very Low" Expansion Potential (0≤EI≤20)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	One- and Two-Story – 12
Minimum Foundation Width (Inches)*	One- and Two-Story – 12
Minimum Slab Thickness (actual)	4 inches
Minimum Slab Reinforcing	6" x 6" – W1.4/W1.4 welded wire fabric placed in middle of slab
Minimum Footing Reinforcement	Two No. 4 Reinforcing bars, one top and one bottom
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum 100% to a depth of 12 inches

*Code minimums per Table 1809.7 of the 2019 CBC.

It should be noted that the criteria provided are based on soil support characteristics only. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

An allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This value may be increased by 400 psf for each additional 12 inches in depth and by 400 psf for each additional 12 inches in width to a maximum value of 3,000 psf. Additionally, an increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads).

Based on the recommended site grading, we estimate a total static settlement of less than 1 inch. A differential static settlement of about ½ inch over a 30-foot span is also estimated. Seismically induced total and differential settlement are considered to be negligible.

The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

A grade beam, a minimum of 12 inches wide and 12 inches deep, should be utilized across large entrances. The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2019 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2019 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as the result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. It is GeoTek's opinion that a minimum ten mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and atmospheric conditions.

Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e. thickness, composition, strength, and permeance) to achieve the desired performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

We recommend that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural engineer.

6.3.2 Miscellaneous Foundation Recommendations

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge.

Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

6.3.3 Foundation Set Backs

Where applicable, the following setbacks should apply to all foundations. Any improvements not conforming to these setbacks may be subject to lateral movements and/or differential settlements:

- The outside bottom edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least 5 feet and need not exceed 40 feet.
- The outside bottom edge of all footings should be set back a minimum of H/2 (where H is the slope height) from the face of any ascending slope. The setback should be at least 5 feet and need not to exceed 15 feet. Where a retaining wall is constructed at the toe of the slope, the height of the slope should be measured from top of the wall to the top of the slope.
- The bottom of all footings for structures near retaining walls should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom inside edge of the wall footing.
- The bottom of any proposed foundations for structures should be deepened so as to extend below a 1:1 (h:v) projection upward from the bottom of the nearest excavation.

6.4 RETAINING WALL DESIGN AND CONSTRUCTION

6.4.1 General Design Criteria

Recommendations presented herein may apply to typical masonry or concrete vertical walls retaining up to six feet of soil. Additional review and recommendations should be requested for higher walls.

Retaining wall foundations embedded a minimum of 12 inches below the lowest adjacent grade and should rest on either 24 inches of compacted fill placed on competent bedrock or on competent bedrock. Wall footings should be designed using an allowable bearing capacity of 2,000 psf. An increase of one-third may be applied when considering short-term live loads (e.g. seismic and wind loads). The passive earth pressure may be computed as an equivalent fluid having a density of 280 psf per foot of depth, to a maximum earth pressure of 2,500 psf. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

An equivalent fluid pressure approach may be used to compute the horizontal active pressure against the wall. The appropriate fluid unit weights are given in the table below for specific slope gradients of retained materials.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (H:V)	Equivalent Fluid Pressure (PCF) Native Materials*
Level	41
2:1	60

*The design pressures assume the native backfill material has an expansion index less than or equal to 20. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

The above equivalent fluid weights do not include superimposed loading conditions such as expansive soils, vehicular traffic, structures, seismic conditions or adverse geologic conditions.

6.4.2 Restrained Retaining Walls

Any retaining wall that will be restrained prior to placing backfill or walls that have male or reentrant corners should be designed for at-rest soil conditions using an equivalent fluid pressure of 61 pcf, plus any applicable surcharge loading. For areas having male or reentrant corners, the restrained wall design should extend a minimum distance equal to twice the height of the wall laterally from the corner, or as otherwise determined by the structural engineer.

6.4.3 Wall Backfill and Drainage

Retaining wall backfill should be free of deleterious and/or oversized materials and should have and expansion index of less than 20. Retaining walls should be provided with an adequate pipe

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one-cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight inches in thickness and compacted to a minimum of 90 percent relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one-foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The rock should be separated from the earth with filter fabric. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within two feet of the ground surface. The subdrain should be placed at the base of the wall in direct contact with the Miradrain 2000.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained. Walls from two to four feet in height may be drained using localized gravel packs behind weep holes at eight feet maximum spacing (e.g. approximately 1.5 cubic feet of gravel in a woven plastic bag). Weep holes should be provided or the head joints omitted in the first course of block extended above the ground surface. However, nuisance water may still collect in front of the wall.

Drain outlets should be maintained over the life of the project and should not be obstructed or plugged by adjacent improvements.

6.4.3.1 Other Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.

- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

6.4.4 Pavement Design Considerations

Pavement design for proposed on-site and off-site street improvements was conducted per Caltrans *Highway Design Manual* guidelines for flexible pavements. Based on traffic indices (TIs) of 6.0 and 7.0 generally associated with these types of projects and using an assumed design R-value of 50, the following preliminary sections were calculated:

PRELIMINARY PAVEMENT SECTIONS

TI	R-Value	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
6.0	50	4*	6*
7.0		4*	6*

*Minimum pavement structural section per City of Moreno Valley Street Standards

The TIs used in our pavement design are considered reasonable values for the proposed street areas and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

The recommended pavement sections provided are intended as a minimum guideline and final selection of pavement cross section parameters should be made by the project civil engineer, based upon the local laws and ordinates, expected subgrade and pavement response, and desired level of conservatism. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. Final pavement design should be checked by testing of soils exposed at subgrade (the upper 12 inches) after final grading has been completed.

Asphalt concrete and aggregate base should conform to current Caltrans Standard Specifications Section 39 and 26-1.02, respectively. As an alternative, asphalt concrete can conform to Section 203-6 of the current Standard Specifications for Public Work (Green

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Book). Crushed aggregate base or crushed miscellaneous base can conform to Section 200-2.2 and 200-2.4 of the Green Book, respectively. Pavement base should be compacted to at least 95 percent of the ASTM D1557 laboratory maximum dry density (modified proctor).

All pavement installation, including preparation and compaction of subgrade, compaction of base material, placement and rolling of asphaltic concrete, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City Inspector where required. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern.

Deleterious material, excessive wet or dry pockets, oversized rock fragments, and other unsuitable yielding materials encountered during grading should be removed. Once existing compacted fill are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform and unyielding surface. The upper 12 inches of pavement subgrade soils should be scarified, moisture conditioned at or near optimum moisture content, and recompacted to at least 95 percent of the laboratory maximum dry density (ASTM D1557). If loose or yielding materials are encountered during construction, additional evaluation of these areas should be carried out by GeoTek. All pavement section changes should be properly transitioned.

6.4.5 Soil Corrosivity

A corrosion report was prepared for the site by our sub-consultant HDR based on various samples recently obtained across the site. The site corrosion report is included in Appendix E. In general, the report concluded that the on-site materials are "moderately corrosive" to ferrous metals and "aggressive" to copper.

6.4.6 Soil Sulfate Content

The corrosion evaluation performed by HDR, Inc. states that the site soils have negligible sulfate concentrations. Based upon the test results, no special concrete mix design is required by Code for sulfate attack resistance. Additional recommendations for mitigation of soil corrosion are provided in Appendix E.

6.4.7 Import Soils

Import soils should have expansion characteristics similar to the on-site soils. GeoTek also recommends that the proposed import soils be tested for expansion and sulfate potential. GeoTek should be notified a minimum of 72 hours prior to importing so that appropriate sampling and laboratory testing can be performed.

6.4.8 Concrete Flatwork

6.4.8.1 Exterior Concrete Slabs, Sidewalks, and Driveways

Exterior concrete slabs, sidewalks and driveways should be designed using a four-inch minimum thickness. No specific reinforcement is required from a geotechnical perspective. However, some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in industrial construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

Subgrade soils should be pre-moistened prior to placing concrete. The subgrade soils below exterior flatwork should be pre-saturated to a minimum of 100 percent of optimum moisture content to a depth of at least 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Moreno Valley specifications, and under the observation and testing of GeoTek and a City inspector, if necessary.

6.4.8.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 0.125-inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent upon a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

6.5 POST CONSTRUCTION CONSIDERATIONS

6.5.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. Leaching as a method of soil preparation prior to planting is not recommended. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.

It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundations. This type of landscaping should be avoided. Due to the presence of high expansive soils, irrigation should be minimized adjacent to the buildings. Planters within 30 feet of the buildings should be above ground and underlain by a concrete slab. Waterproofing of the foundation and/or subdrains may be warranted and advisable. We could discuss these issues, if desired, when plans are made available.

6.5.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times, as directed by the project civil engineer. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and not allowed to pond or seep into the ground adjacent to the footings and floor-slabs. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

Roof gutters should be installed that will direct the collected water at least 20 feet from the buildings.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

6.6 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading, specifications, retaining wall/shoring plans and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. Additional recommendations may be necessary based on these reviews. We also recommend that GeoTek representatives be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek's representative perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing when necessary.
- Observe the fill for uniformity during placement including utility trenches.
- Test the fill for field density and relative compaction.
- Test the near-surface soils to verify proper moisture content.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

7. LIMITATIONS

This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our proposal (Proposal No. P-0602020-

CR) dated July 1, 2020 and geotechnical engineering standards normally used on similar projects in this region.

The materials observed on the project site appear to be representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

8. SELECTED REFERENCES

American Society of Civil Engineers (ASCE), 2017, “Minimum Design Loads for Buildings and Other Structures,” ASCE/SEI 7-16.

Bowles, J. E., 1977, “Foundation Analysis and Design”, Second Edition.

Bryant, W.A., and Hart, E.W., 2007, "Fault Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," California Geological Survey: Special Publication 42.

California Code of Regulations, Title 24, 2019 “California Building Code,” 2 volumes.

California Geological Survey (CGS, formerly referred to as the California Division of Mines and Geology), 1977, “Geologic Map of California.”

_____, 1998, “Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada,” International Conference of Building Officials.

_____, 2008, “Guidelines for Evaluating and Mitigating Seismic Hazards in California,” Special Publication 117A.

Dibblee, T.W. and Minch, J.A., 2003, “Geologic Map and Digital Database of the Sunnymead/South ½ if Redlands Quadrangle, San Bernardino and Riverside Counties, California,” U.S Geological Survey DF-110, scale 1:24,000.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

EGA Consultants, 2006, "Geotechnical Investigation for 17.7 Acre Proposed Mixed Use Commercial and Residential Property L:ocated at NEC Alessandro Blvd. and Lasselle Street, Moreno Valley, California", May 10, Project No. VB435.1.

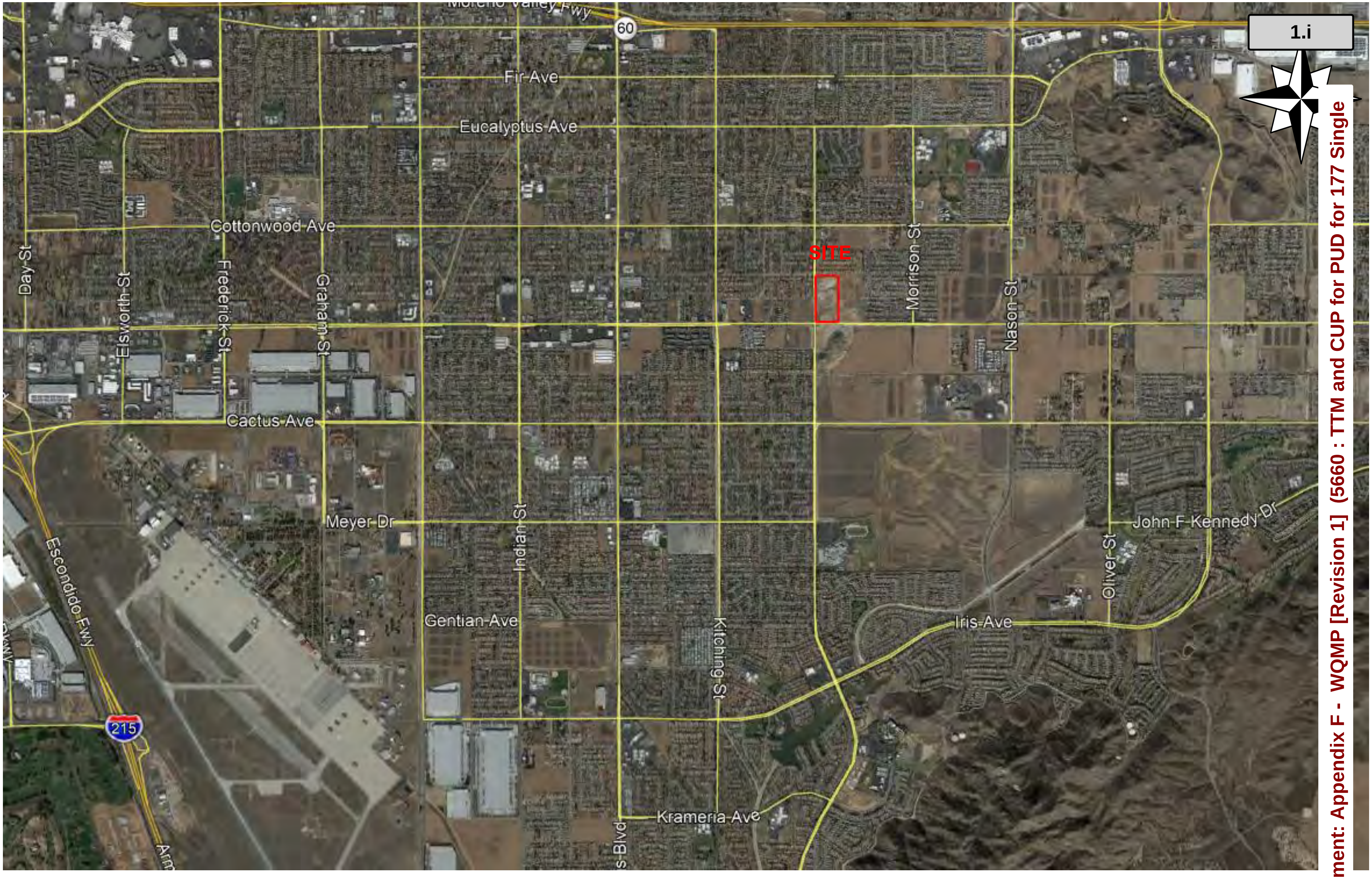
GeoTek, Inc., In-house proprietary information.

Leighton and Associates, Inc., 2005, Draft version of "Geotechnical Investigation for Due-Diligence Purposes, 20-Acre, 74-Lot Tentative Tract 31589 (Chen 74), Southwest of Bay Avenue and Regis Drive, City of Moreno Valley, California", dated April 22, Project No. 021521-001.

Proactive Engineering Consultants West, Inc., 2020, Lotting Study Plan and Cut/Fill Plan, dated July 31.

Terzaghi, K. and Peck, R. B., 1967, "Soil Mechanics in Engineering Practice", Second Edition.

U.S. Seismic Design Maps (http://earthquake.usgs.gov/designmaps).



D•R•Horton Los Angeles Holding Company
Winco Site
Moreno Valley, Riverside County, California

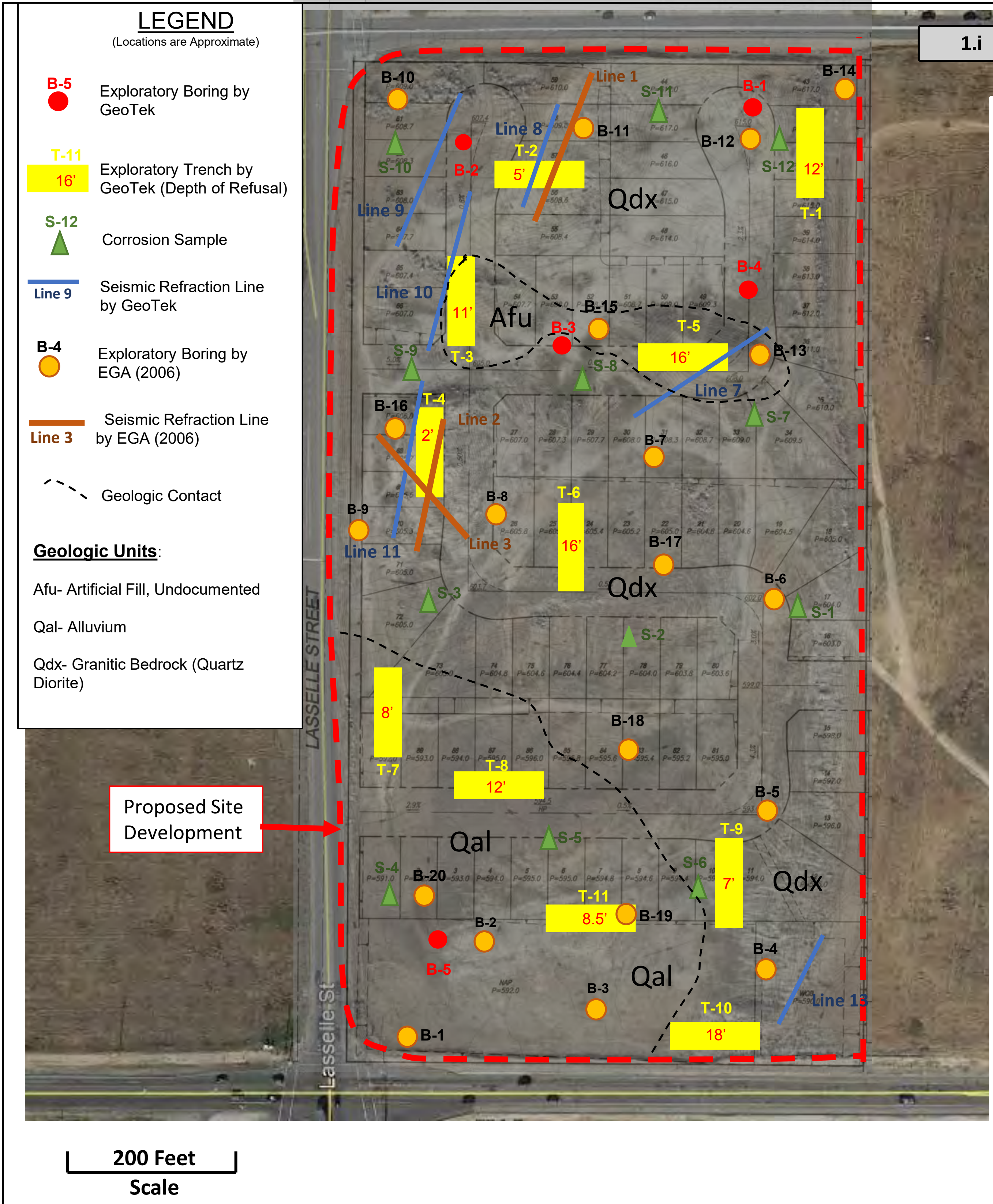
Project No. 2438-CR

Scale: As Shown

0 1 mi.

Figure 1

Site Location Map



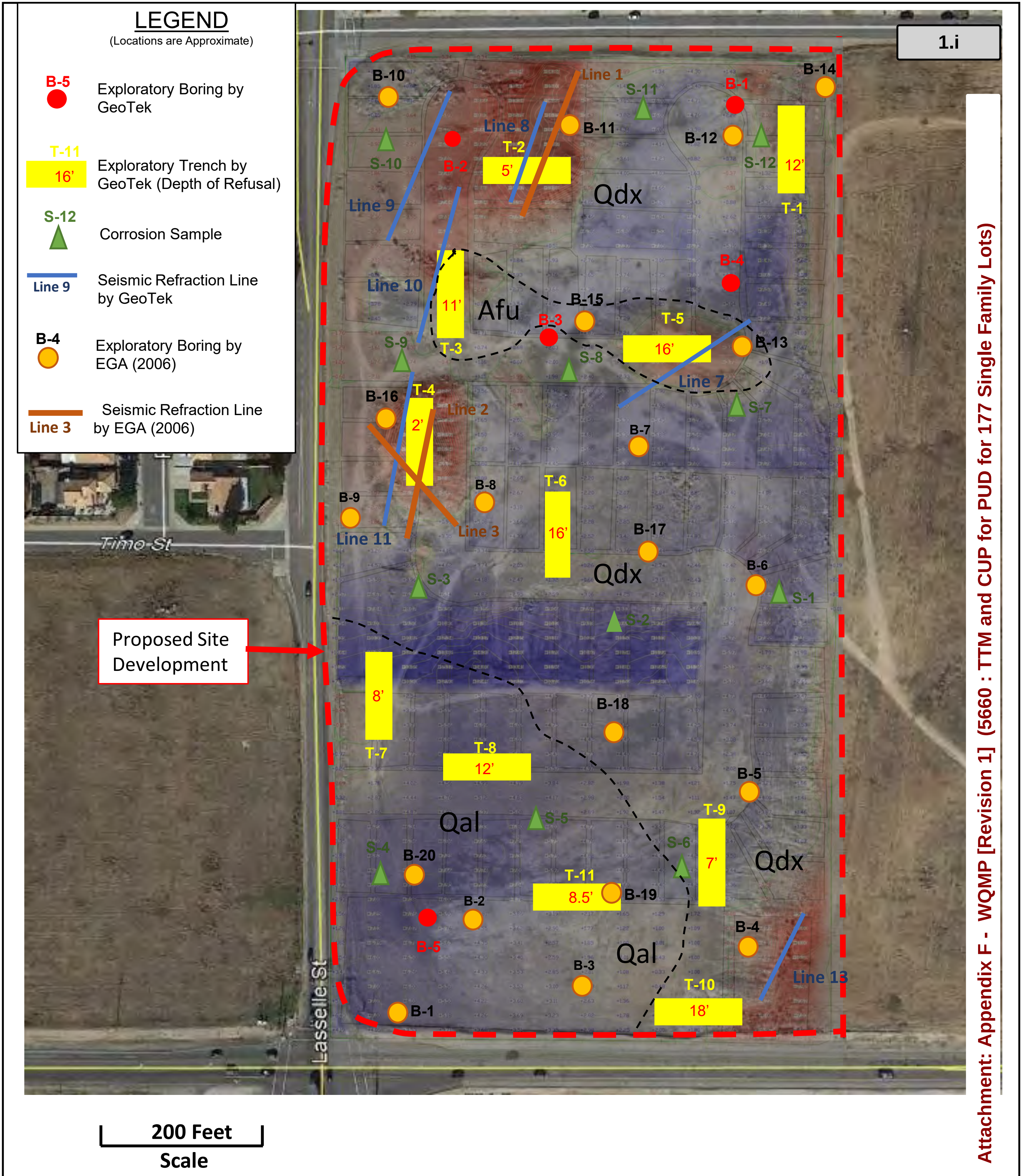
DR Horton Los Angeles Company, Inc.
Winco Site
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

N

Figure 2a

Exploration Location Map



DR Horton Los Angeles Company, Inc.

Winco Site

Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

N

Figure 2b

Exploration Location Map

APPENDIX A

EXPLORATORY BORINGS LOGS, SEISMIC REFRACTION TRAVERSES, AND LABORATORY TEST RESULTS BY EGA CONSULTANTS, INC. (2006)

Updated Geotechnical Evaluation

Winco Site, Moreno Valley, Riverside County, California

Project No. 2438-CR

GEOTEK

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-1**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1585 ft. above MSL

■ Thin Wall Tube ☒ 2.5" Ring Sample

⧄ Bulk Sample ◫ Standard Split Spoon Sample ∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/5"	2.0	117.3					
10		◫	⧄		50/4"							
		☒			50/3"	2.4	112.7					
15												
				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure A-1

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-2**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1587 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒	⧄	BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/6"	3.3	120.5					
10		◫	⧄		50/5"							
15		☒		Sample disturbed.	50/3"	2.9						
20		◫			50/3"							
25		◫		Very difficult to drill. Refusal.	50/3"							
30				Total Depth: 25 ft. at Refusal No Water No Caving Backfilled 4/17/06								
35												
40												

EGA Consultants

Figure
A-2

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-3**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1590 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/2"	1.3						
10		◫			50/2"							
15		☒			50/2"	1.3	117.9					
20		◫		Very difficult to drill. Refusal.	50/2"							
25				Total Depth: 23 ft. at Refusal No Water No Caving Backfilled 4/17/06								
30												
35												
40												

EGA Consultants

Figure A-3

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	B-4
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1593 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/2"	2.7	110.8					
5												
10		◫			50/2"							
			▨									
					50/3"	1.3	117.9					
15		◫		at 15 ft. - "salt and pepper" appearance.								
20		◫			50/2"							
25		◫			50/2"							
30		◫			50/2"							
35		☒		Very difficult to drill. Refusal.	50/3"	13.9						
40				Total Depth: 36 ft. at Refusal No Water No Caving. Backfilled 4/17/06								

EGA Consultants

Figure A-4

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-5**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1594 ft. above MSL

Legend: ■ Thin Wall Tube ☒ 2.5" Ring Sample ▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand. at 2 ft. becomes more light in color.								
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.	50/3"	2.3	113.2					
10		◫			50/4"	2.2						
15		◫			50/3"	3.0						
		◫			50/3"	3.4						
20				Total Depth: 20 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-5

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-6**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1598 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
	SM		⧄	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1												
		☒		BEDROCK (Kt): at 6" Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.	50/4"	1.6	120.3	0	133.5	57	30	O.M. 7.5
5												
10		◫		at 10 ft. becomes white and orange.	50/2"	1.7						
				Becomes very difficult to drill.								
		◫			50/2"							
15												
				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure
A-6

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: B-7
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1603 ft. above MSL

Sample Type: ■ Thin Wall Tube; ☒ 2.5" Ring Sample; ▱ Bulk Sample; ◫ Standard Split Spoon Sample; ∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
0–1	SM		▱	FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5			O.M. 7.5
				BEDROCK (Kt): at 6" Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.								
5		☒			50/3"	1.8	119.9					
10		◫		at 10 ft. becomes white and orange.	50/3"	2.1						
				Becomes very difficult to drill.								
15		◫			50/3"							

Total Depth: 15 ft.
No Water
No Caving
Backfilled 4/17/06

Depth scale: 1, 5, 10, 15, 20, 25, 30, 35, 40

EGA Consultants

Figure
A-7

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	B-8
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1606 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
⧄ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1				BEDROCK (Kt): Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.				0		57	30	
5		☒			50/4"	3.4	110.3					
		◫		Difficult to drill.	50/3"							
10				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-8

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-9**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1605 ft. above MSL

■ Thin Wall Tube ☒ 2.5" Ring Sample ◿ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM			<u>FILL/TOPSOIL</u>: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		<u>BEDROCK (Kt)</u>: Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. "Salt and peper" appearance.	50/4"	6.5	122.7					
10		◫			50/3"	5.2						
15		◫			50/3"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-9

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-10**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1607 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◪ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		BEDROCK (Kt): at 1 ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. "Salt and peper" appearance.	50/3"	4.1	128.8					
10		◫			50/2"	1.7						

Total Depth: 10 ft.
No Water
No Caving
Backfilled 4/17/06

EGA Consultants

Figure
A-10

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-11**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1626 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1		☒		<u>BEDROCK (Kt)</u>: Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.	50/4"	2.6	115.8					
5				Total Depth: 3.25 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-11

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-12**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1613 ft. above MSL

Sample Type: ■ Thin Wall Tube ☒ 2.5" Ring Sample ▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: ϕ°	Direct Shear: C psf	Other Tests
	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1		☒		BEDROCK (Kt): at 1 ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.	50/1"	1.4		0				
5				Total Depth: 4.5 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-12

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-13**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1614 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM		◩	FILL: Dark to reddish brown, dry, loose to med.-dense, fine to med.-grained silty sand. Mottled.					133.5			7.5
5		☒			38	5.1	129.7					
10		◫			26							
15		◫		at 13 ft becomes: BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Difficult to drill.	50/3"							
20		◫			50/2"							
25				Total Depth: 20 ft. No Water No Caving Backfilled 4/17/06								
30												
35												
40												

EGA Consultants

Figure A-13

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-14**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1616 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		☒		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.	50/6"	2.9	117.5					
10		◫			50/4"	2.7						
15				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure A-14

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-15**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1604 ft. above MSL

■ Thin Wall Tube

☒ 2.5" Ring Sample

▨ Bulk Sample

◫ Standard Split Spoon Sample

▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5	57	30	7.5
5		◫		BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.	50/4"							
10		◫			50/4"							
15				Total Depth: 10 ft. No Water No Caving Backfilled 4/17/06								
20												
25												
30												
35												
40												

EGA Consultants

Figure A-15

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-16**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1624 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1		◫		BEDROCK (Kt): Outcrops- Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated.	50/3"							
5				Total Depth: 5 ft. No Water No Caving Backfilled 4/17/06								
10												
15												
20												
25												
30												
35												
40												

EGA Consultants

Figure A-16

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number:	VB435.1	Boring No:	**B-17**
Project:	NEC Alessandro & Lasselle Moreno Valley, CA	Boring Location:	See Figure 2
Date Started:	4/17/2006	Rig:	Mob. CM75 w/8" augers
Date Completed:	4/17/2006	Grnd Elev.	1600 ft. above MSL

Sample Type:
■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
5		◫		BEDROCK (Kt): at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.	50/3"							
10		◫		at 11 ft. becomes white and orange.	50/4"							
15		◫		Becomes very difficult to drill.	50/2"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-17

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-18**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1592 ft. above MSL

Sample Type:
■ Thin Wall Tube
☒ 2.5" Ring Sample
◩ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear: φ°	Direct Shear: C psf	Other Tests
0–1	SM			<u>FILL/TOPSOIL</u>: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1–5				<u>BEDROCK (Kt)</u>: at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth. Large crystals to 1/4-inch dia.								
6.5		◫			50/3"							
10.5		◫			50/3"							
11				at 11 ft. becomes white and orange.								
14.5		◫		Becomes very difficult to drill.	50/2"							
15												

Total Depth: 15 ft.
No Water
No Caving
Backfilled 4/17/06

EGA Consultants

Figure A-18

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-19**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1590 ft. above MSL

■ Thin Wall Tube
☒ 2.5" Ring Sample
▨ Bulk Sample
◫ Standard Split Spoon Sample
▽ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.								
1				BEDROCK (Kt): at 1ft. Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and well-foliated. Becomes less weathered with depth. Large crystals to 1/2-inch dia.								
5		◫			50/3"							
10		◫		at 11 ft. becomes white and orange.	50/3"							
15		◫		Becomes very difficult to drill.	50/3"							
20				Total Depth: 15 ft. No Water No Caving Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-19

LOG OF EXPLORATORY BORING

Sheet 1 of 1

Job Number: VB435.1
Project: NEC Alessandro & Lasselle
Moreno Valley, CA
Date Started: 4/17/2006
Date Completed: 4/17/2006

Boring No: **B-20**
Boring Location: See Figure 2
Rig: Mob. CM75 w/8" augers
Grnd Elev. 1585 ft. above MSL

Sample Type:
■ Thin Wall Tube
☒ 2.5" Ring Sample
◪ Bulk Sample
◫ Standard Split Spoon Sample
∇ Static Water Table

Depth in Feet	Soil Type	Sample Type: Undisturbed	Sample Type: Bulk	SOIL DESCRIPTION	Blows/foot	Moisture Content, %	Dry Density, pcf	Expansion Index	Maximum Density, pcf	Direct Shear φ°	Direct Shear C psf	Other Tests
1	SM			FILL/TOPSOIL: Light brown and gray, dry, loose to med.-dense, fine to med.-grained silty sand.				0	133.5			7.5
		◫			50/4"							
5				BEDROCK (Kt): Grayish white, equigranular dense to very dense, dry, coarse-grained crystalline bedrock. Massive and foliated. Becomes less weathered with depth.								
10		◫		Large crystals to 1/4-inch dia.	50/2"							
		◫		Difficult to drill.	50/3"							
15												
20				Total Depth: 15 ft. No Water No Caving. Backfilled 4/17/06								
25												
30												
35												
40												

EGA Consultants

Figure A-20

LABORATORY TEST RESULTS

Summarized below are the results of requested laboratory testing on samples submitted to our office.

Dry Density and Moisture Content

Tabulated below are the results of field dry density/moisture contents of undisturbed soils samples retained in 2 3/8–inch inside diameter by one-inch height rings. Moisture only results were obtained from bulk samples.

TABLE 1

Sample Identification	Dry Density (pcf)	Moisture Content (%)
B-1@ 5'	117.3	2.0
B-1@ 15'	112.7	2.4
B-2@ 5'	120.5	3.3
B-2@ 15'	106.2 Disturbed	2.9
B-3@ 5'	*	1.3
B-3@ 15'	117.9	1.3
B-4@ 3'	110.8	2.7
B-4@ 35'	*	13.9
B-5@ 5'	113.2	2.3
B-5@ 10'	*	2.2
B-5@ 15'	*	3.0

TABLE 1 (Cont.)

Sample Identification	Dry Density (pcf)	Moisture Content (%)
B5@ 20'	*	3.4
B-6@ 3'	120.3	1.6
B-6@ 10'	*	1.7
B-7@ 5'	119.9	1.8
B-7@ 10'	*	2.1
B-8@ 5'	110.3	3.4
B-9@ 5'	122.7	6.5
B-9@ 10'	*	5.2
B-10@ 5'	128.8	4.1
B-10@ 10'	*	1.7
B-11@ 3'	115.8	2.6
B-12@ 5'	*	1.4
B-13 @ 5'	129.7	5.1
B-14@ 5'	117.5	2.9
B-14@ 10'	*	2.7

Note: (*) denotes soil sample disturbance and/or insufficient soil sample for density determination. No density possible

Maximum Dry Density and Optimum Moisture Content

A maximum dry density and optimum moisture content test was performed on the requested bulk soil sample in accordance with ASTM: D 1557. The results are shown below:

Sample Identification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-6 @ 0-4'	133.5	7.5

Sieve Analysis

Two sieve analyses were performed on bulk soil samples identified as B-2 @ 15-20 feet and B-4 @ 20-30 feet. These tests were performed in accordance with ASTM D422 and the results are shown graphically on Plates B-1and B-2.

Direct Shear

Direct shear tests were performed on relatively undisturbed ring samples, identified as B-6 @ 3 feet, with a direct shear machine of the strain-controlled type. The controlled rate of strain is 0.004 inch per minute. The samples were soaked in a confined state prior to shearing. Then the samples where sheared under varied loads ranging from 1.0 ksf to 4.0 ksf. The test results are plotted on Plate B-3.

Expansion Index

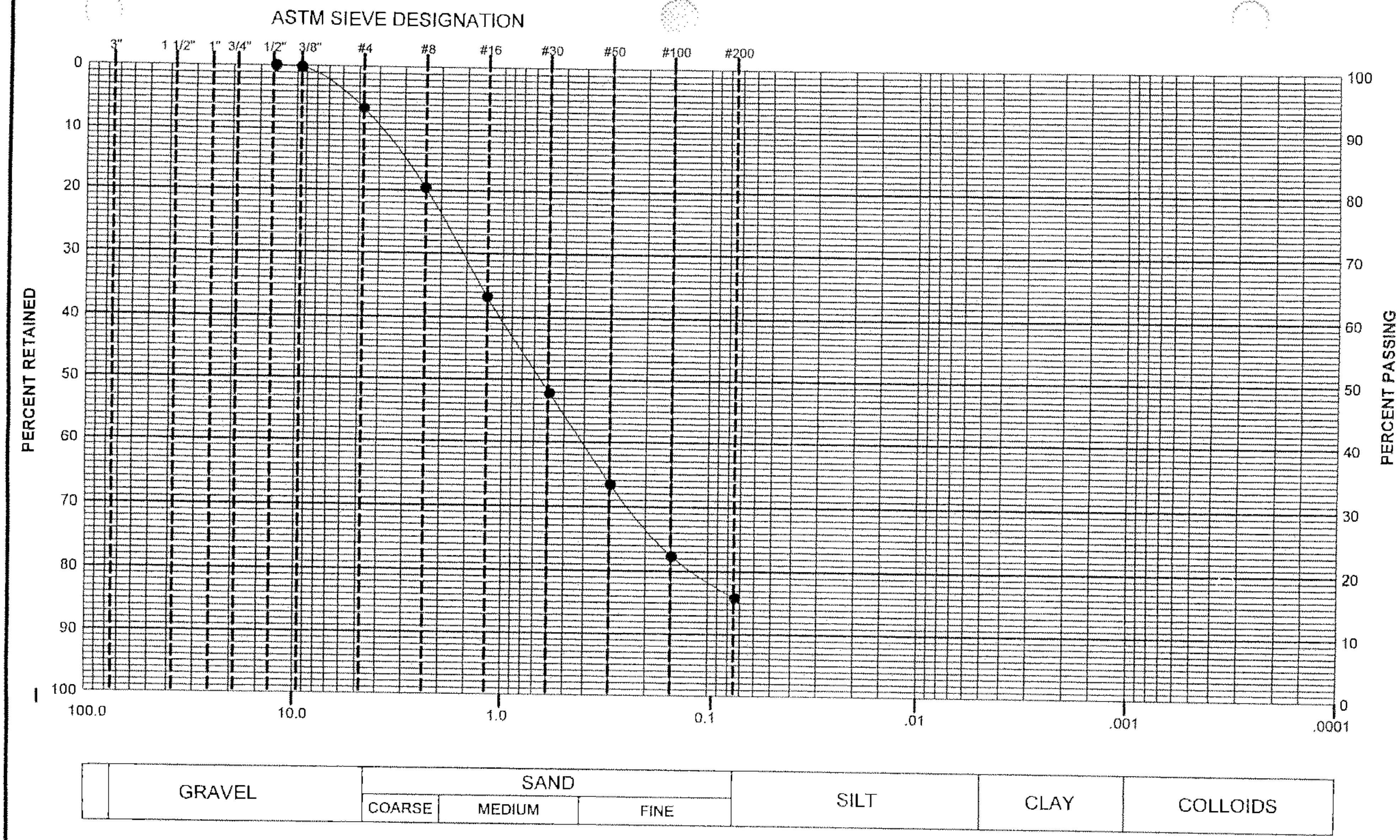
A bulk soil sample was tested for expansion potential following the ASTM D-4829 Test Procedure. Test results are presented below:

Sample Identification	Expansion Index	Expansion Potential (UBC 18-1-B)
B-6 @ 0-4'	0	Very Low

Sulfate Content

A selected bulk sample was tested for soluble sulfate content in accordance with Hach procedure. The test result is shown below.

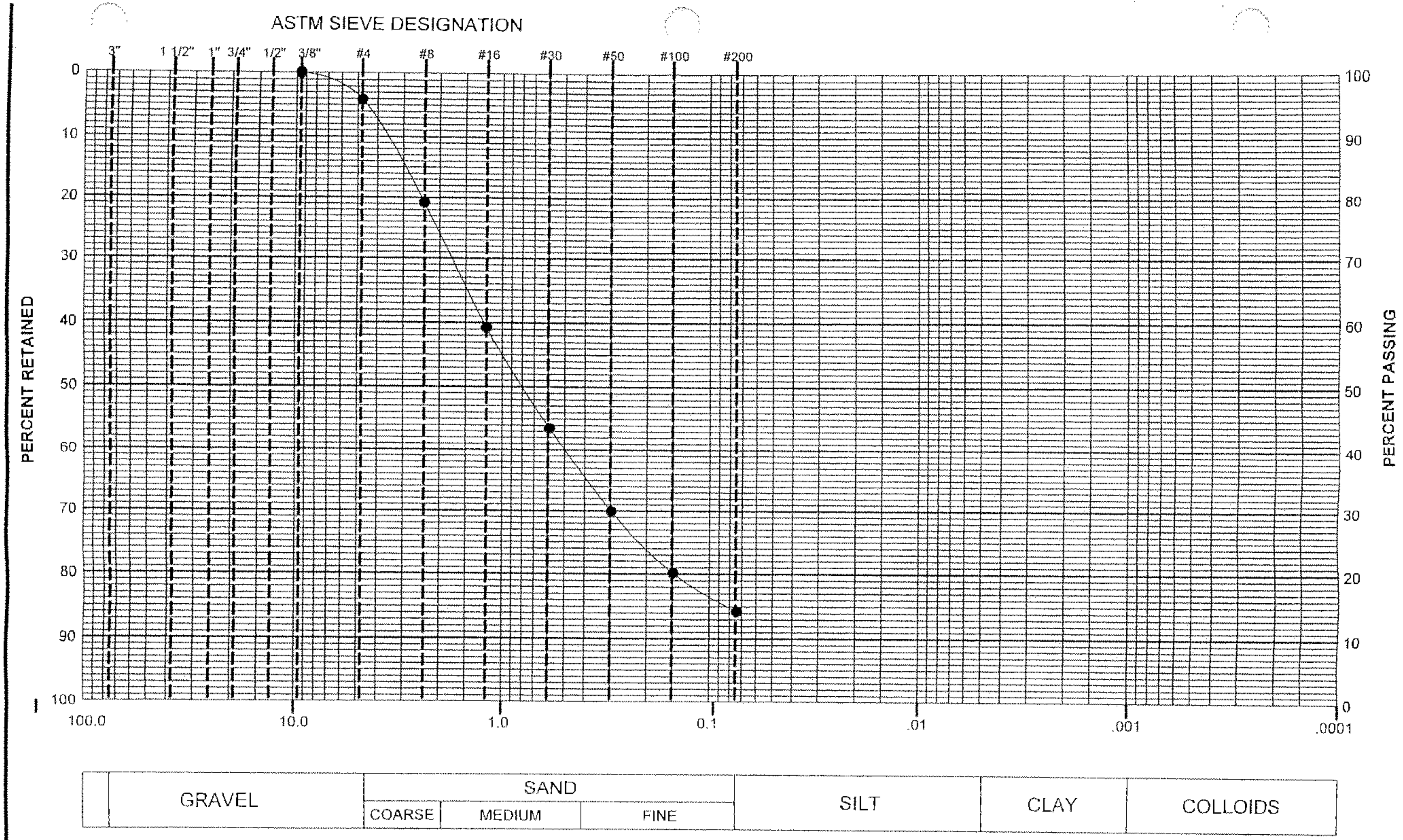
Sample Identification	Water Soluble Sulfate In Soil (Percentage by weight (%))	Sulfate Exposure (UBC Table 19-A-4)
B-14 @ 0-3'	0.0022	Negligible



Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-2	15-20'				15.8		EGA @ Alessandro Site

GRAIN SIZE DISTRIBUTION

NEBLETT & ASSOCIATES,INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649 714 840-8286
P.N. 314-087-12 **DATE 5/8/06**



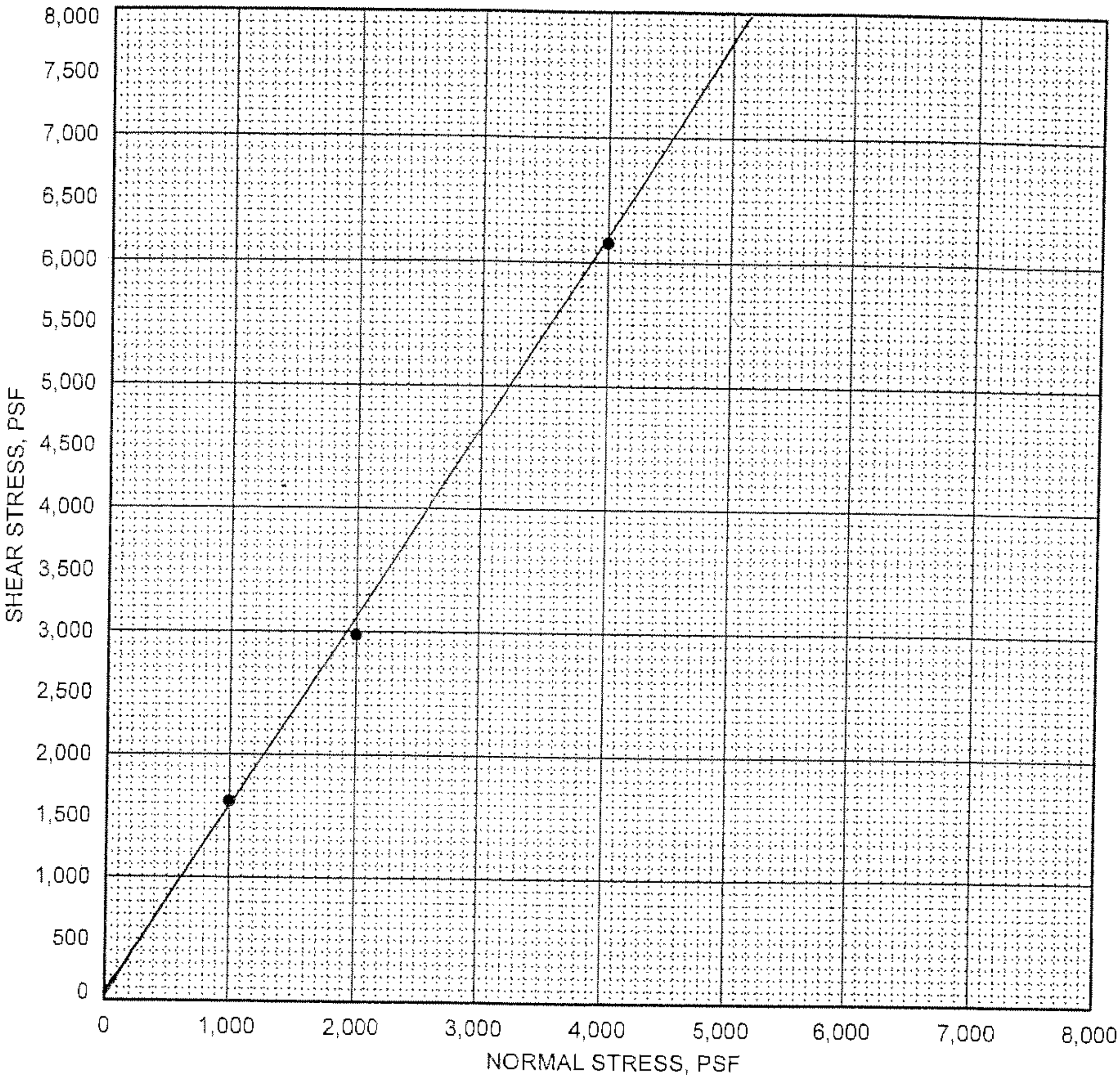
Symbol	Boring or Trench	Depth (ft.)	L.L.	P.L.	P.I.	% Passing #200 sieve	Group Symbol	Typical Names
●	B-4	20–30'				14.2		EGA @ Alessandro Site

GRAIN SIZE DISTRIBUTION

NEBLETT & ASSOCIATES,INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649 714 840-828

P.N. 314-087-12 **DATE 5/8/06**

DIRECT SHEAR TEST
Undisturbed



EGA@ Alessandro Site	COHESION	30	psf.
	FRICTION ANGLE	57.0	degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-6	3.0			

DIRECT SHEAR TEST

NEBLETT & ASSOCIATES, INC.
4911 WARNER AVENUE, SUITE 218
HUNTINGTON BEACH, CA, 92649 714 840-8286

P.N. 314-087-12 **DATE 5/8/06**

PLATE B-3

SCHIFF ASSOCIATES

www.schiffassociates.com
Consulting Corrosion Engineers – Since 1959

Table 1 - Laboratory Tests on Soil Samples

EGA Consultants
Alessandro, Moreno Valley, CA
Your #314-087-12, MJS&A #06-0668LAB
25-Apr-06

Sample ID			B-1 @ 0-5'
Resistivity		**Units**	
as-received		ohm-cm	270,000
saturated		ohm-cm	13,000
pH			8.1
Electrical Conductivity		mS/cm	0.03
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	28
magnesium	Mg^{2+}	mg/kg	17
sodium	Na^{1+}	mg/kg	ND
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	82
chloride	Cl^{1-}	mg/kg	ND
sulfate	SO_4^{2-}	mg/kg	ND
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

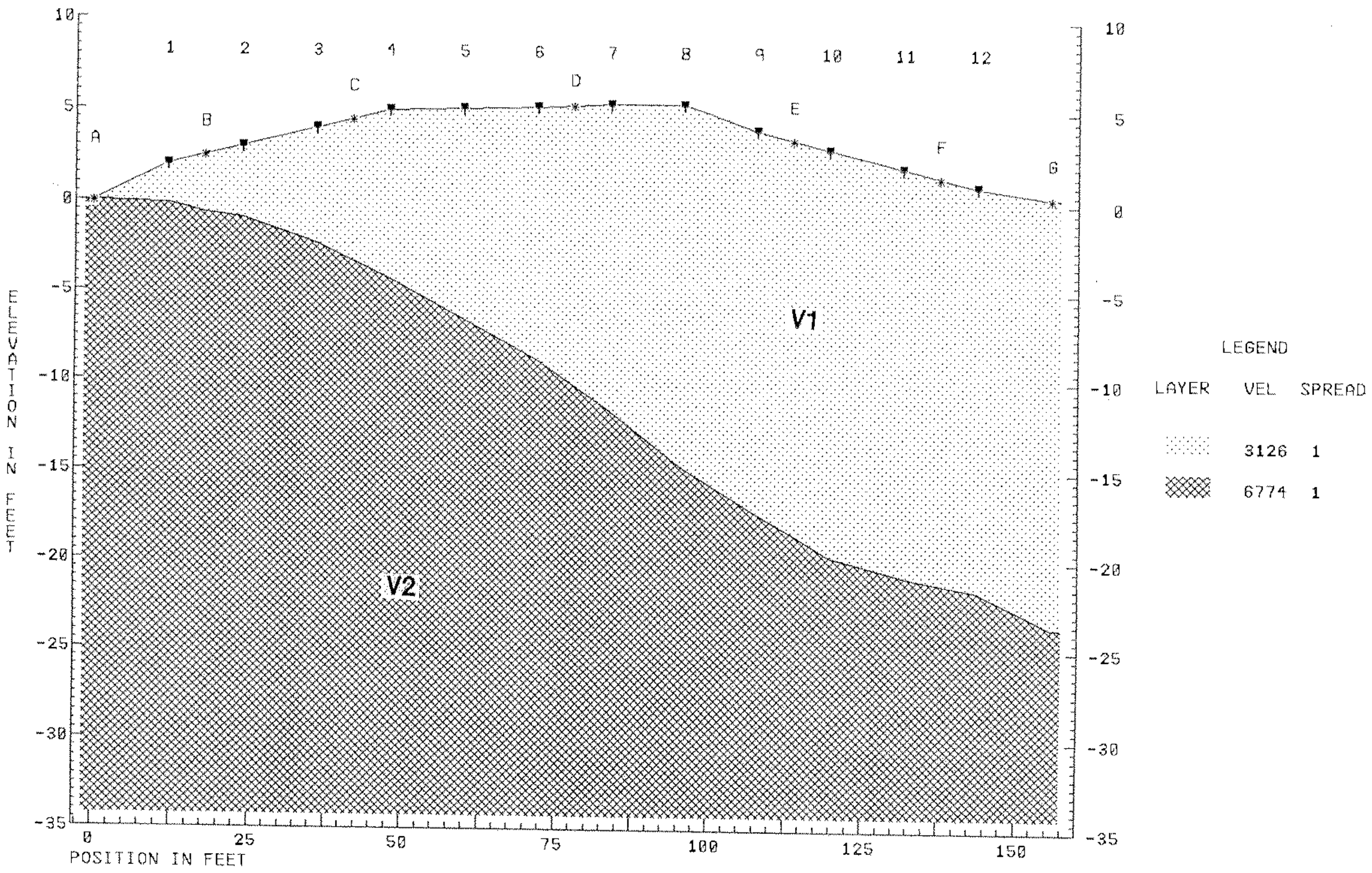
Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

LAYER VELOCITY PROFILE S-1

North 25° East →

FILE 2071-1.SIP
SEISMIC LINE S-1

SPREAD 1

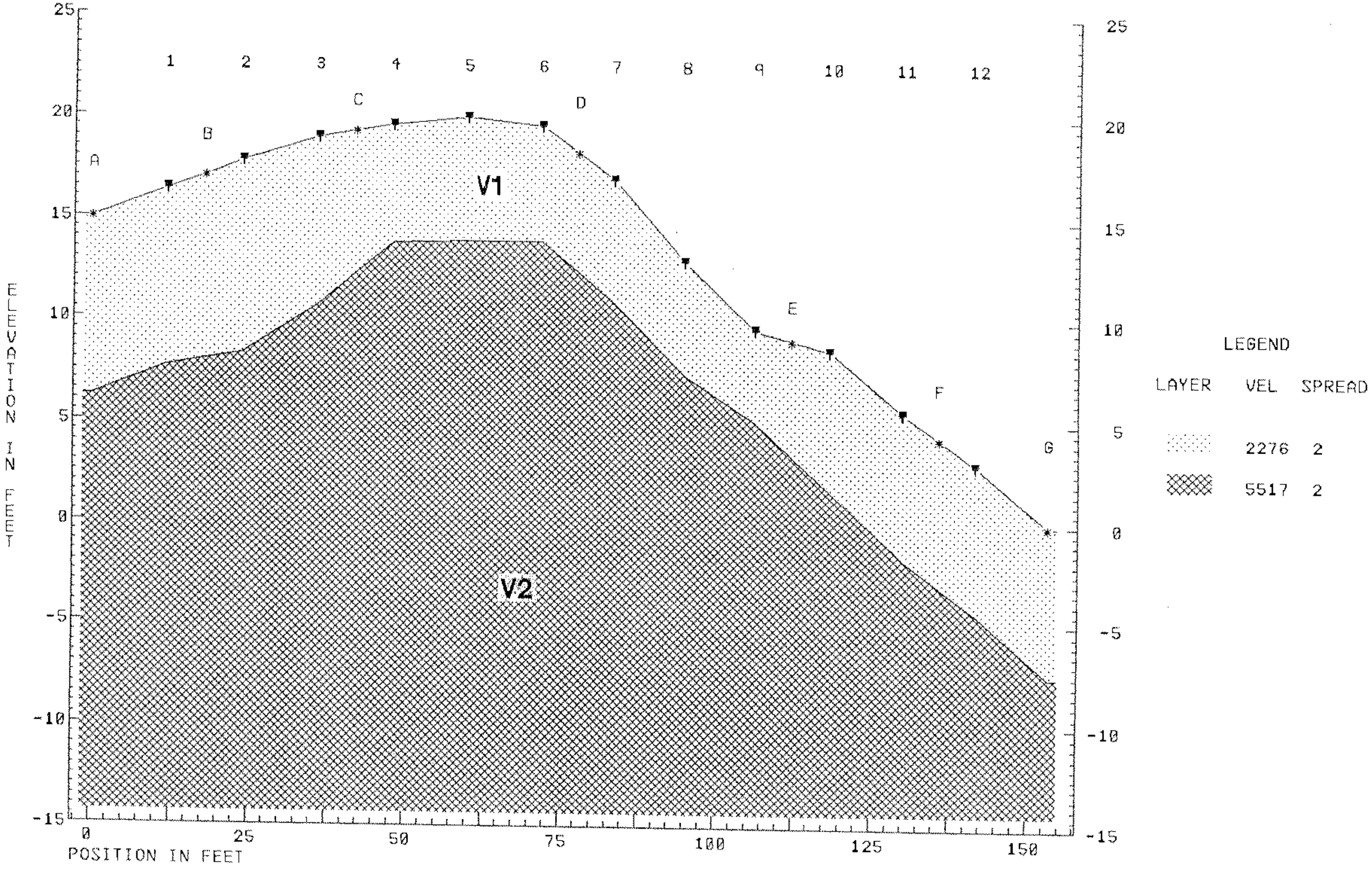


LAYER VELOCITY PROFILE S-2

South 10° West →

FILE 2071-2.SIP
SEISMIC LINE S-2

SPREAD 2

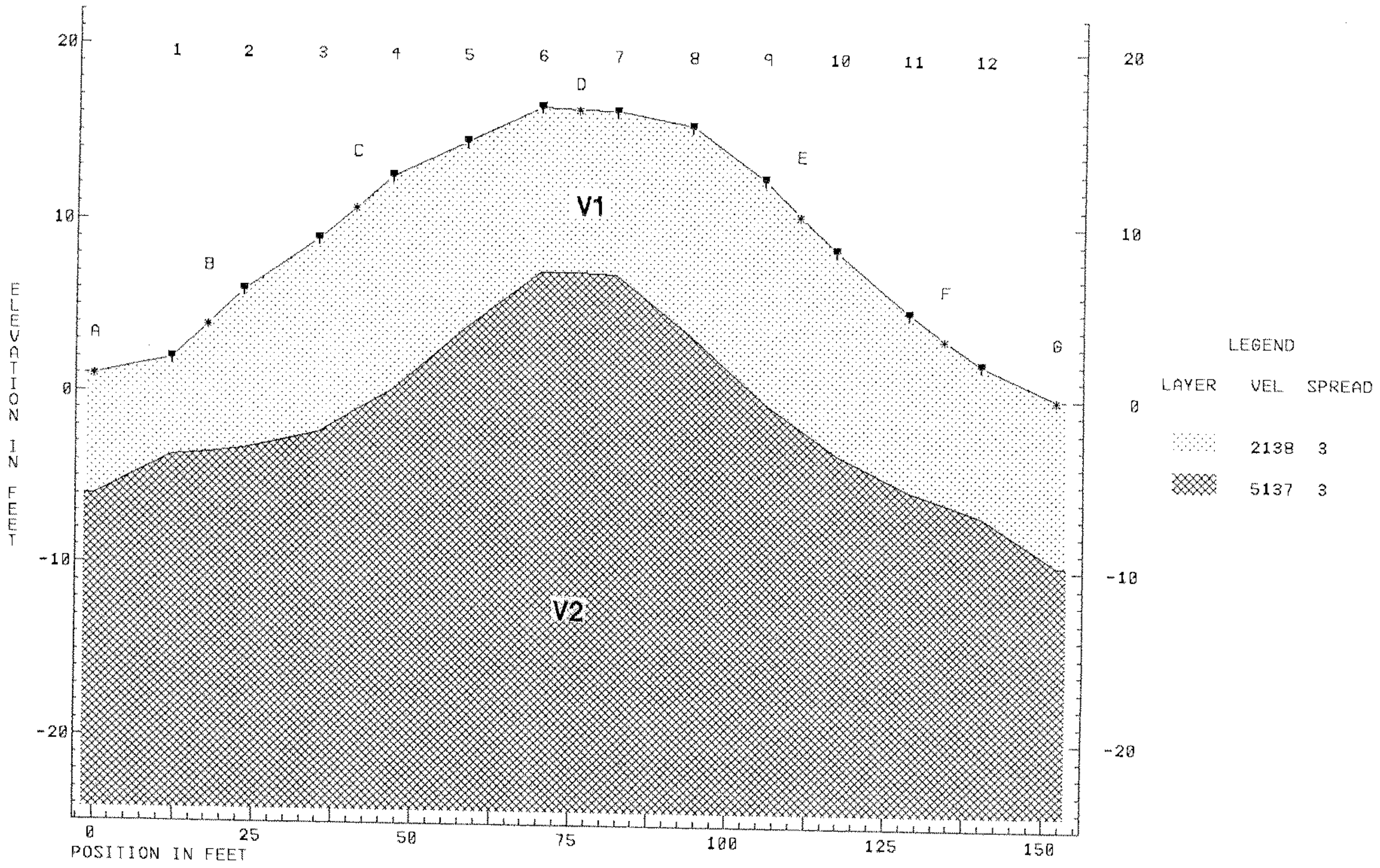


LAYER VELOCITY PROFILE S-3

North 35° West →

FILE 2071-3.SIP
SEISMIC LINE S-3

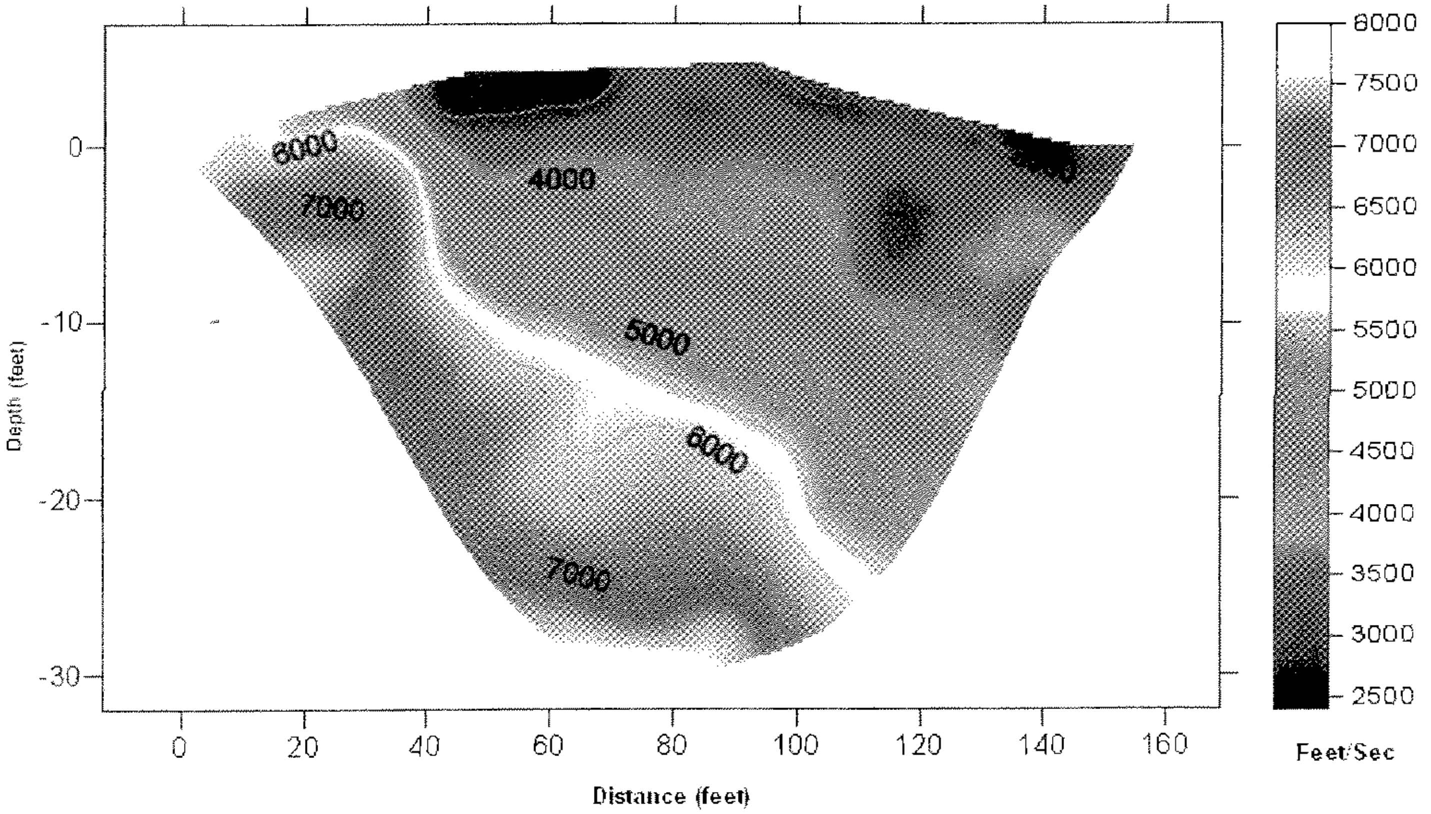
SPREAD 3



SEISMIC LINE S-1

North 25° East →

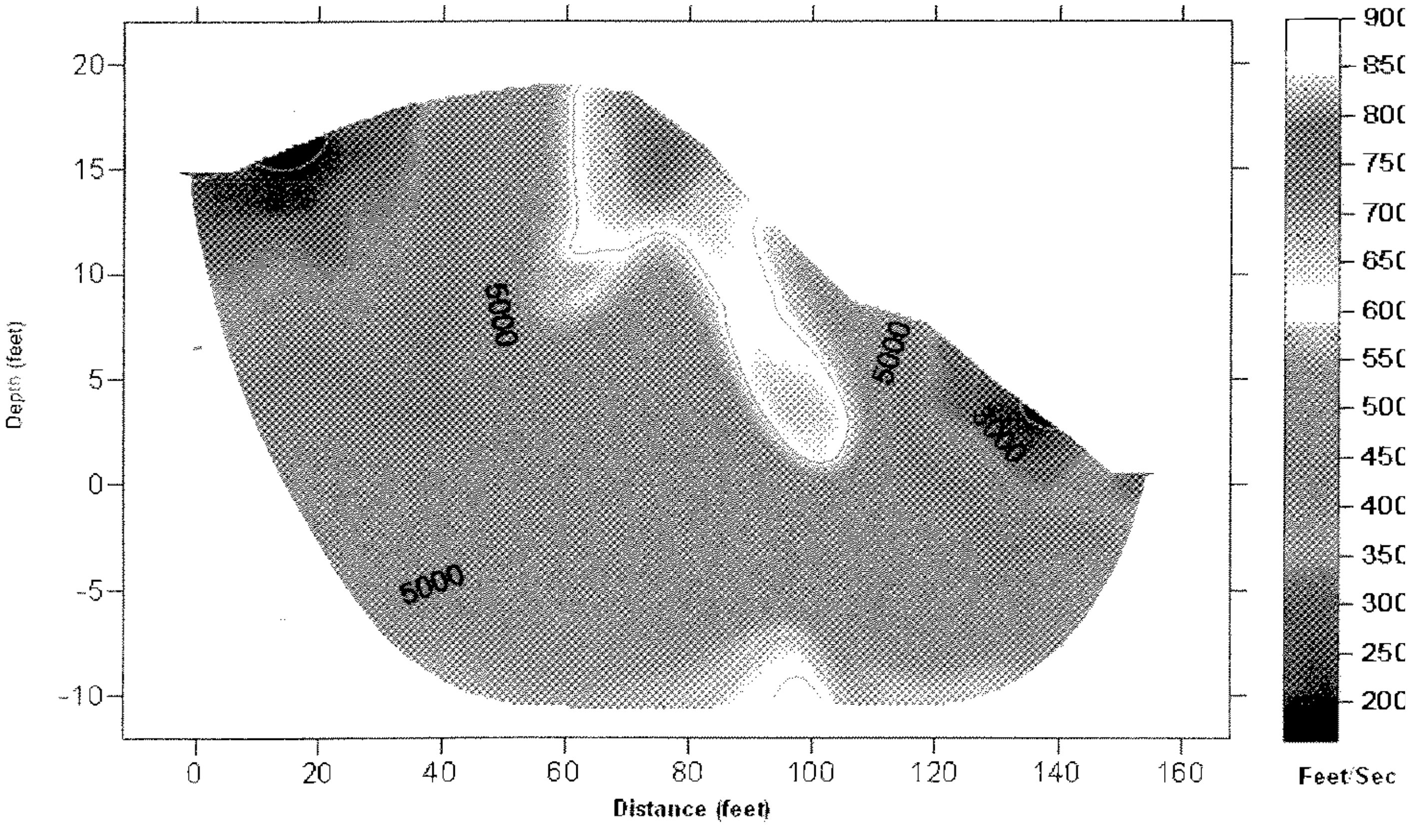
TOMOGRAPHIC MODEL



SEISMIC LINE S-2

South 10° West →

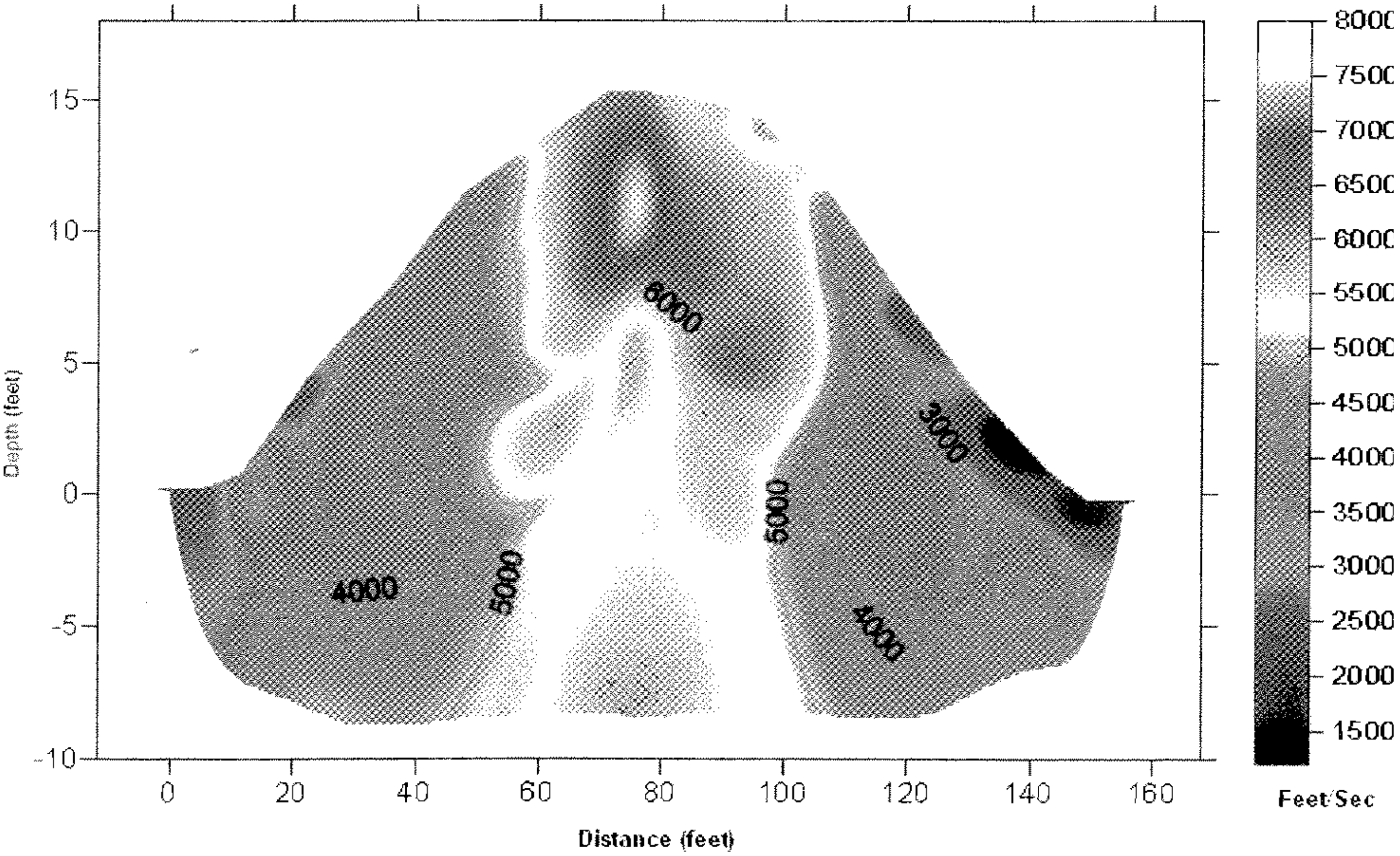
TOMOGRAPHIC MODEL



SEISMIC LINE S-3

North 35° West →

TOMOGRAPHIC MODEL



APPENDIX B

LOGS OF EXPLORATORY TRENCHES AND BORINGS
BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

Bulk Samples (Large)
These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)
These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B – TRENCH/BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the logs of trenches and borings:

SOILS

USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium

GEOLOGIC

B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
………..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
━━━	Thick solid line denotes end of the trench/boring

(Additional denotations and symbols are provided on the log of trench/boring)

GEOTEK

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

	SAMPLES				**BORING NO.: B-1**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					Granitic Bedrock: excavates as Silty f-c SAND, gray, dry, fairly easy to drill			
5								
					Same as above, drilling slowed down slightly but material is still friable			
10					Becomes brownish gray, slightly moist			
15								
					Becomes very hard to drill Driller had drill rig off the ground with no auger advancement			
					BORING TERMINATED AT 18 FEET (REFUSAL)			
20					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 10:42			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-2

Depth (ft)	SAMPLES Sample Type	SAMPLES Blows/ 6 in	SAMPLES Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
					Granitic Bedrock:			
					Excavates as Silty f-c SAND, brown, dry			
5					excavates as Silty f-c SAND, gray, slightly moist, friable			
10					Becomes grayish brown, moderately hard to drill			
					Becomes gray			
15								
					Very hard drilling, excavates as silty f-c SAND, light gray, slightly moist			
					Material still appears friable			
20					**BORING TERMINATED AT 20 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 9:42			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
SR = Sulfate/Resisitivity Test
EI = Expansion Index
SH = Shear Test
SA = Sieve Analysis
HC= Consolidation
RV = R-Value Test
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

	SAMPLES				**BORING NO.: B-3**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					Granitic Bedrock:			
	☒				excavates as Silty f-c SAND, brown, dry			MD, EI, SH
5					Excavates as Silty f-c SAND, gray, slightly moist, friable			
10					Becomes hard to drill			
15								
					Same as above, still appears friable			
20					**BORING TERMINATED AT 20 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 10:32			
25								
30								

LEGEND

Sample type: ■ ---Ring ■ ---SPT ◪ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

BORING NO.: B-4

	SAMPLES					Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					Granitic Bedrock: Excavates as Silty f-c SAND, brown, dry			
5					Same as above, becomes hard to drill			
10					Becomes light gray			
15					Same as above, still appears friable			
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 0 feet to 20 feet was 11:27			
25								
30								

LEGEND

Sample type: ▨ ---Ring ▨ ---SPT ◩ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resisitivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT:	DR Horton	**DRILLER:**	2R Drilling Inc.	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**DRILL METHOD:**	Hollow Stem Auger	**OPERATOR:**	Jeff
PROJECT NO.:	2438-CR	**HAMMER:**	140lbs/30in.	**RIG TYPE:**	CME 75
LOCATION:	See Exploration Location Map			**DATE:**	7/17/2020

	SAMPLES				**BORING NO.: B-5**	Laboratory Testing		
Depth (ft)	Sample Type	Blows/ 6 in	Sample Number	USCS Symbol	**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
					Alluvium:			
	▆	9 9 7		SM	Silty f-c SAND, brown, slightly moist, loose	8.8	126.4	
5	▆	8 16 21			Silty f-c SAND, reddish brown, moist	6.8	129.1	HC
					Granitic Bedrock: Excavates as silty f-c SAND, reddish brown to brown, slightly moist			
10								
15					Becomes harder to drill, excavates as silty f-c SAND, light gray, slightly moist			
					Same as above, appears friable			
20					**BORING TERMINATED AT 20 FEET** No groundwater encountered Boring backfilled with soil cuttings Total time to drill from 7 feet to 20 feet was 6:21			
25								
30								

LEGEND

Sample type: ▆ ---Ring ▆ ---SPT ⧄ ---Small Bulk ☒ ---Large Bulk ☐ ---No Recovery ▽ ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-1	Laboratory Testing		
	Sample Type	Time for Excavation		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
				Granitic bedrock: Weathered granite, excavates as silty f-vc SAND, brownish gray, slightly moist, moderately easy to excavate 2-3 scratches for full bucket			
		0:53					
				Same as above, becomes moderately hard 3-4 scratches for 1/2 to full bucket			
		2:52		Same as above			
5							
		5:19		Same as above			
				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		10:10		Same as above			
10		16:45		Same as above, very tight but still friable			
		28:10		Becomes almost unexcavatable, 7+ scratches for 1/8 to 1/4 bucket			
				TRENCH TERMINATED AT 12 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▇ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map

LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-2** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Granitic bedrock: Slightly weathered granite, excavates as silty f-c SAND, gray, dry, moderately hard to excavate 3-4 scratches for 1/2 to full bucket			
		3:36		Becomes very hard to excavate, 8 scratches for 1/8 to 1/4 bucket, granitic clasts approx. 6-8" in diameter more apparent in spoils			
		11:07 19:07		Same as above			
5				**TRENCH TERMINATED AT 5 FEET (REFUSAL)** No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map

LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	**TRENCH NO.: T-3** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
				Undocumented fill:			
			SM	Silty clayey f-c SAND, brown to grayish brown, slightly moist			
		0:26					
		1:30		Same as above			
5				**Granitic bedrock:** Weathered, excavates as silty f-c SAND, grayish brown, slightly moist			
		3:04					
				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket, excavates as silty f-vc SAND, gray, slightly moist			
		11:47					
10		19:19		Same as above			
		25:25					
				TRENCH TERMINATED AT 11 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	**TRENCH NO.: T-4** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
		6:17		**Quartzite bedrock:** Non-weathered quartzite, excavates as sandy GRAVEL with cobbles, very hard to excavate 5+ scratches for 1/8 to 1/2 bucket			
				TRENCH TERMINATED AT 2 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
5							
10							
15							

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Trench Location Map		

TRENCH NO.: T-5

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Undocumented fill:			
		0:25	SM	Silty f-c SAND, brown, slightly moist, trace asphalt fragments			
		1:36		Same as above			
5							
		2:27		Same as above, very easy to excavate			
		4:21		Silty f-c SAND, brown, moist			
10		6:12		Same as above			
		8:40					
				Granitic Bedrock:			
		11:40		Non weathered granite, excavates as silty f-c SAND, gray, slightly moist, hard to excavate 4-5 scratches for 1/2 to full bucket			
15				Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		23:25					
				TRENCH TERMINATED AT 16 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-6** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			SM	Silty f-c SAND, reddish brown, dry to slightly moist			
		0:31					
		1:31		Silty clayey f-c SAND, reddish brown, moist			
5							
		2:49		Same as above			
				Granitic bedrock:			
		5:17		Weathered granite, excavates as silty f-c SAND, grayish brown, slightly moist, hard to excavate 4-5 scratches for 1/2 to full bucket			
10		9:52		Same as above			
		14:38		Same as above, becomes gray			
				becomes very hard to excavate 5+ for 1/4 to 1/2 bucket			
		23:52		Same as above			
15							
		33:14					
				TRENCH TERMINATED AT 16 FEET (REFUSAL)			
				No groundwatered encountered			
				Trench backfilled with excavated materials			

LEGEND

Sample type: ■ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES		USCS Symbol	**TRENCH NO.: T-7**	Laboratory Testing		
	Sample Type	Time for Excavation		**MATERIAL DESCRIPTION AND COMMENTS**	Water Content (%)	Dry Density (pcf)	Others
			SM	**Alluvium:** Silty clayey f-c SAND, reddish brown, dry			
		0:41		**Granitic bedrock:** Weathered granite, excavates as silty f-c SAND, grayish brown, dry to slightly moist, moderately easy to excavate 2-3 scratches for full bucket			
		3:24		Becomes hard to excavate 4-5 scratches for 1/2 to full bucket			
5							
		9:28		Becomes very hard to excavate 5 scratches for 1/4 to 1/2 bucket, excavates as silty f-c SAND, gray, slightly moist Excavated material appears to be quartzite, excavates as f-c sandy gravel with some cobbles			
		22:07					
				TRENCH TERMINATED AT 8 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

Depth (ft)	SAMPLES Sample Type	 Time for Excavation	USCS Symbol	**TRENCH NO.: T-8** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	 Dry Density (pcf)	 Others
				Alluvium:			
			sM	Silty clayey f-c SAND, brown, dry			
		0:34		Same as above, becomes slightly moist			
		1:21		Same as above			
5							
		2:31		Silty f-c SAND, brown, slightly moist			
				Granitic Bedrock:			
		5:44		Weathered granite, excavates as silty f-vc SAND, brownish gray, slightly moist, becomes hard to excavate 4-5 scrathes for 1/2 to full bucket			
10		11:12		Same as above			
		19:00		Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		25:26		Same as above, still friable but very tight			
		31:26					
15				**TRENCH TERMINATED AT 12 FEET (REFUSAL)**			
				No groundwatered encountered			
				Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map
LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-9** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Granitic bedrock:			
		2:31		Non-weathered granitic bedrock, excavates as silty f-vc SAND, gray, dry to slightly moist, very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		8:53		Same as above, still friable			
5				Same as above, some of the material is excavated in cobble sized clasts			
		14:00 22:07		Same as above, there is a quartzite dike appro 2-3 in wide that appears unexcavatable perpendicular to the test pit			
				TRENCH TERMINATED AT 7 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT: DR Horton
PROJECT NAME: Winco Site
PROJECT NO.: 2438-CR
LOCATION: See Exploration Location Map

LOGGED BY: DRW
EQUIPMENT 100K Excavator
DATE: 7/14//2020

Depth (ft)	SAMPLES		USCS Symbol	TRENCH NO.: T-10	Laboratory Testing		
	Sample Type	Time for Excavation		MATERIAL DESCRIPTION AND COMMENTS	Water Content (%)	Dry Density (pcf)	Others
				Quartzite bedrock:			
		0:33		Very weathered quartzite, excavates as silty clayey f-c SAND, light gray, dry, easy to excavate			
		1:35		Same as above			
5				Becomes moderately easy to excavate 2-3 scrathes for 1/2 to full bucket			
		3:42					
		7:03		Same as above, becomes moist			
10		10:56					
				Becomes easy to excavate 1-2 scratches for full bucket, trace clayey fault gouge becomes apparent			
		12:43					
		15:16					
15							
		17:44		Still easy to excavate, clayey fault gouge becomes more apparent			
		19:28					
				TRENCH TERMINATED AT 18 FEET No groundwatered encountered Trench backfilled with excavated materials			

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY TRENCH

CLIENT:	DR Horton	**LOGGED BY:**	DRW
PROJECT NAME:	Winco Site	**EQUIPMENT**	100K Excavator
PROJECT NO.:	2438-CR	**DATE:**	7/14//2020
LOCATION:	See Exploration Location Map		

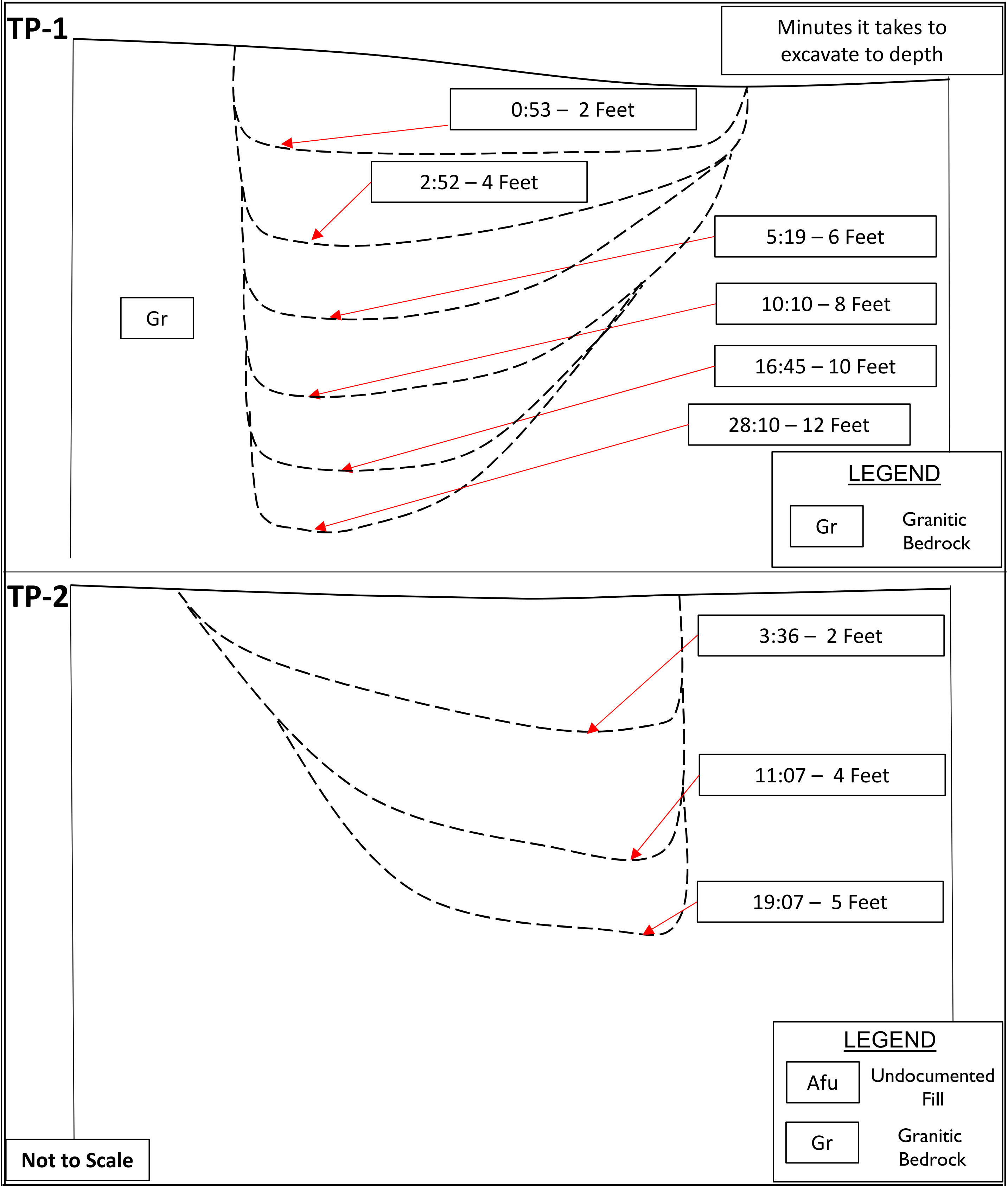
Depth (ft)	SAMPLES Sample Type	SAMPLES Time for Excavation	USCS Symbol	**TRENCH NO.: T-11** **MATERIAL DESCRIPTION AND COMMENTS**	Laboratory Testing Water Content (%)	Laboratory Testing Dry Density (pcf)	Laboratory Testing Others
				Alluvium:			
			SM	Silty f-c SAND, brown, dry to slightly moist			
		0:27		**Granitic bedrock:** weathered granite, excavates as silty f-c SAND, brownish gray, slightly moist			
		1:52		Same as above, becomes moderately easy to excavate 2-3 scratches for 1/2 to full bucket			
5							
		4:14		Becomes hard to excavate 4-5 scratches for 1/2 to full bucket, some quartzite clasts become apparent within spoils Becomes very hard to excavate 5+ scratches for 1/4 to 1/2 bucket			
		19:06		Excavator scratching on quatrzite that is unexcavatable			
				TRENCH TERMINATED AT 8.5 FEET (REFUSAL) No groundwatered encountered Trench backfilled with excavated materials			
10							
15							

LEGEND

Sample type: ▨ ---Ring ☒ ---Large Bulk ▽ ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

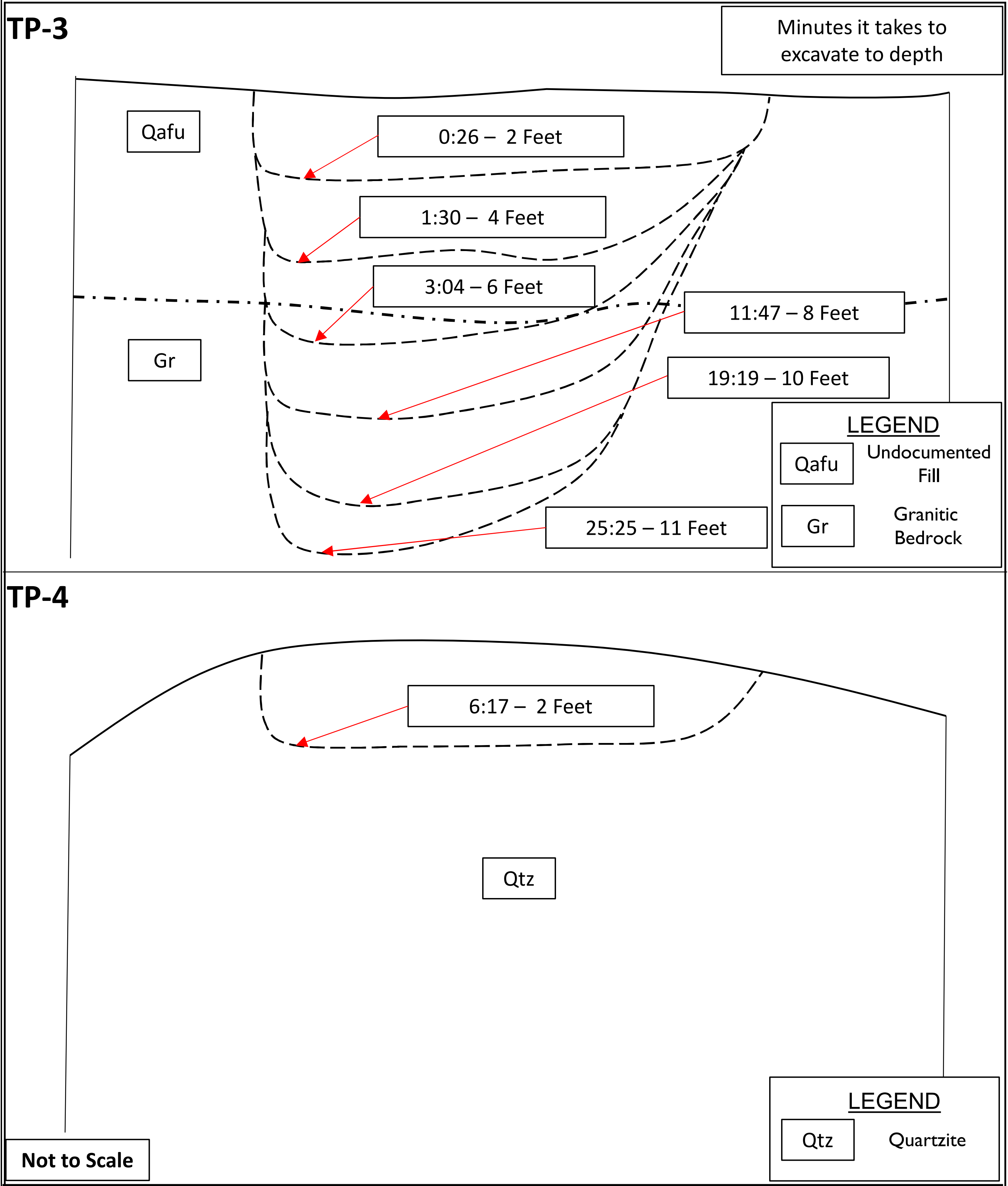
GeoTek Project No. 2438-CR

Figure I

Graphic Trench Logs

GEOTEK

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



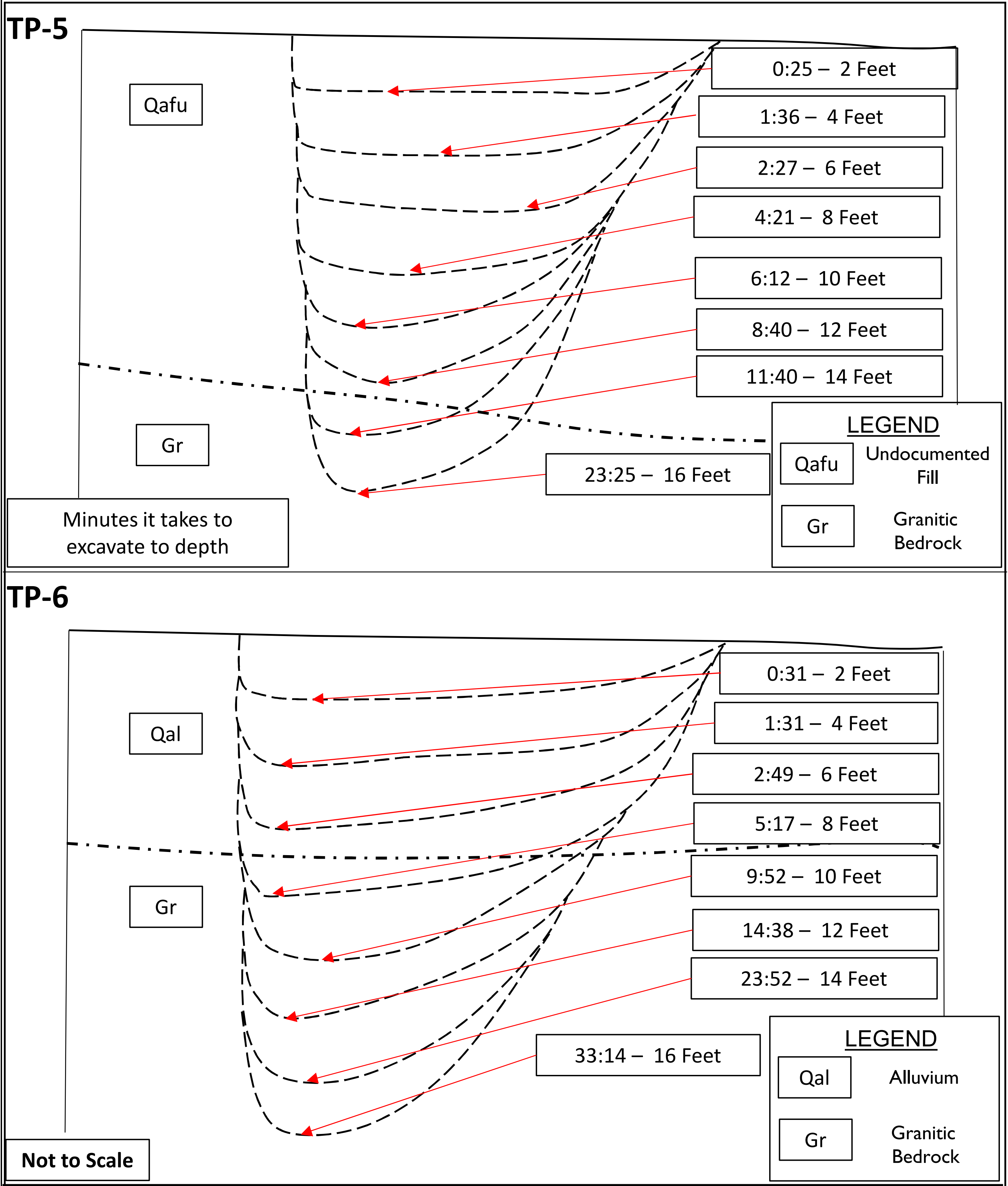
DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 2

Graphic Trench Logs

GEOTEK



DR Horton
Winco Site Project
Moreno Valley, Riverside County,
California

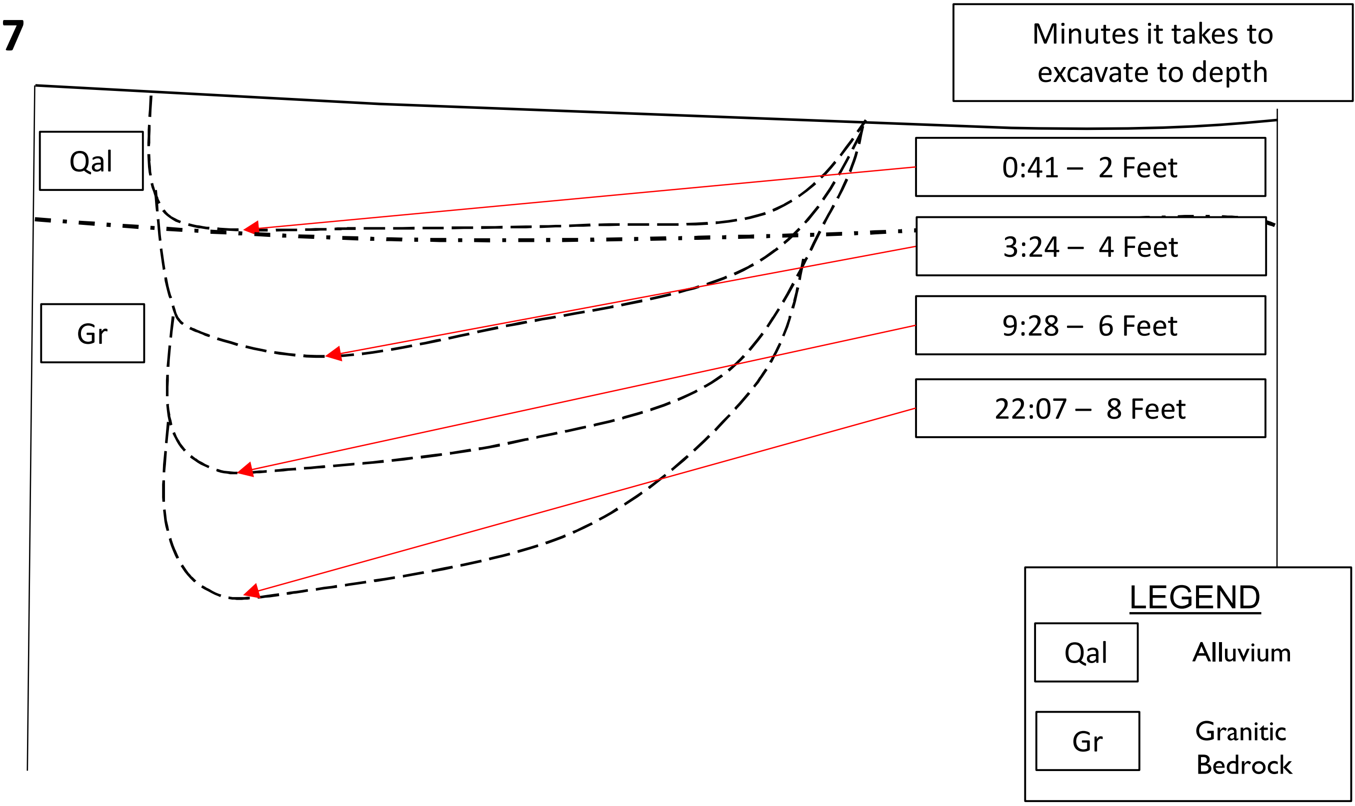
GeoTek Project No. 2438-CR

Figure 3

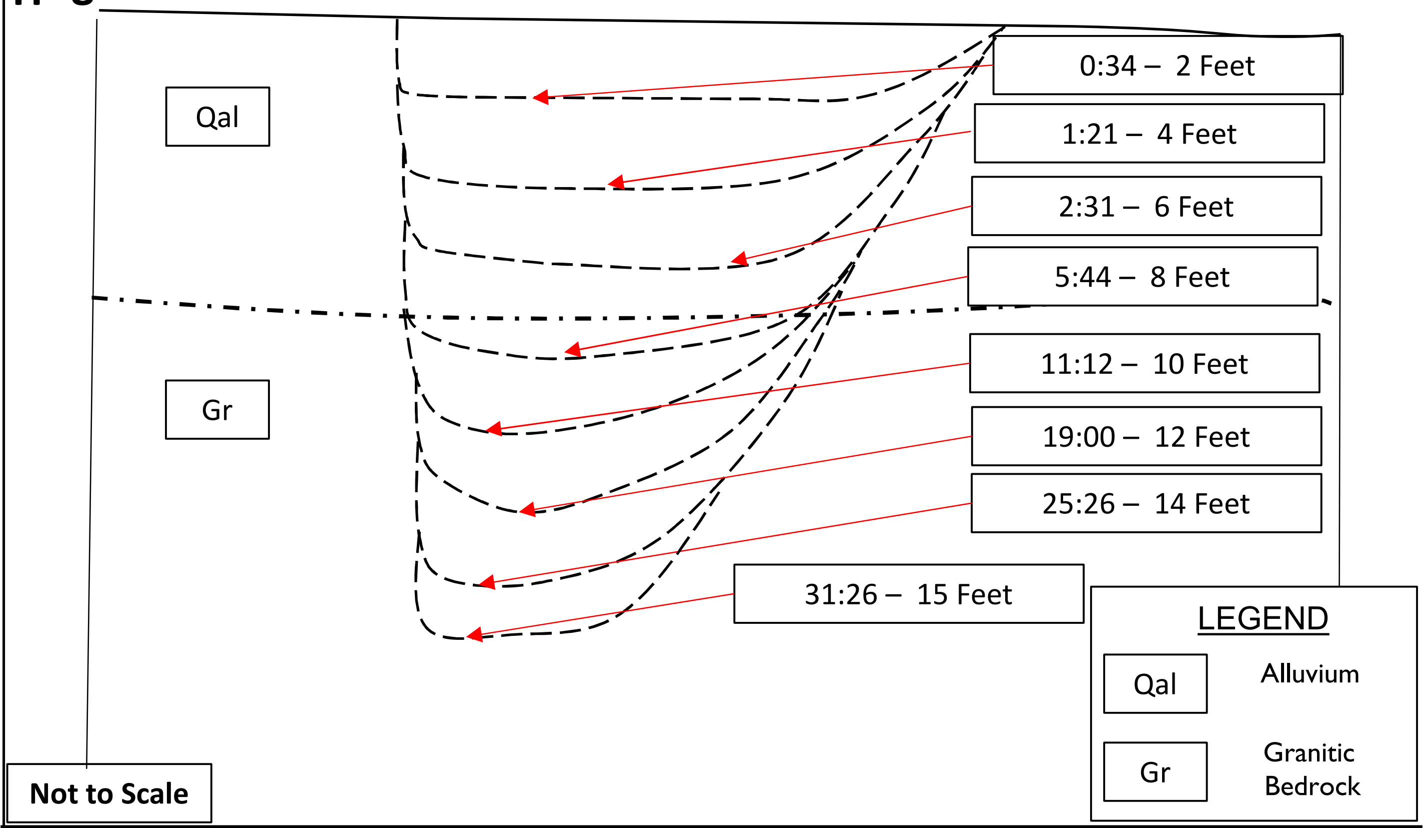
Graphic Trench Logs

GEOTEK

TP-7



TP-8



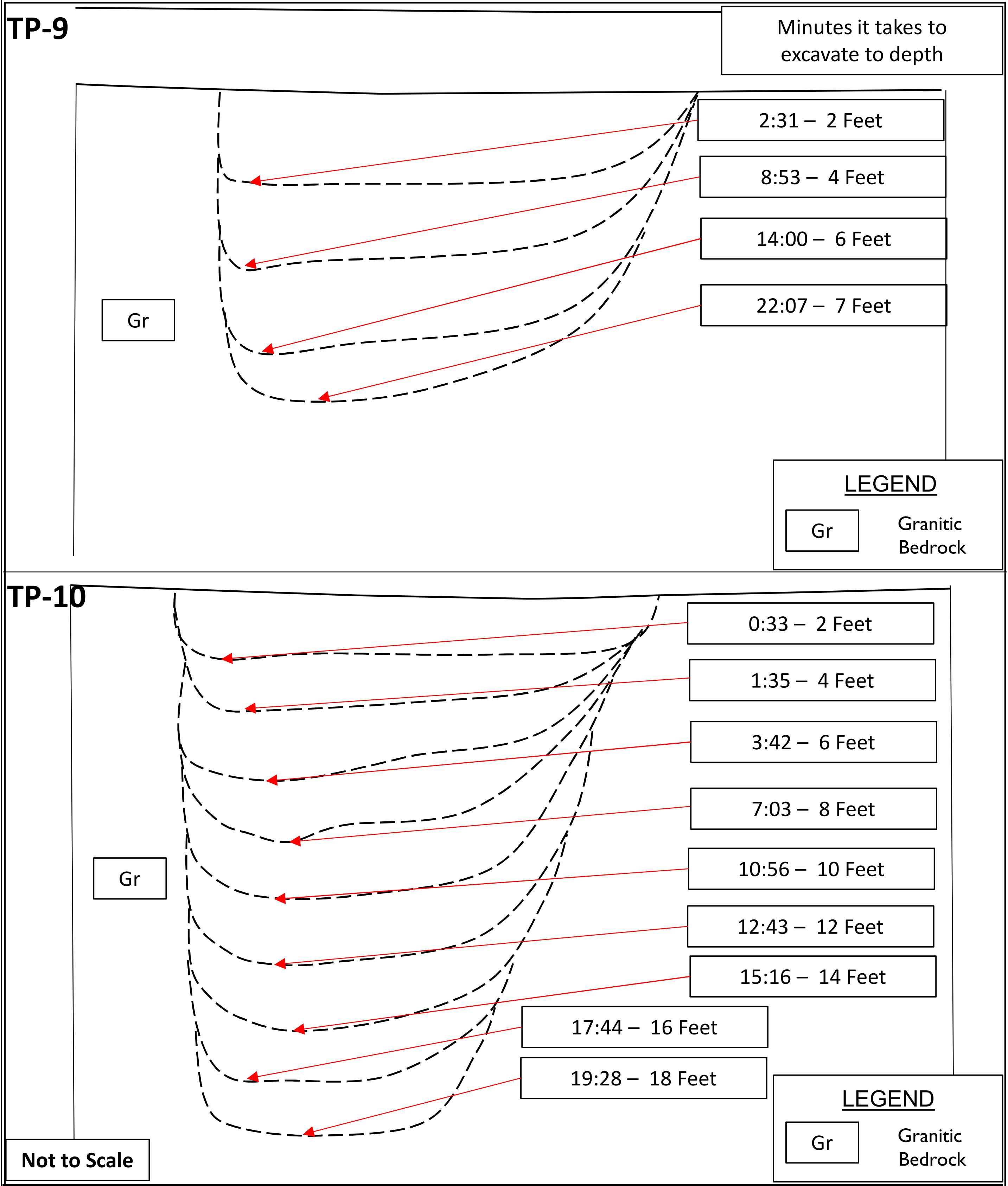
DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 4

Graphic Trench Logs

GEOTEK



Not to Scale

DR Horton
Winco Site Project
Moreno Valley, Riverside County,
California

GeoTek Project No. 2438-CR

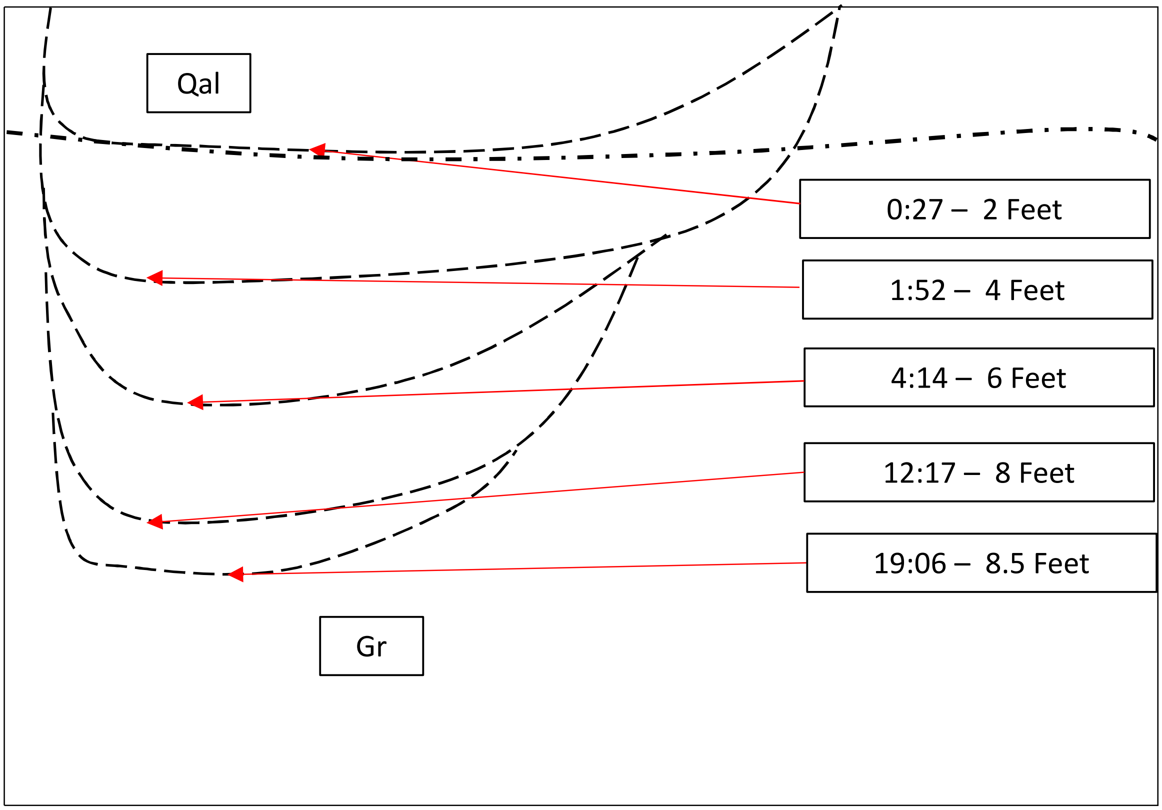
Figure 5

Graphic Trench Logs

GEOTEK

TP-11

Minutes it takes to excavate to depth



Not to Scale

LEGEND

Qal	Alluvium
Gr	Granitic Bedrock

DR Horton
Winco Site Project
Moreno Valley, Riverside County, California

GeoTek Project No. 2438-CR

Figure 6

Graphic Trench Logs

GEOTEK

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

APPENDIX C

SEISMIC REFRACTION SURVEY RESULTS BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

Subsurface Surveys & Associates, Inc.
2075 Corte Del Nogal, Suite W   Carlsbad, CA 92011
Phone: (760) 476-0492   Fax: (760) 476-0493

GeoTek. Inc.
1548 North Maple Street
Corona, CA   92880

August 19, 2020

Attn: Ed LaMont

Re: Seismic Survey Summary Report
Darwin 72 Project, Moreno Valley, CA

This report covers the results of a seismic refraction survey performed at the Darwin 72 Project site in Moreno Valley, California. The purpose of the survey was to measure the compressional wave velocity of bedrock for rippability assessment and to provide cross sections showing thickness of the weathered zone and depth to the unweathered interface. This should be useful for planning cuts, grading, and other earthwork.

The field work was conducted during July 27-28, 2020. Thirteen seismic lines were recorded at locations selected by GeoTek. A survey location map is provided on Figure 1 that shows the position and orientation of the traverses.

GEOLOGIC SETTING

A review of the “Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California ”, (USGS Open File Report 2006-1217, 2006) indicates the survey area is underlain by Cretaceous tonalite (Kt), undifferentiated.

Surface deposits are mapped as very old alluvial fan deposits (Qvof).

DATA ACQUISITION AND FIELD METHODS

Seismic refraction data were recorded with a Bison 9024 signal enhancement seismograph and 28 Hz geophones. The standard spread layout used 24 geophones with a 5 or 8-foot spacing which provided a line length of 120 and 192 feet, respectively. Each spread used five shotpoints, one off each end (5-foot offset) and three within the interior of the spread. Depth of investigation was approximately 20-45 feet

Compressional wave energy was created by sledge hammer impacts on a metal plate. The signal enhancement feature of the seismograph allowed returns from repeated hits to be stacked, thus improving the signal. Each record was stored digitally on an internal hard disk and printed copies of each seismogram were made in the field on thermal paper. Example field records are shown on Figure 2.

Relative elevations of all shotpoints and geophones were determined by differential leveling with a hand level. Geophone 1 (distance = 0 ft.) at the beginning of each line was assigned a elevation value of 0.0 feet. This datum point served as the reference elevation for all other measurements.

Labeled wooden stakes were placed at the beginning and end of each spread and a Garmin handheld GPS receiver was used to record the latitude and longitude coordinates of the stakes. The coordinates were used to make the location map shown on Figure 1.

SEISMIC REFRACTION METHOD

The refraction method involves measuring the total time for compressional waves to travel from a shotpoint through the subsurface to a set of geophones placed linearly along the ground. Based on Snell's Law, when two or more layers are present with increasingly higher acoustic velocity, waves become critically refracted across the layer boundaries and begin traveling at the speed of the underlying layer. The advancing waves then generate new wavefronts back to the ground surface. The first surge of energy hitting the geophone is termed the "first arrival" and is depicted on the seismogram as a high angle deflection along each trace.

Recognition of direct wave arrivals (non-refracted) verses refracted waves is a key element of refraction interpretation. To assist this process, the first arrival times measured from the seismic records are plotted on graphs of time verses distance called Time-Distance graphs. An example T-D graph from Line 3 is shown on Figure 3. Based on changes in slope on the graphs, a preliminary layer number (i.e. 1, 2, 3) is assigned to each segment of the graph. The layer assignments together with time, distance and elevation data are input to a computer for additional processing.

DATA REDUCTION AND VELOCITY DETERMINATION

Seismic data from this survey were processed using two methods. The first method uses “SIPT2", an interactive inversion modeling program developed by James Scott for the U.S. Bureau of Mines. This software applies a modified “delay-time” approach to calculate the average velocity across the refraction horizons and calculate the thickness of the layers.

The second modeling method uses what is referred to as tomographic inversion and produces velocity gradient cross sections in color. Tomography does not perform refraction layer calculations or attempt to measure discrete depths. Instead, the main objective is to create a velocity distribution grid in the subsurface. Each node of the grid has a specific velocity associated with it. The goal is to adjust or “iterate” the velocity matrix so that the computer derived travel-time curves match what was recorded in the field. The final velocity grid is then loaded into a contouring program that produces color filled cross sections. This method is typically used for imaging the shape and configuration of complex structures such as faults, landslides and intrusions, and areas where strong lateral velocity gradients are suspected within the weathered profile.

The tomographic modeling program used for this survey is SeisOpt Version 3.5 from Optim LLC. It uses a proprietary inversion algorithm that applies a non-linear optimization technique called generalized simulated annealing to adjust the velocity grid points for the best statistical match. It is referred to as an optimization because it attempts to find the model that has the least minimum travel-time error between the calculated and observed (field) measurements.

SUMMARY OF RESULTS

Prior to starting the fieldwork, Geotek provided information on the proposed cuts beneath each of the 13 traverses. Where planned cuts were 15 feet or less, data were recorded with a 5-foot geophone spacing to provide good resolution of the geologic units and a penetration depth of about 20-25 feet. This group included Lines 2, 5, 6, 8, 12, and 13. Proposed cuts beneath the other seven traverses ranged for 18 to 28 feet. An 8-foot geophone spacing was used for these lines to provide a greater exploration depth beneath of about 40 feet.

Seismic Refraction Layer Models

Results from refraction analysis show a three layer solution beneath all lines (see Figures 5-17). Velocities posted on the cross sections represent averages as described in the previous section. Therefore, minor localized changes in velocity may occur along any profile.

Four main geologic units are interpreted from the modeling results. The refraction software was used to determine the average velocity of each layer. A description of the layers is provided below and a velocity summary is shown in Table 1. Please note: only three of the four layers are displayed on the cross sections. This is the result of Layer 2 being very thin, generally less than five feet thick, and therefore was not resolved beneath lines with 8-foot spacing.

Layer 1 -	is mostly loose soil and colluvium with rock fragments. Thickness is generally less than 5 feet.
Layer 2 -	is interpreted to be highly weathered or decomposed bedrock.
Layer 3 -	is interpreted to be weathered bedrock. The velocity range is 3360-4887 ft/sec. Based on the Cat rippability chart shown on Figure 4, this range is considered easily rippable with a D-9 Cat.
Layer 4 -	represents moderately weathered to unweathered bedrock.

Table 1. Cross Section Summary Velocity in (ft/sec), Depth in (feet)

Line	Velocity Layer 1	Velocity Layer 2	Velocity Layer 3	Depth Range Moderately Weathered to Unweath. Bedrock Interface
1	1512	4617	6494	10 - 26
2	1471	3270	4793	ND
3	1750	4887	6134	19 - 29
4	1364	3900	5699	19 - 38
5	1166	2930	4020	ND
6	1104	3039	4594	ND
7	1395	3379	5838	11 - 24
8	1321	4131	7464	9 - 16
9	1613	4910	7925	6 - 17
10	1447	3663	6080	4 - 21
11	1667	4191	5705	10 - 22
12	1234	2630	4134	ND
13	1148	2691	3360	ND

ND - Not Detected

Weathering tends to be gradational for most granitic rock types and usually produces a gradual increase in velocity with depth. Consequently, variation of ± 10-15 % from the posted averages may occur between the top and bottom of Layer 2.

Tomographic Models

Following the end of fieldwork, Geotek requested tomographic modeling for Lines 1, 5, 6, 8-11, and 13. The main objective was to provided additional graphics to explore for evidence of possible core stones in the weathered rock matrix.

The five shotpoints per line recorded for refraction survey were to be used for modeling. This is less than the 7 to 9 shotpoints Subsurface Surveys typically uses for tomography because it limits ray-path coverage and localized shotpoint control.

Results are displayed on adjacent pages following the layer model cross sections for each traverse. Some short comings should be noted: 1) areas with poor ray-path density tend to produce low velocity anomalies compared to the surrounding contours and may disrupt the lateral continuity of the higher velocity data and 2) the relatively thin surface layers shown on the refraction models may pinch out or be missing on the tomographic models.

Based on a review of the modeling results and an inspection of all the time-distance graphs, there doesn't appear to be any evidence of core stones with significant size, that would impact grading operations or the digging of utility trenches beneath the seismic lines.

Rippability

Figure 4 presents a rippability chart (courtesy of Caterpillar Tractor Co.) for a D9R Ripper. Bar graphs show the relationship between seismic compressional wave velocity and ripper performance for various rock types in three categories: rippable, marginal, and non-rippable. Granitic rocks are listed as marginally rippable at approximately 6800 ft/sec and are considered non-rippable above 8000 ft/sec. This chart is provided only as a guide and should not be considered absolute. Other geologic factors that may influence bedrock rippability at this site include changes in composition of the bedrock and the presence of fractures and joints.

All data acquired during this survey is considered confidential and is available for review by your staff at any time. We appreciate the opportunity to participate in this project.

Please call if there are any questions.

PAWalen

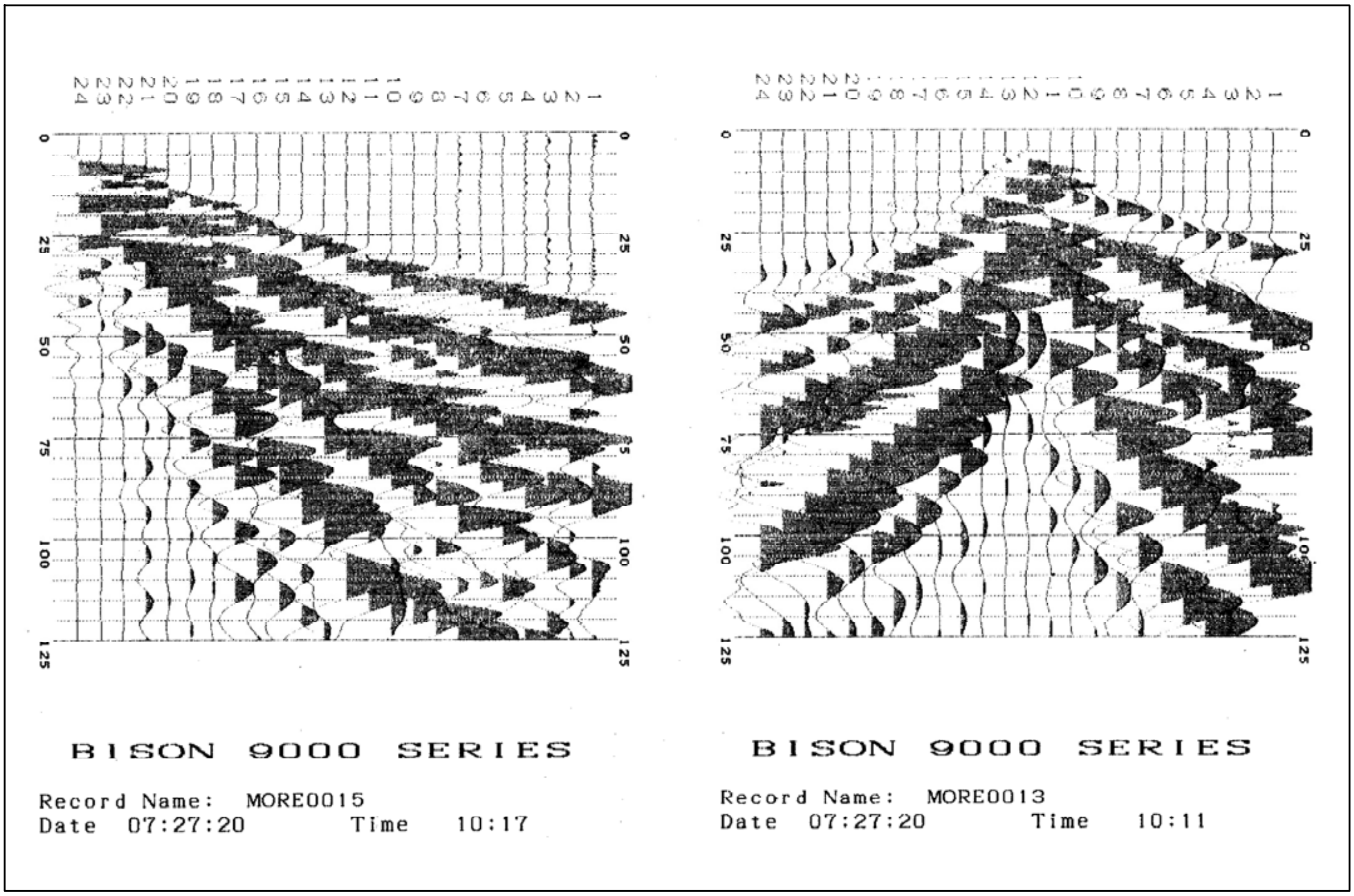
Phillip A. Walen
Senior Geophysicist
CA Registration No. GP917

Seismic Survey Location Map

Tract 31589, Darwin 72 Project -- Moreno Valley, California

Figure 1

Example Seismic Field Records



BISON 9000 SERIES

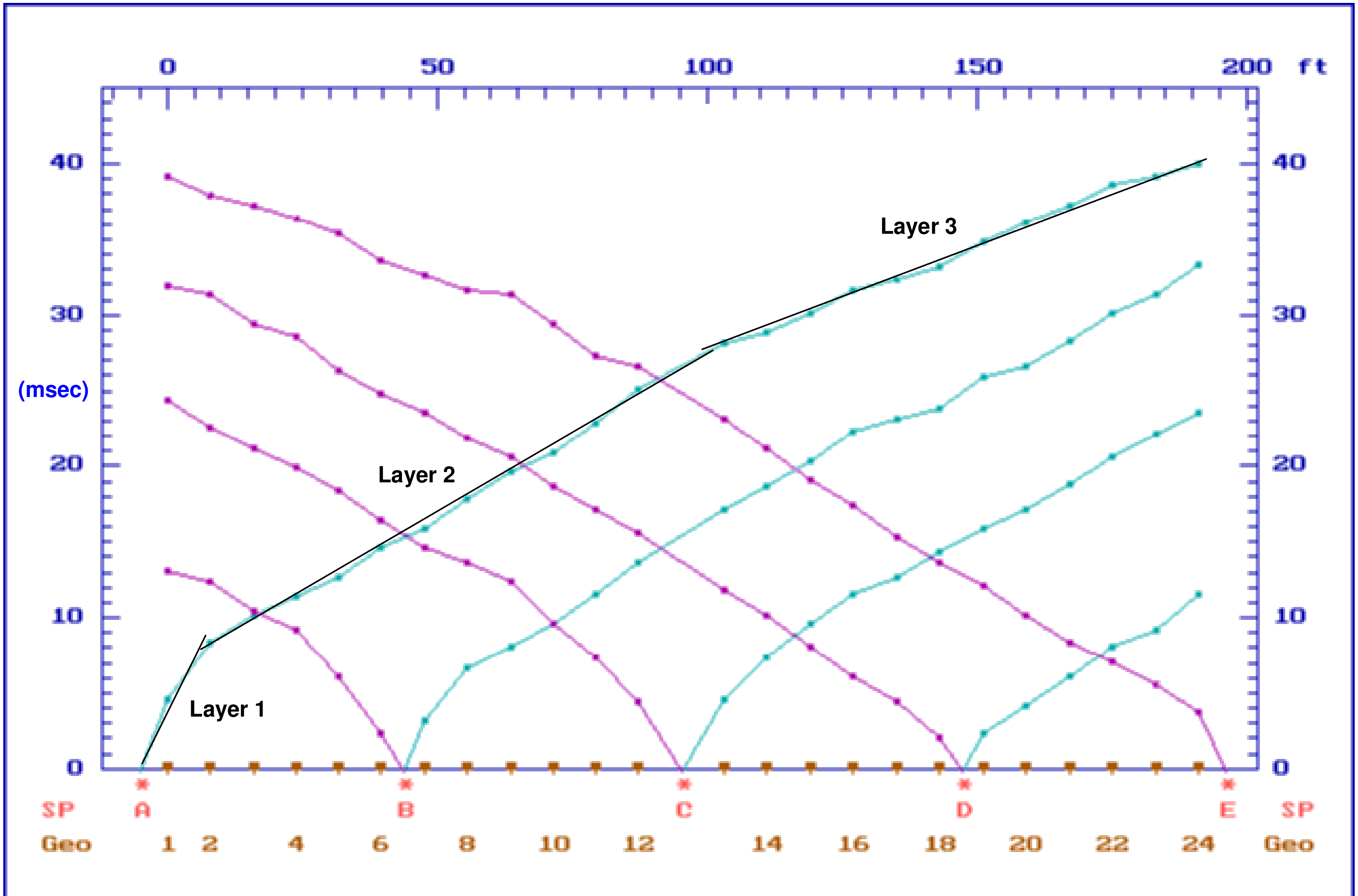
Record Name: MORE0015
Date 07:27:20 Time 10:17

BISON 9000 SERIES

Record Name: MORE0013
Date 07:27:20 Time 10:11

Figure 2

Example Time-Distance Graph -- Line 3



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 3

Rippers | Ripper Performance
- D9R/D9T

D9R/D9T
- **Multi or Single Shank No. 9 Ripper**
- **Estimated by Seismic Wave Velocities**

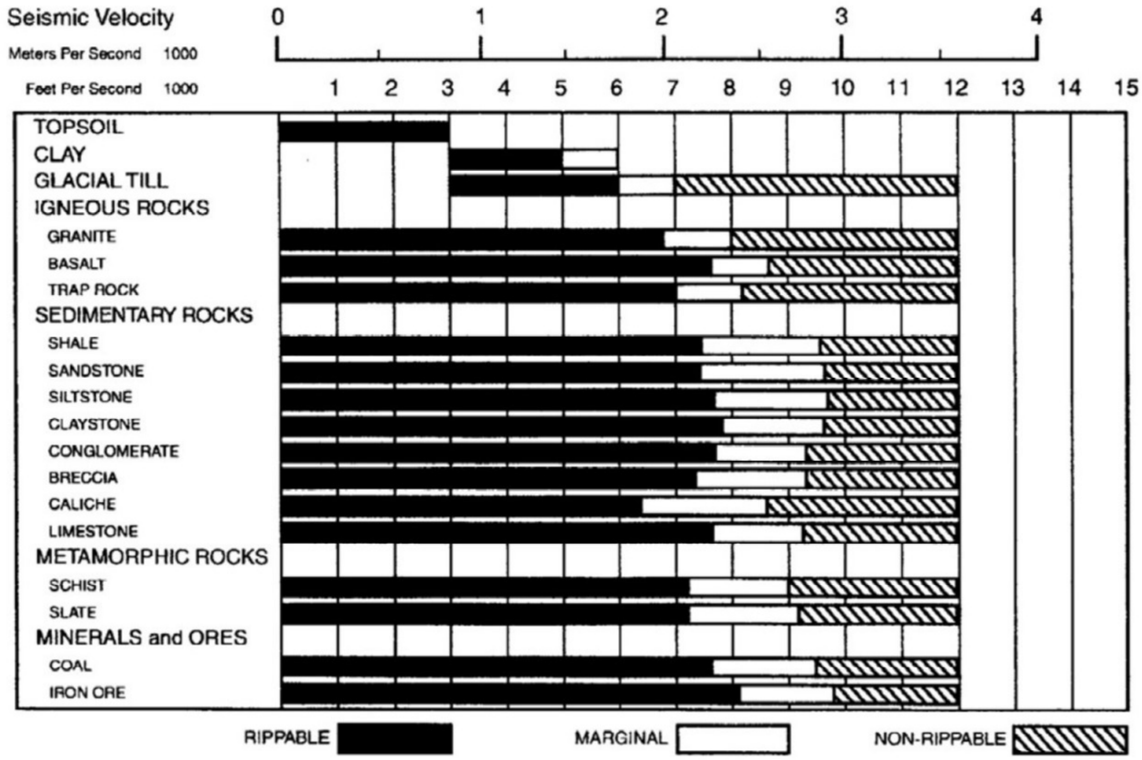
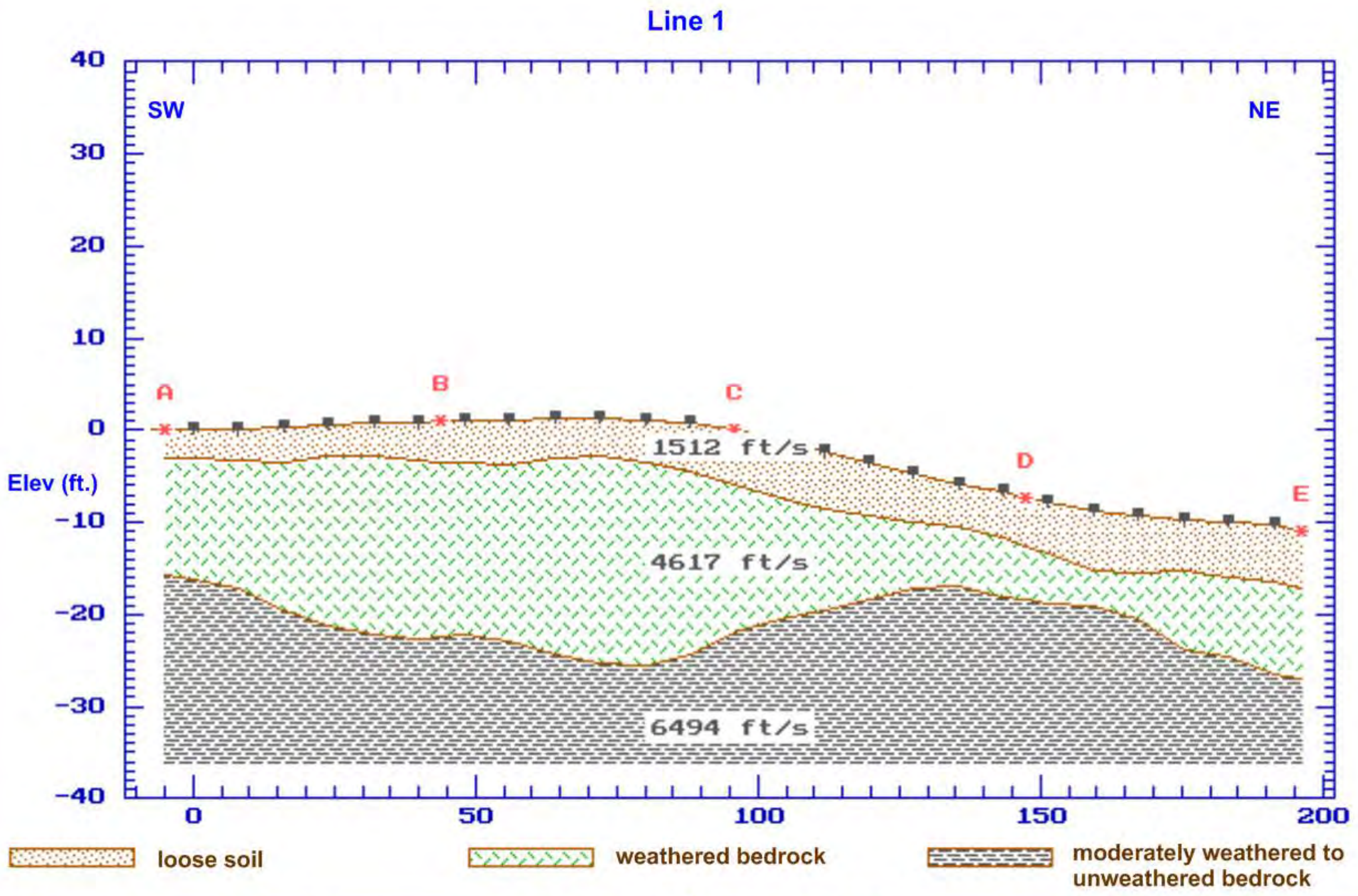


Figure 4



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 5

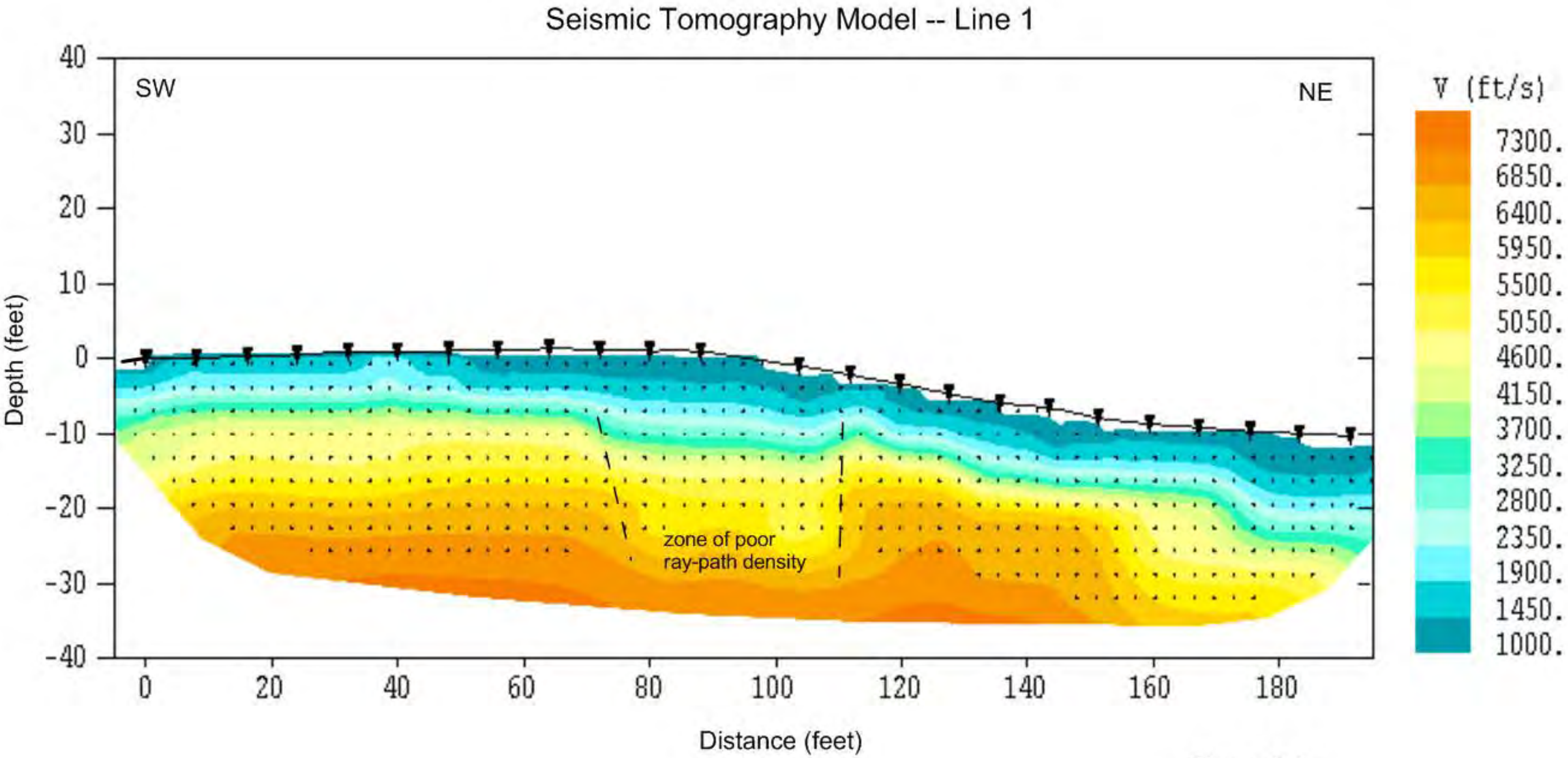
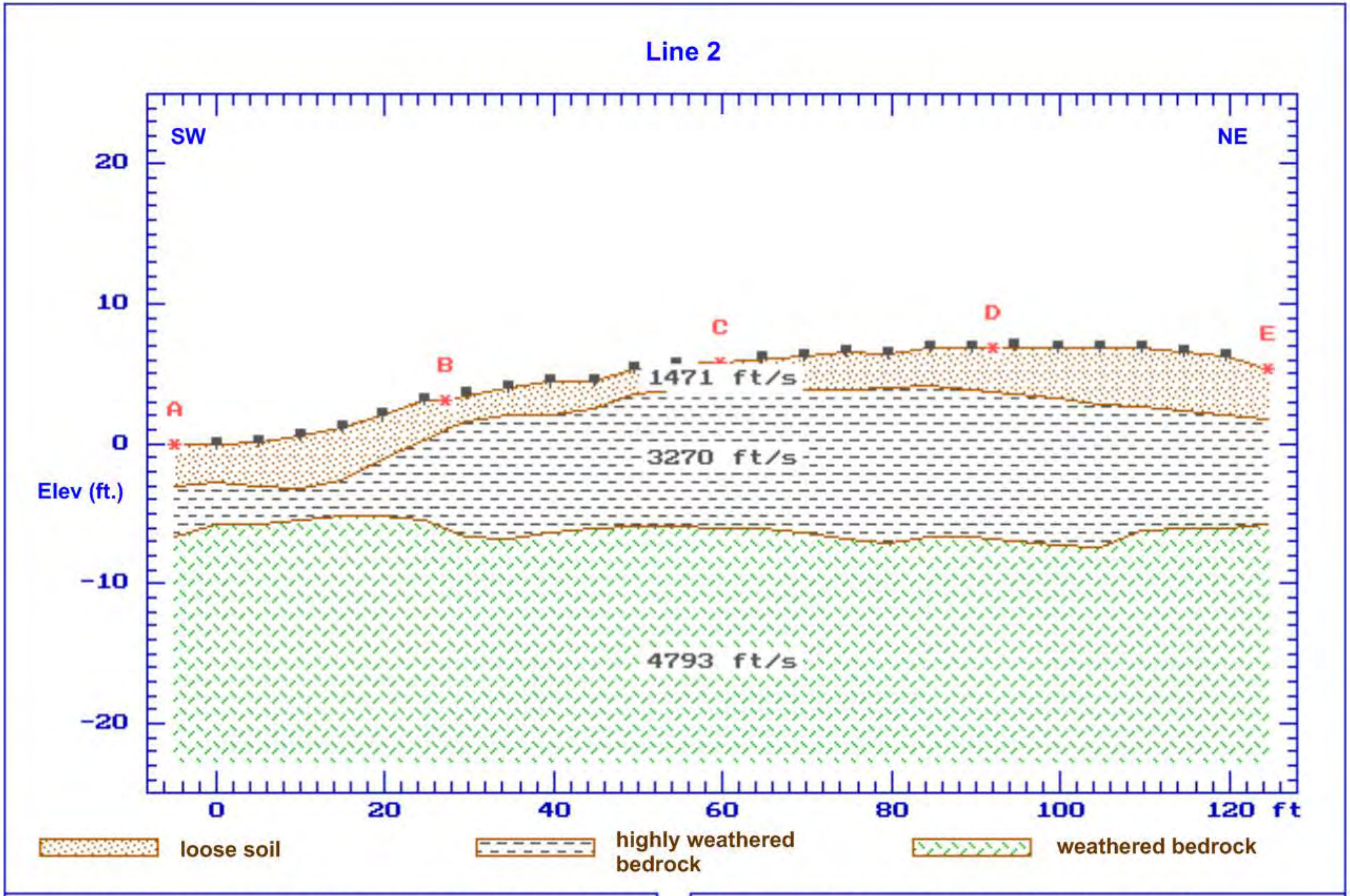
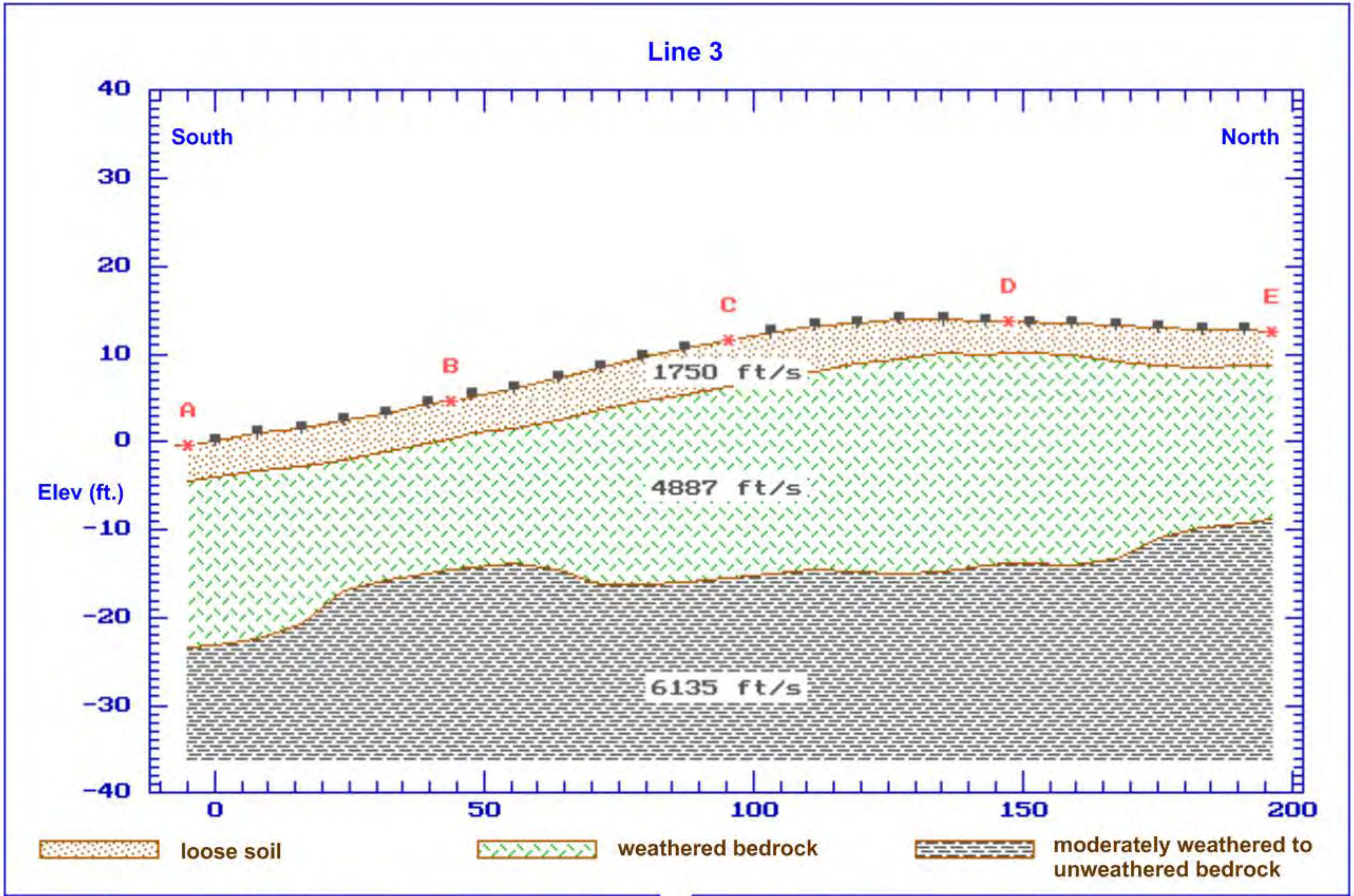

Seismic Tomography Model -- Line 1
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
Distance (feet)
0
20
40
60
80
100
120
140
160
180
zone of poor
ray-path density
V (ft/s)
7300.
6850.
6400.
5950.
5500.
5050.
4600.
4150.
3700.
3250.
2800.
2350.
1900.
1450.
1000.

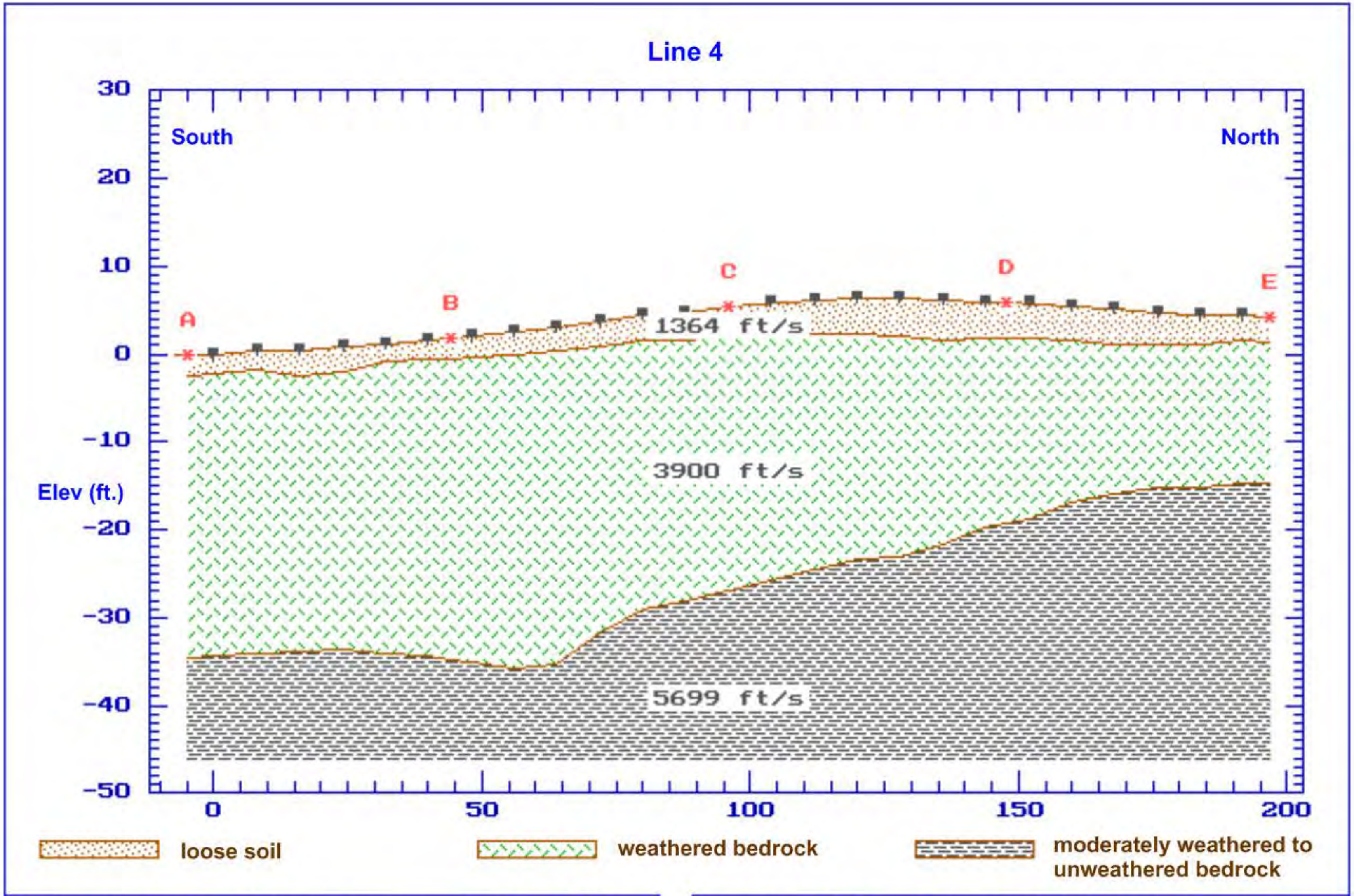
Figure 5-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 6



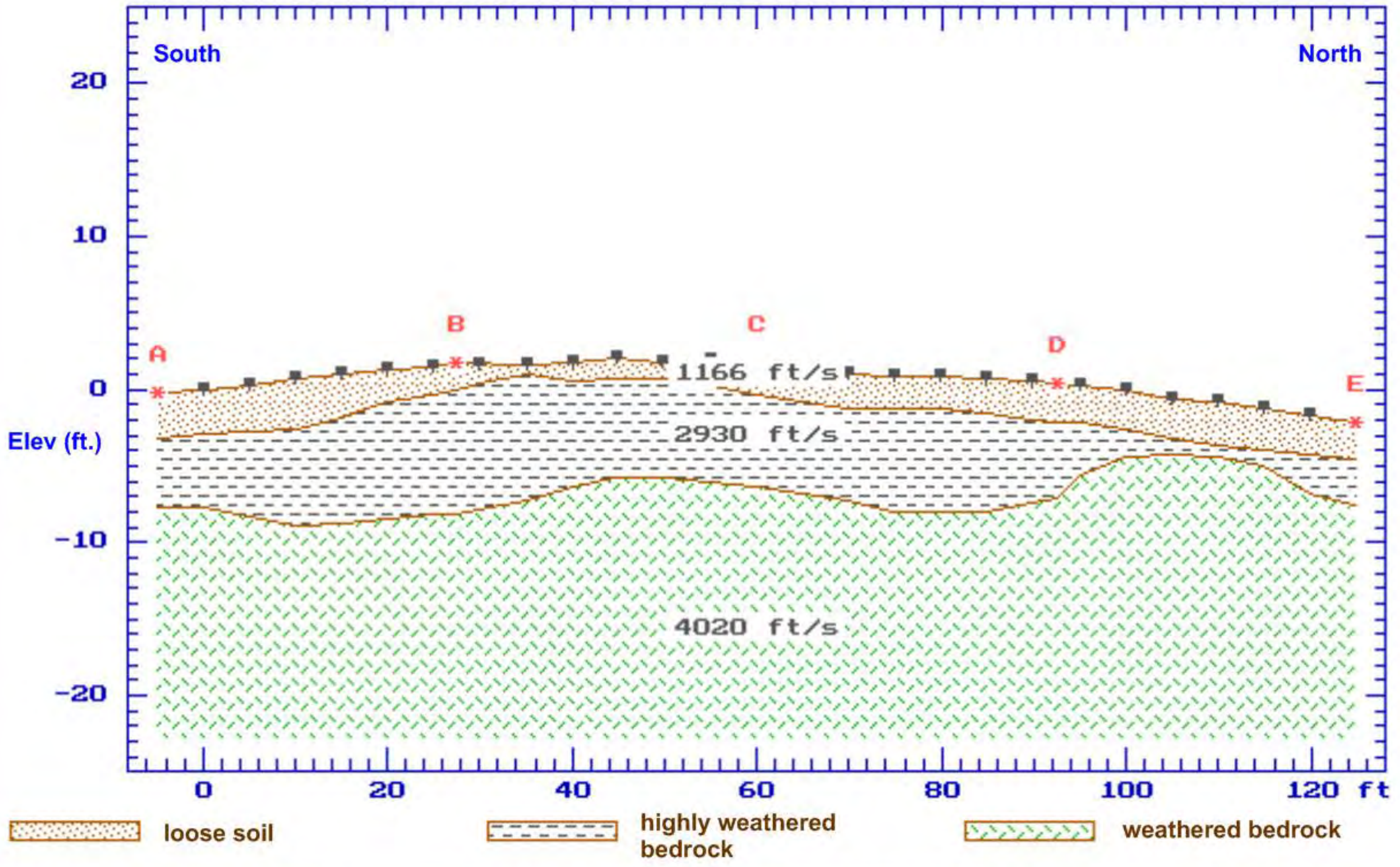
Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 7



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 8

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

Line 5



Seismic Refraction Survey 7/27/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 9

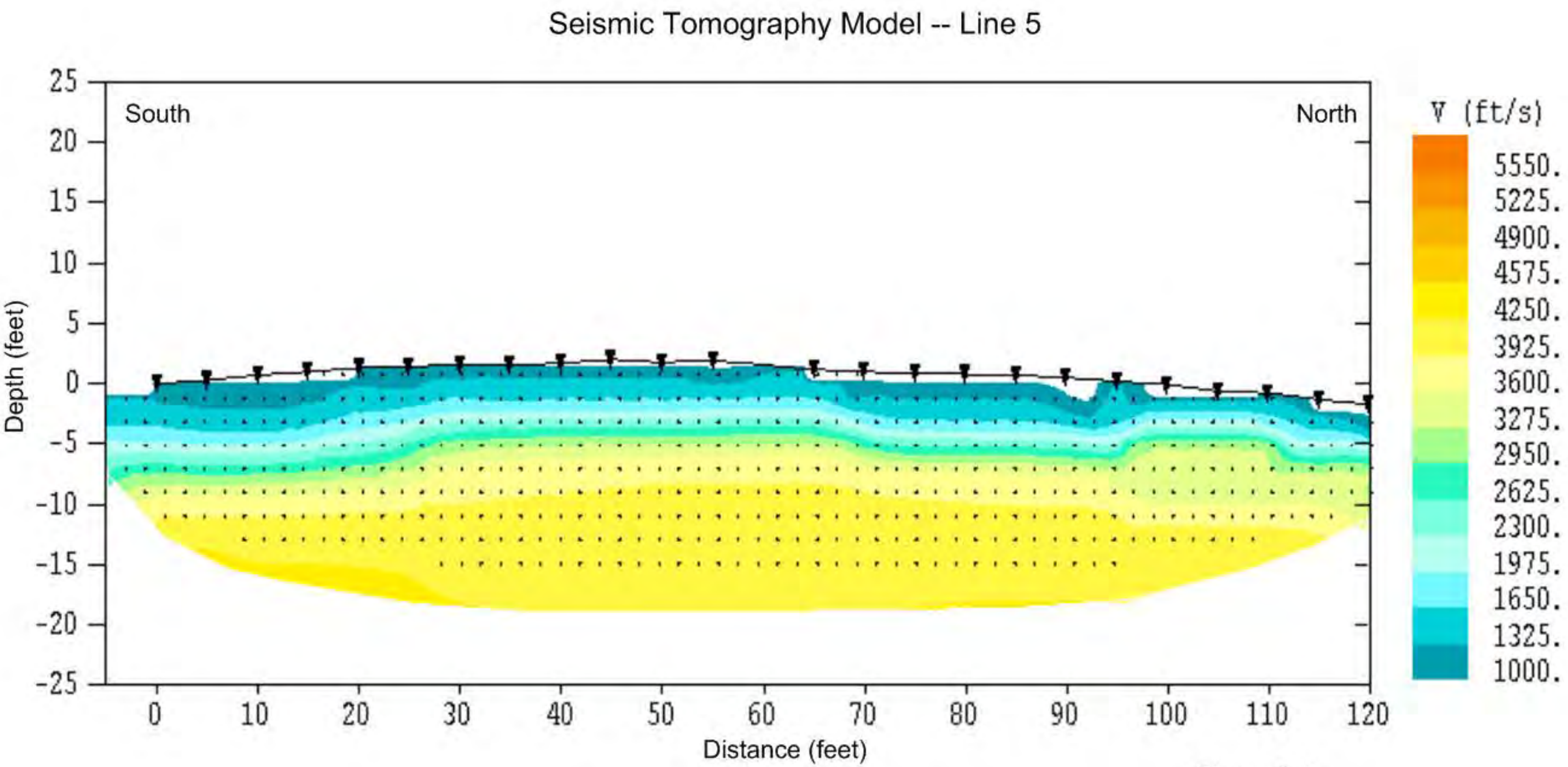
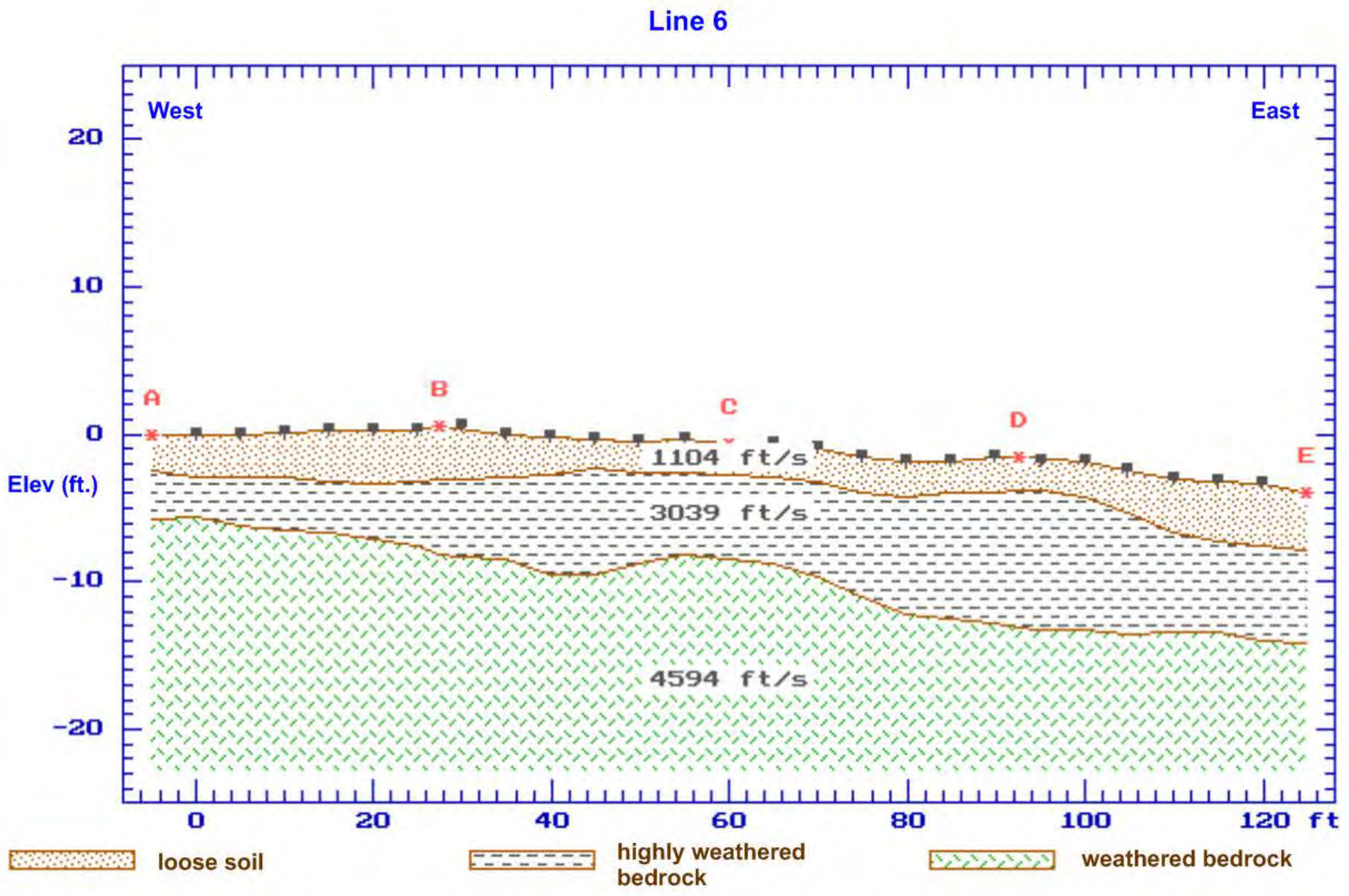

Seismic Tomography Model -- Line 5
South
North
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
110
120
Distance (feet)
V (ft/s)
5550.
5225.
4900.
4575.
4250.
3925.
3600.
3275.
2950.
2625.
2300.
1975.
1650.
1325.
1000.

Figure 9-1



Seismic Refraction Survey 7/27/2020

Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project

Moreno Valley, California

Figure 10

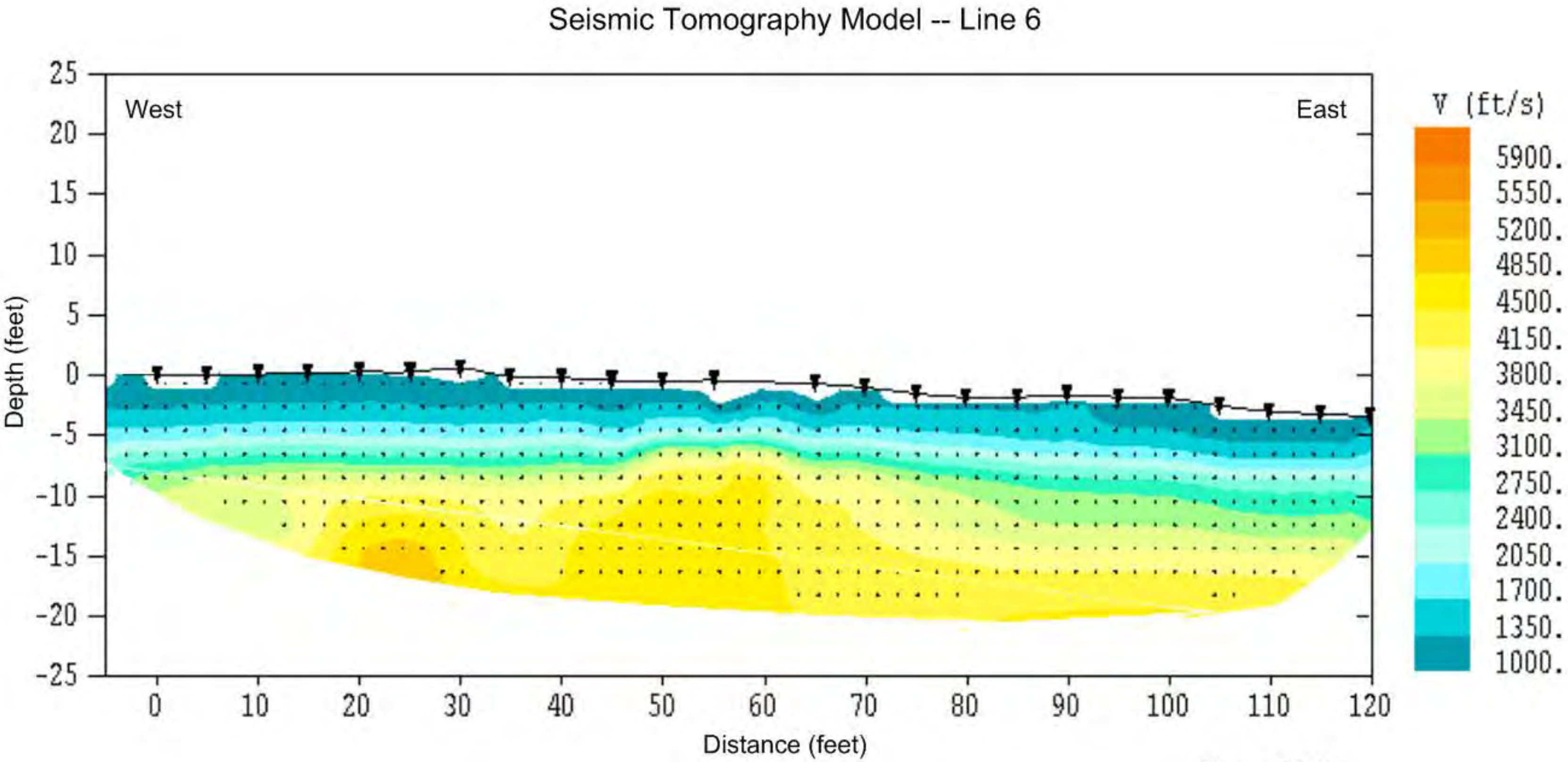
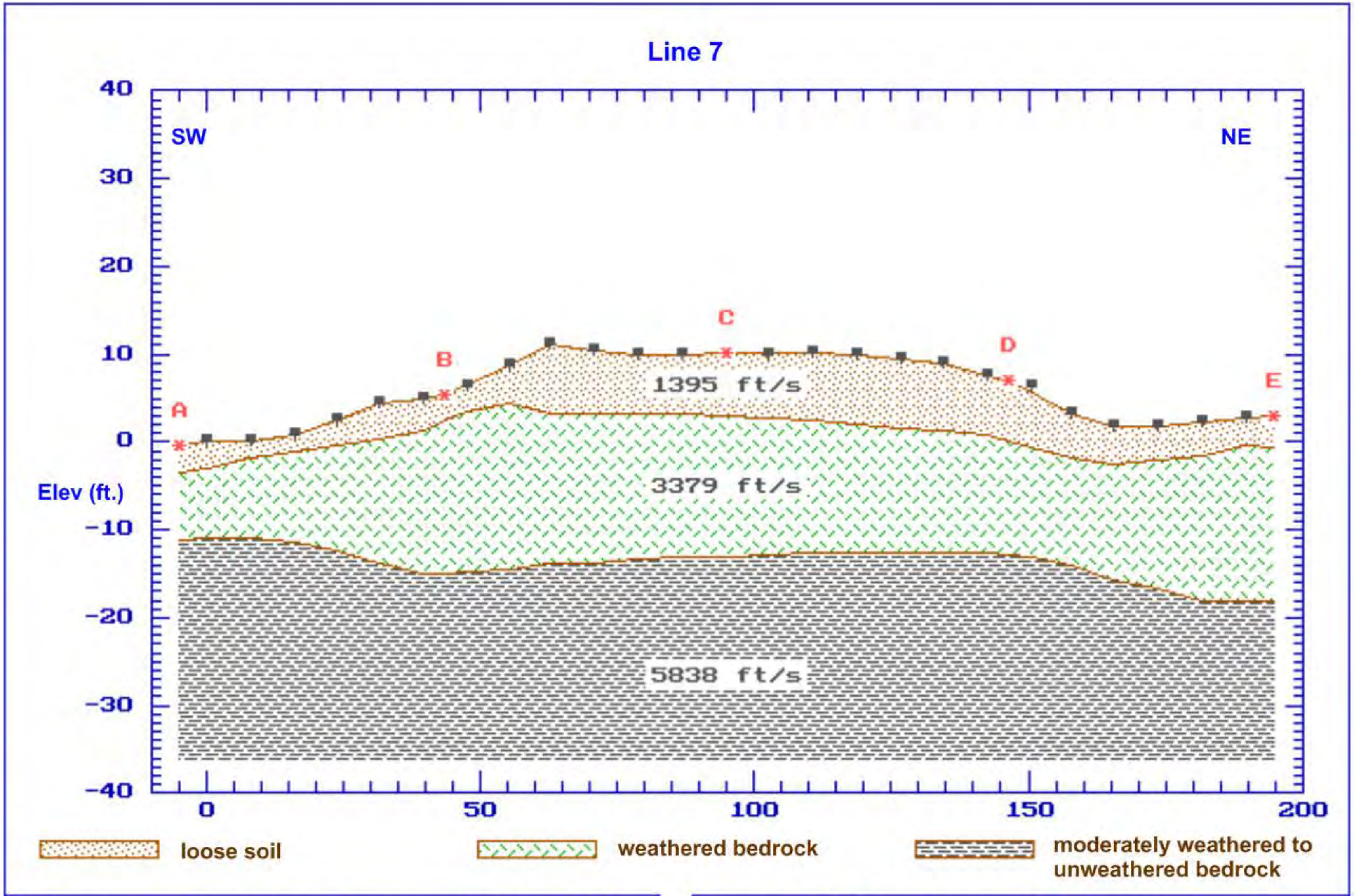

Seismic Tomography Model -- Line 6
West
East
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
110
120
Distance (feet)
V (ft/s)
5900.
5550.
5200.
4850.
4500.
4150.
3800.
3450.
3100.
2750.
2400.
2050.
1700.
1350.
1000.

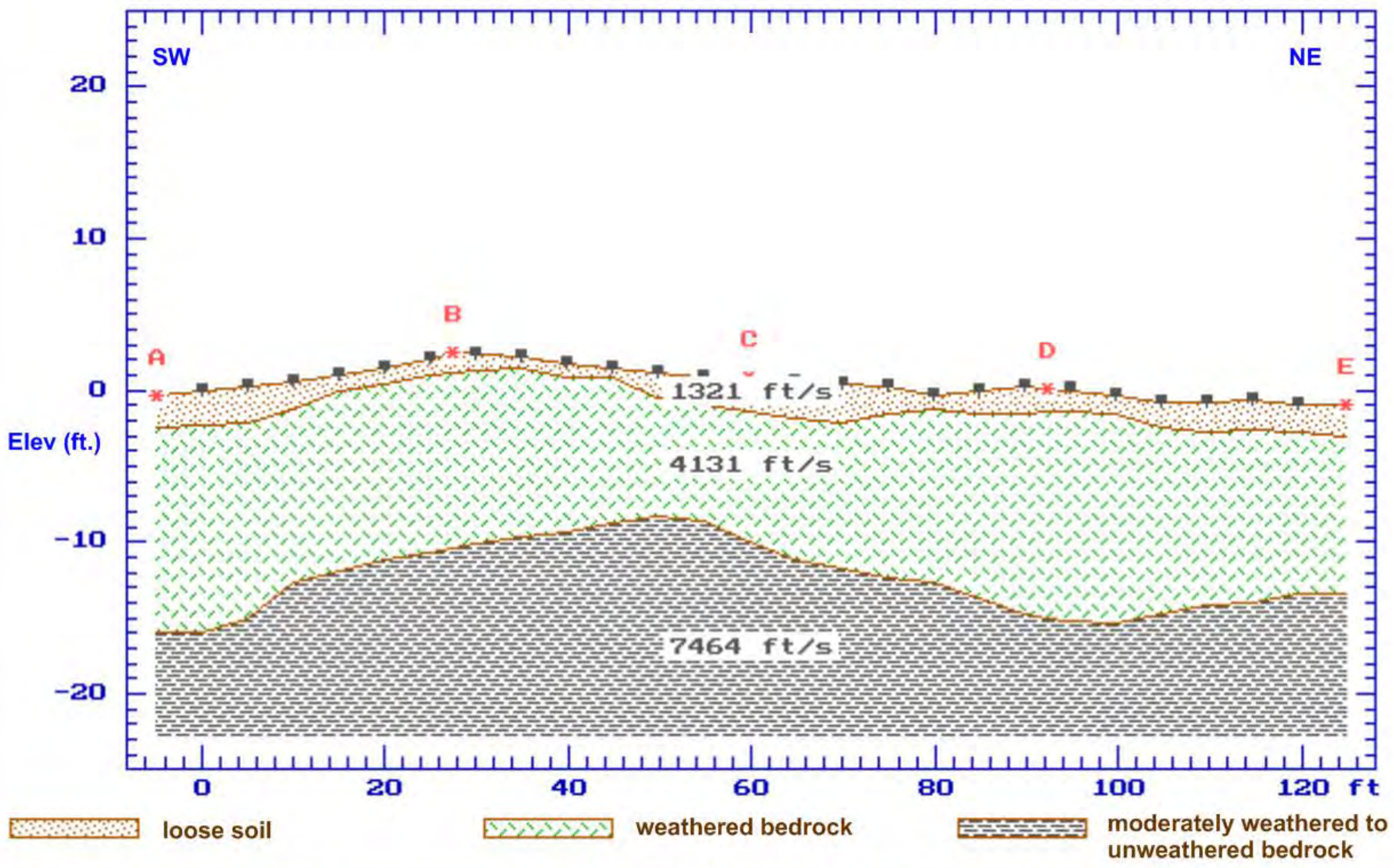
Figure 10-1



Seismic Refraction Survey 7/27/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 11

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

Line 8



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 12

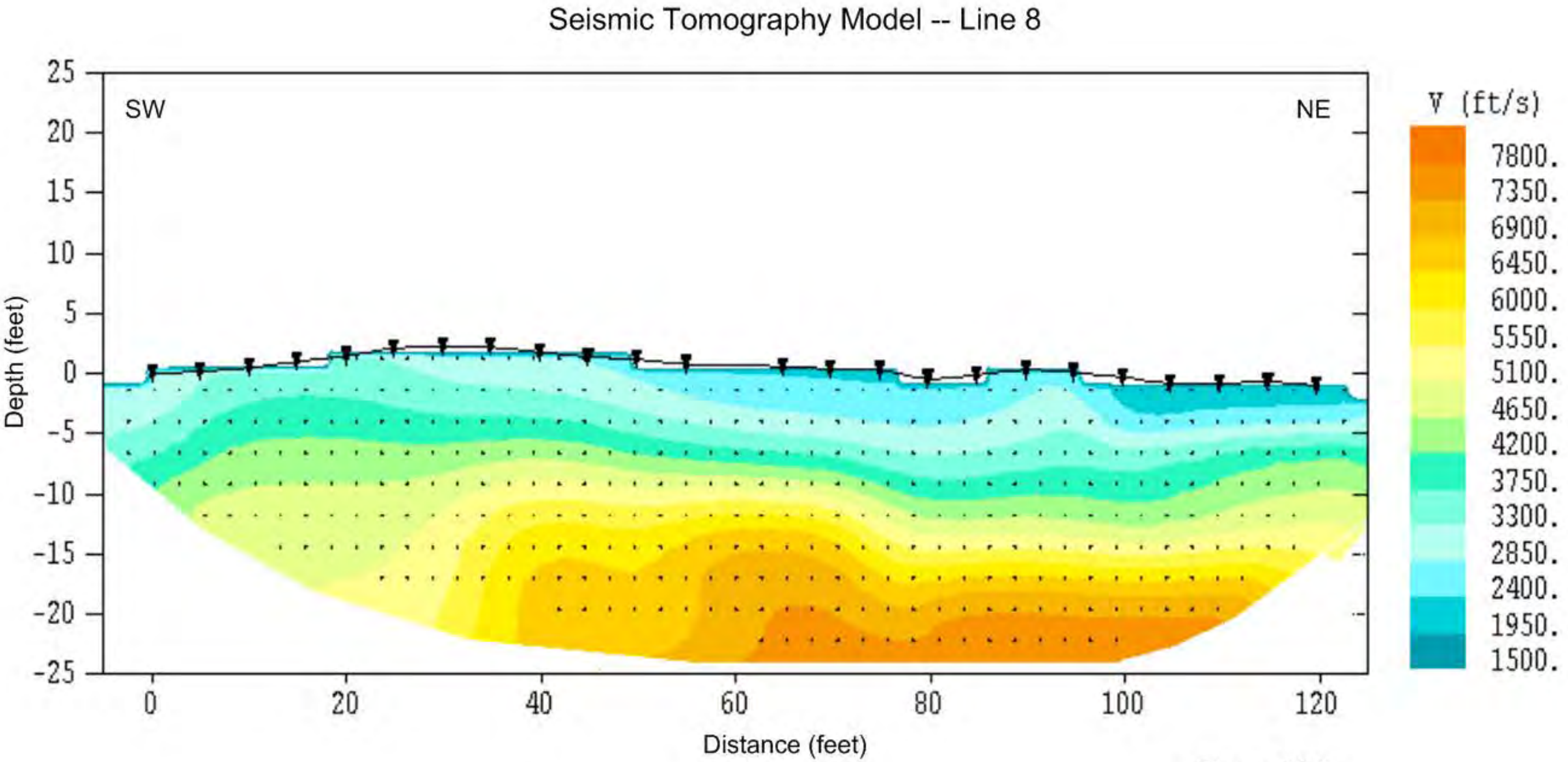
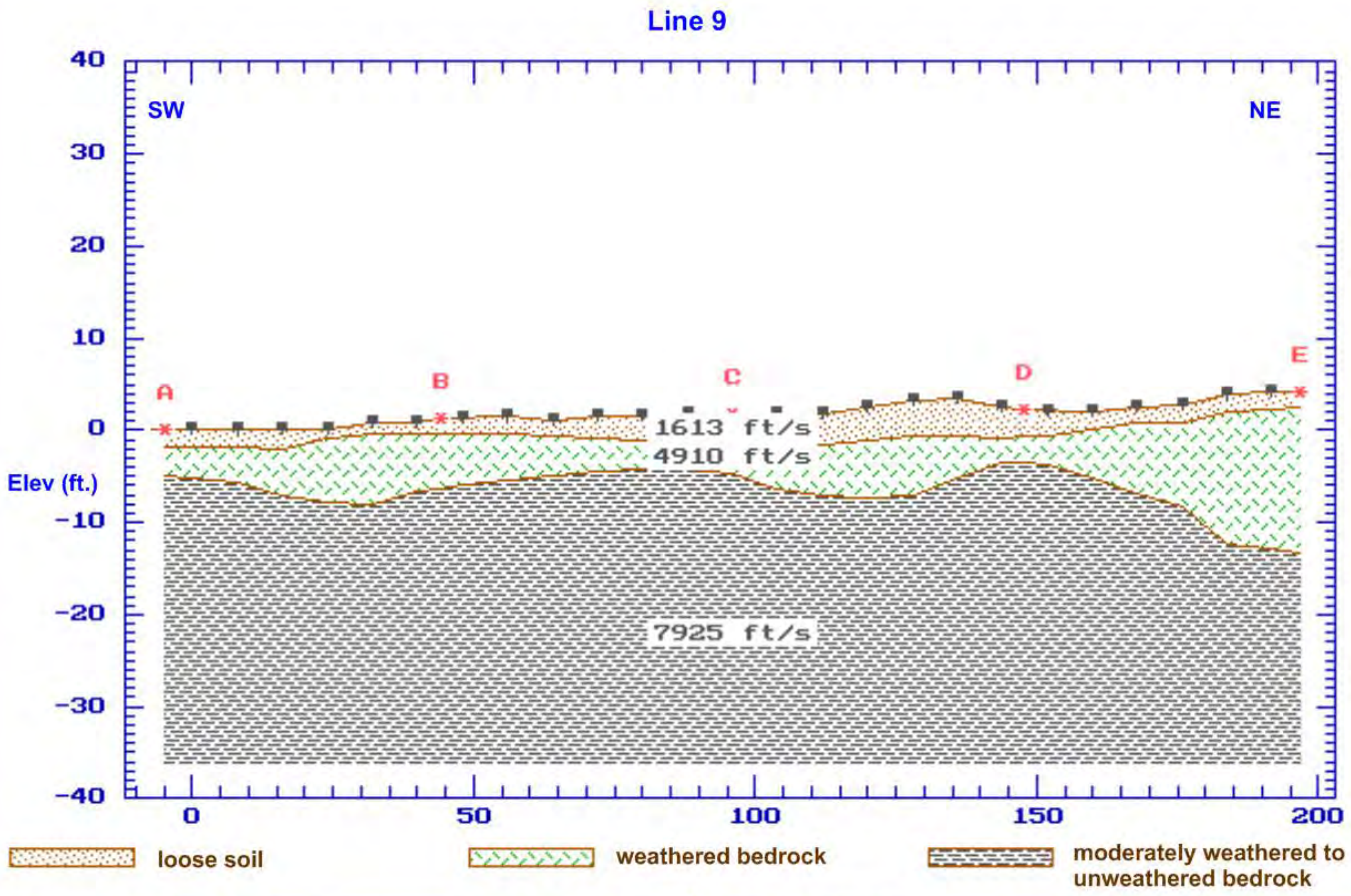

Seismic Tomography Model -- Line 8
SW
NE
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
Distance (feet)
V (ft/s)
7800.
7350.
6900.
6450.
6000.
5550.
5100.
4650.
4200.
3750.
3300.
2850.
2400.
1950.
1500.

Figure 12-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 13

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

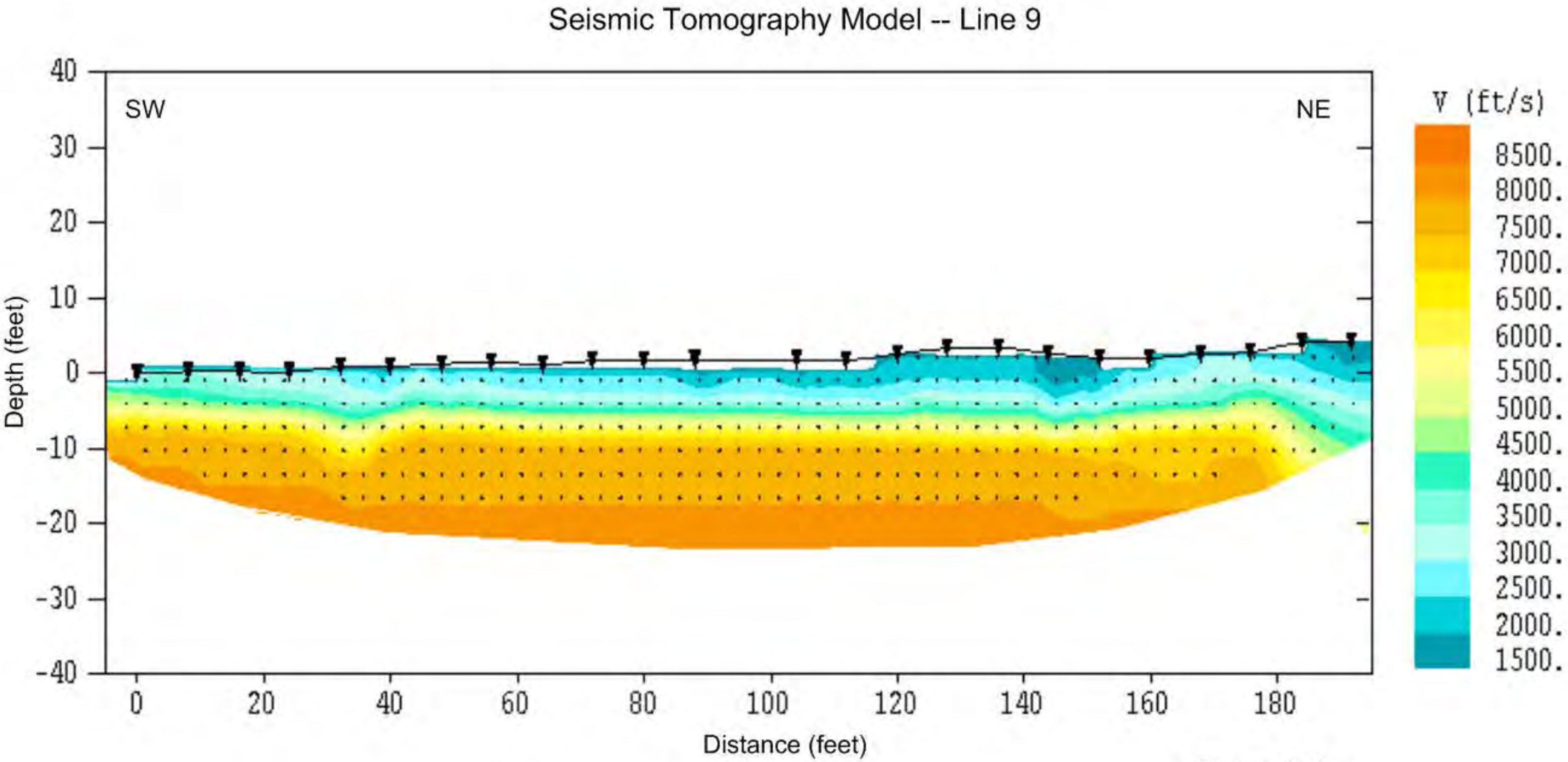
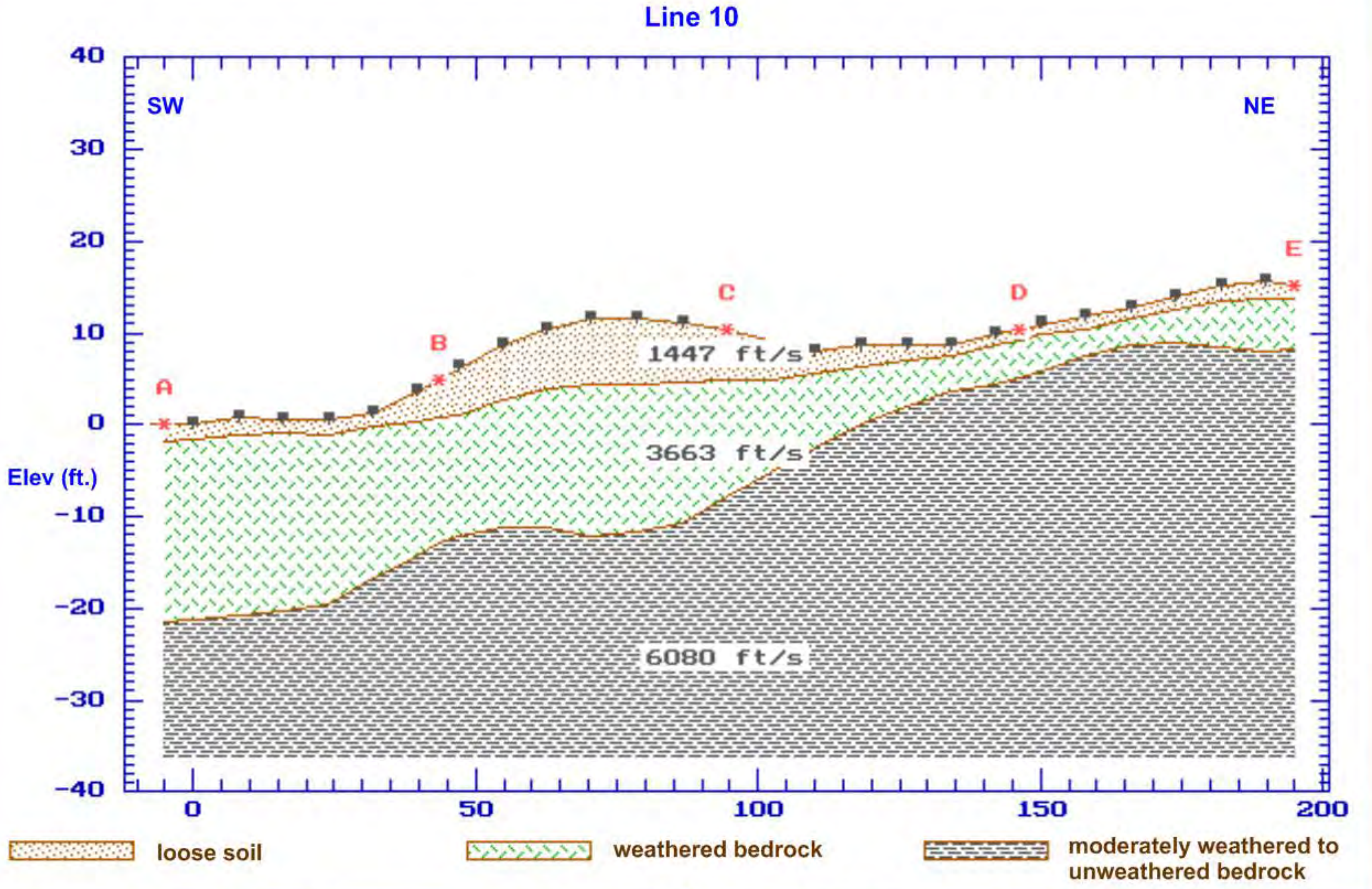

Seismic Tomography Model -- Line 9
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
8500.
8000.
7500.
7000.
6500.
6000.
5500.
5000.
4500.
4000.
3500.
3000.
2500.
2000.
1500.

Figure 13-1



Seismic Refraction Survey 7/28/2020	Tract 31589, Darwin 72 Project
Geotek Project No. 2437-CR	Moreno Valley, California Figure 14

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single

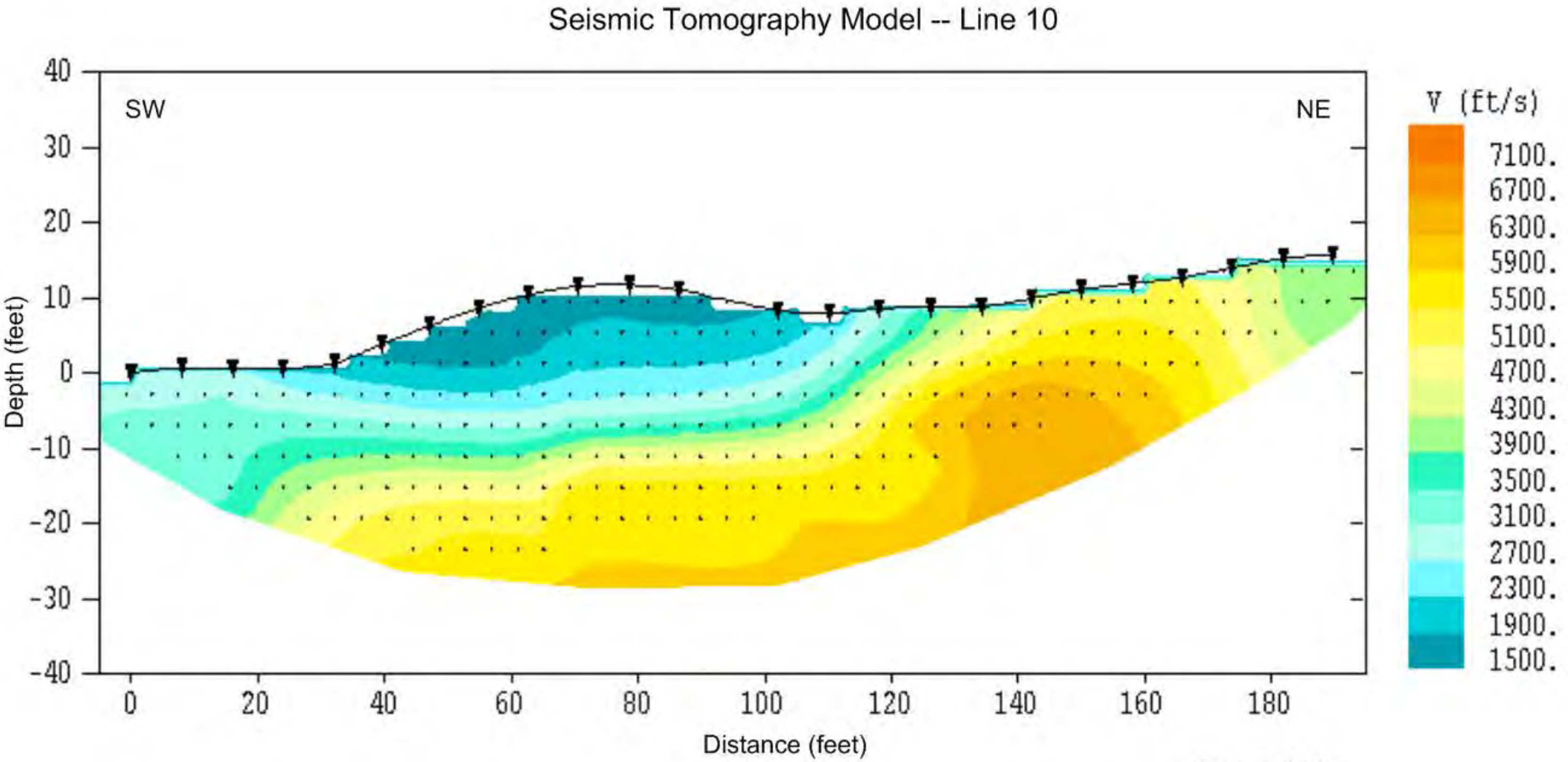
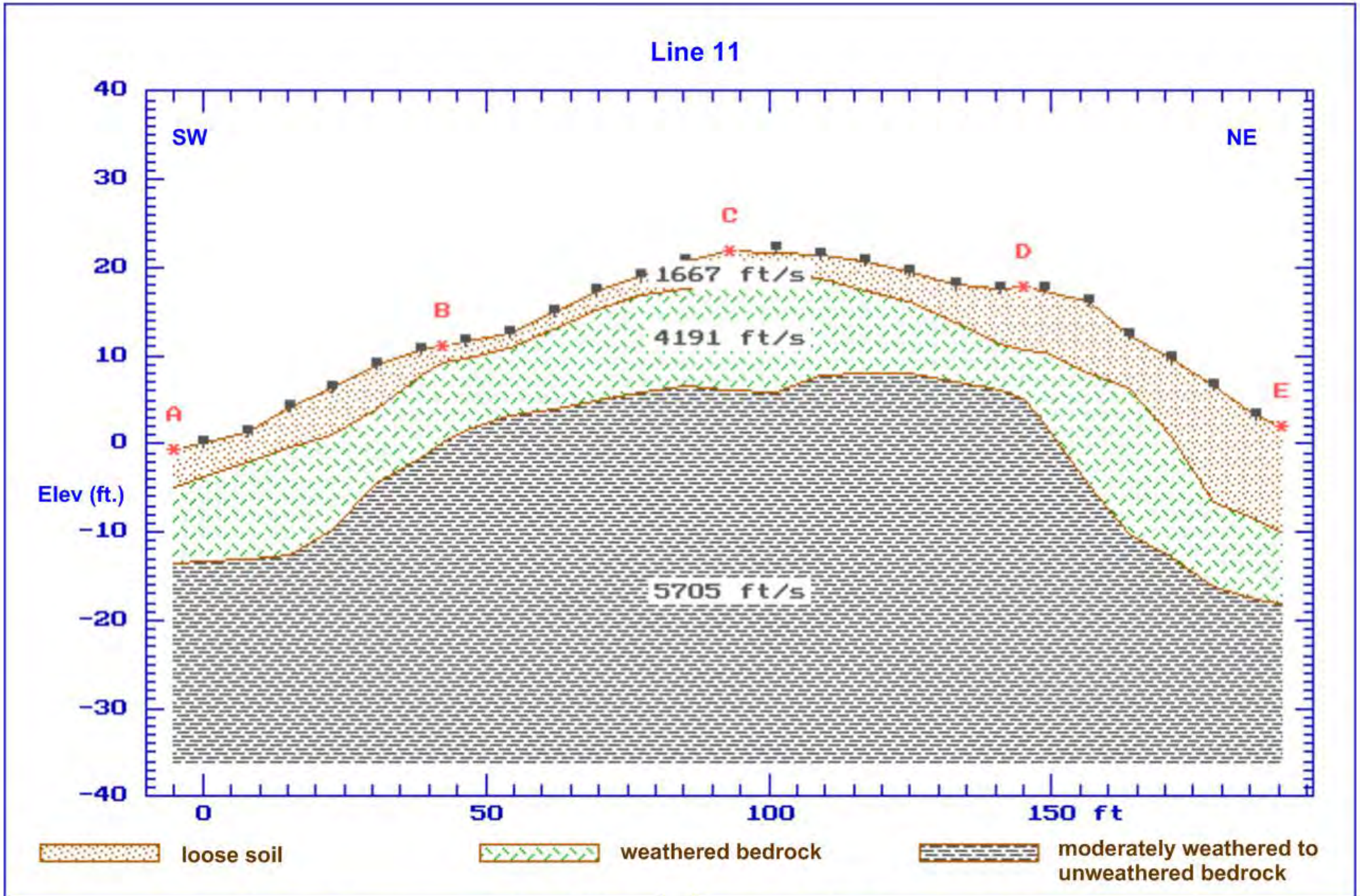

Seismic Tomography Model -- Line 10
SW
NE
Depth (feet)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
7100.
6700.
6300.
5900.
5500.
5100.
4700.
4300.
3900.
3500.
3100.
2700.
2300.
1900.
1500.

Figure 14-1



Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 15

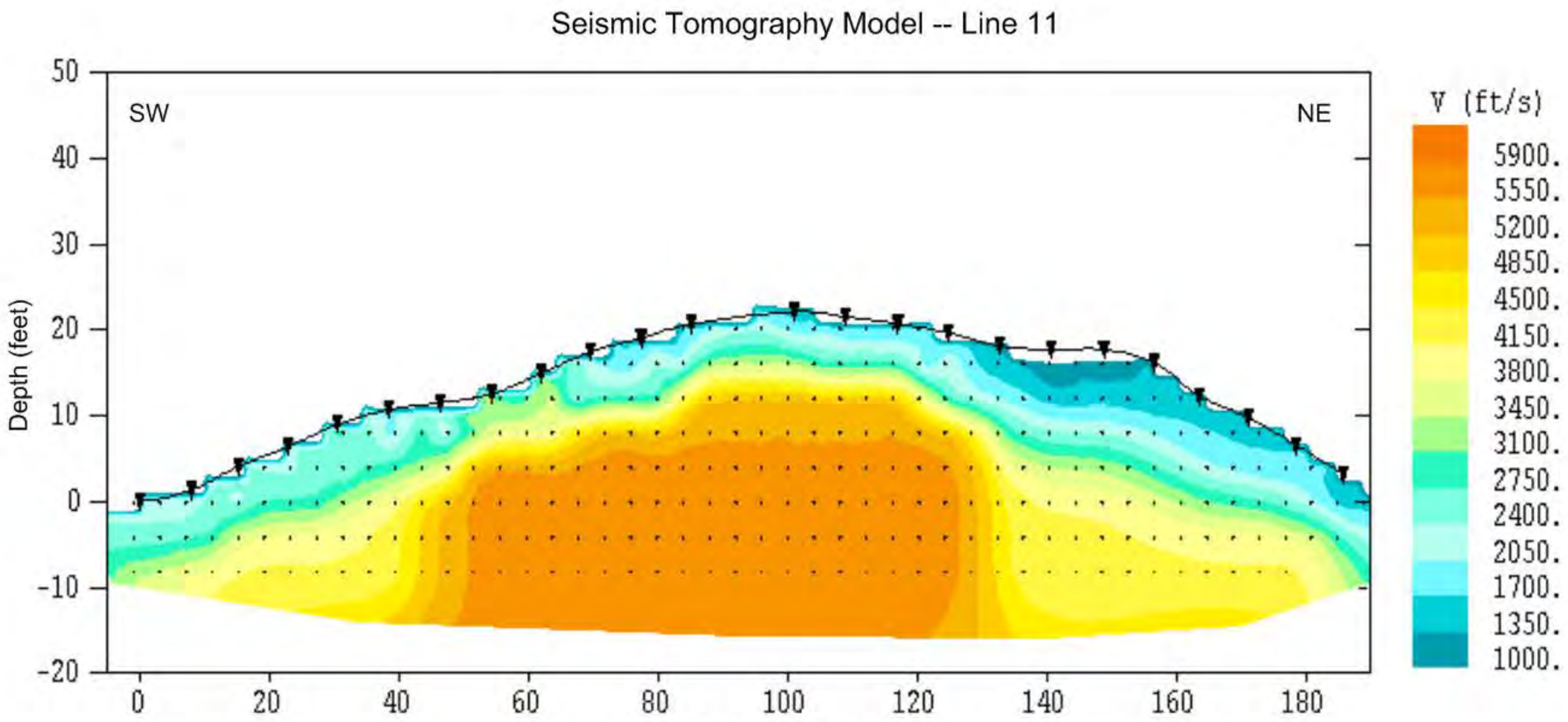
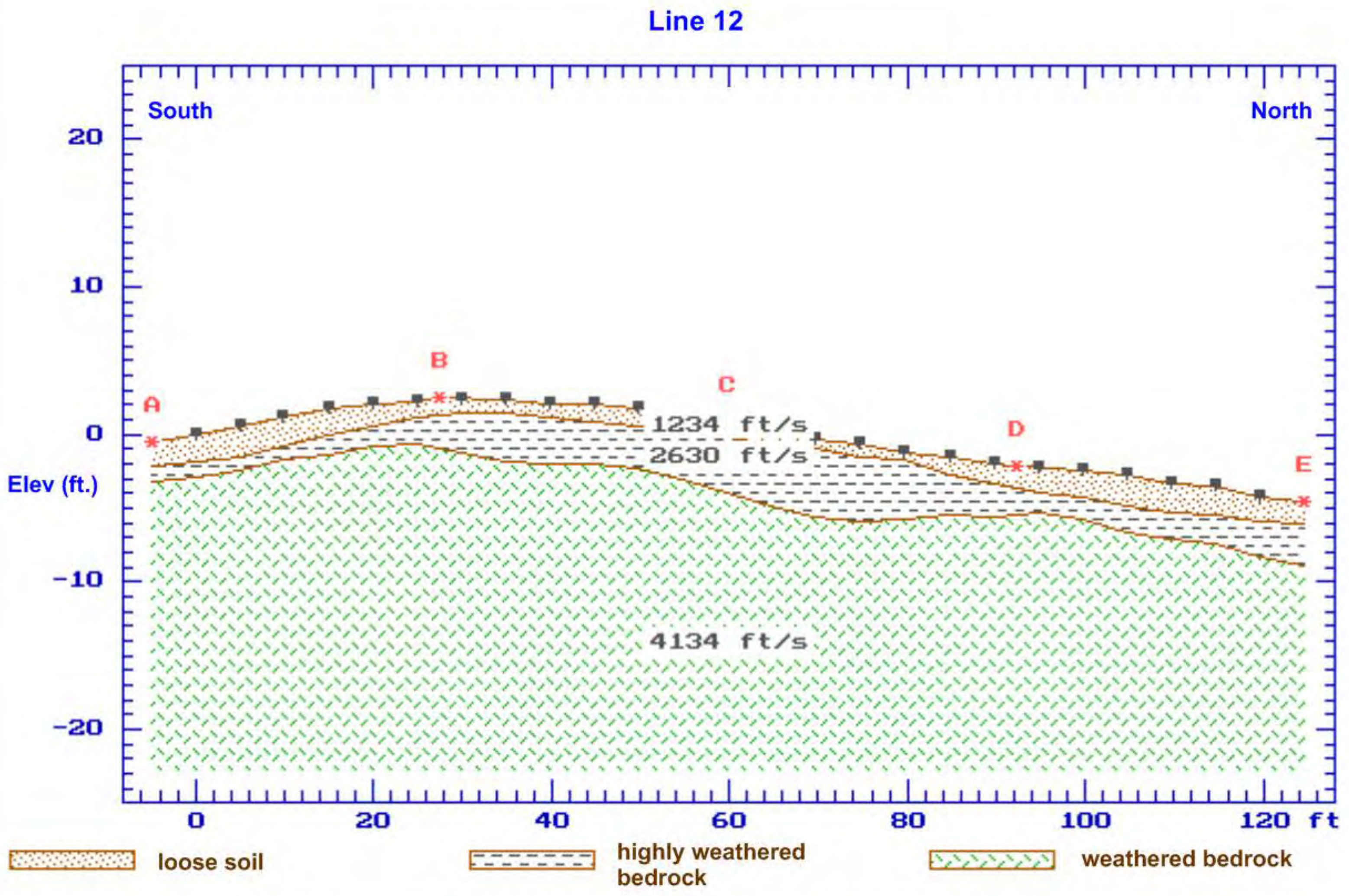

Seismic Tomography Model -- Line 11
SW
NE
Depth (feet)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
Distance (feet)
V (ft/s)
5900.
5550.
5200.
4850.
4500.
4150.
3800.
3450.
3100.
2750.
2400.
2050.
1700.
1350.
1000.

Figure 15-1

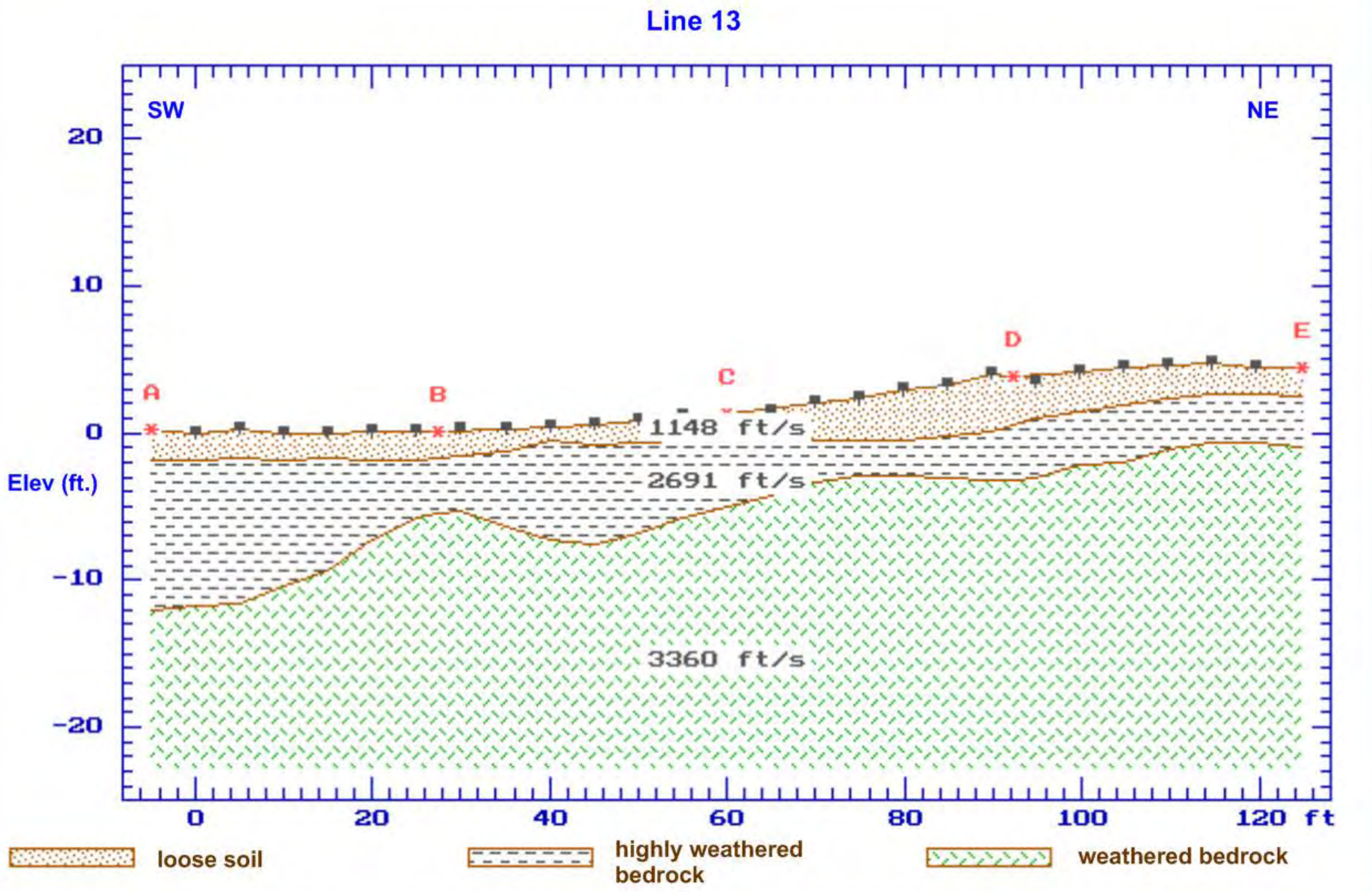


Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 16

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single



Seismic Refraction Survey 7/28/2020
Geotek Project No. 2437-CR

Tract 31589, Darwin 72 Project
Moreno Valley, California

Figure 17

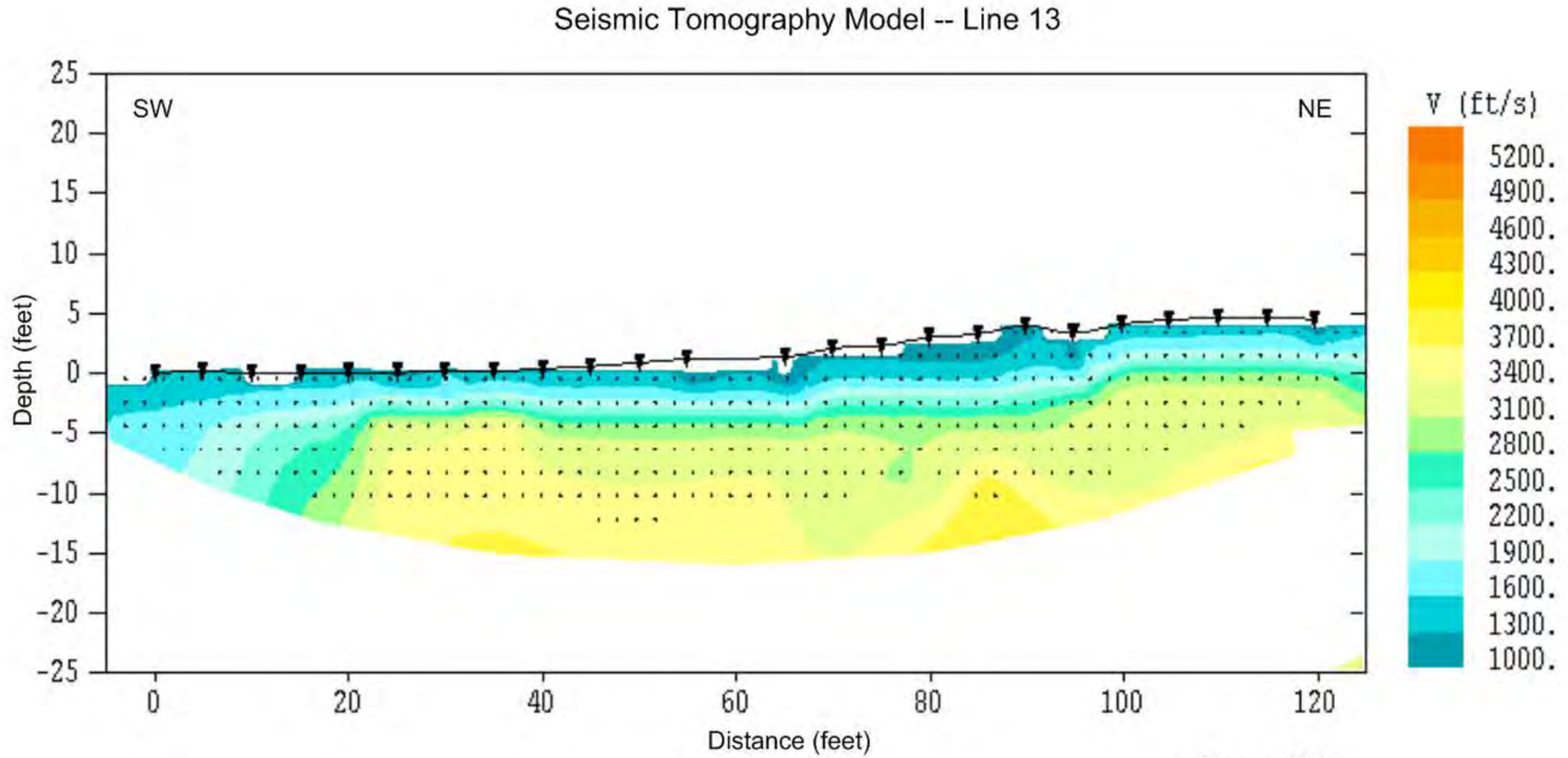

Seismic Tomography Model -- Line 13
SW
NE
Depth (feet)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
Distance (feet)
V (ft/s)
5200.
4900.
4600.
4300.
4000.
3700.
3400.
3100.
2800.
2500.
2200.
1900.
1600.
1300.
1000.

Figure 17-1

APPENDIX D

RESULTS OF LABORATORY TESTING BY GEOTEK

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification

Soils were classified visually in general accordance with the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of trenches and borings in Appendix B.

Moisture-Density Relationship

Laboratory testing was performed on one sample obtained during the subsurface exploration. The laboratory maximum dry density and optimum moisture content was determined in general accordance with ASTM D 1557. The results of the testing are provided herein.

Direct Shear

Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM Test Method D 3080. The rate of deformation was approximately 0.035 inch per minute. The samples were sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. Testing was performed on remolded soil samples (90% of the maximum dry density per ASTM D 1557). The shear test results are presented herein.

Expansion Index

Expansion Index testing was performed on one representative soil sample. Testing was performed in general accordance with ASTM Test Method D 4829. The results of the testing are provided herein.

Hydro-Collapse

Selected soil samples were tested in order to evaluate their potential for hydro-collapse. Testing was performed in general accordance with ASTM Test Method D 4546. The results of the testing are provided herein

GEOTEK

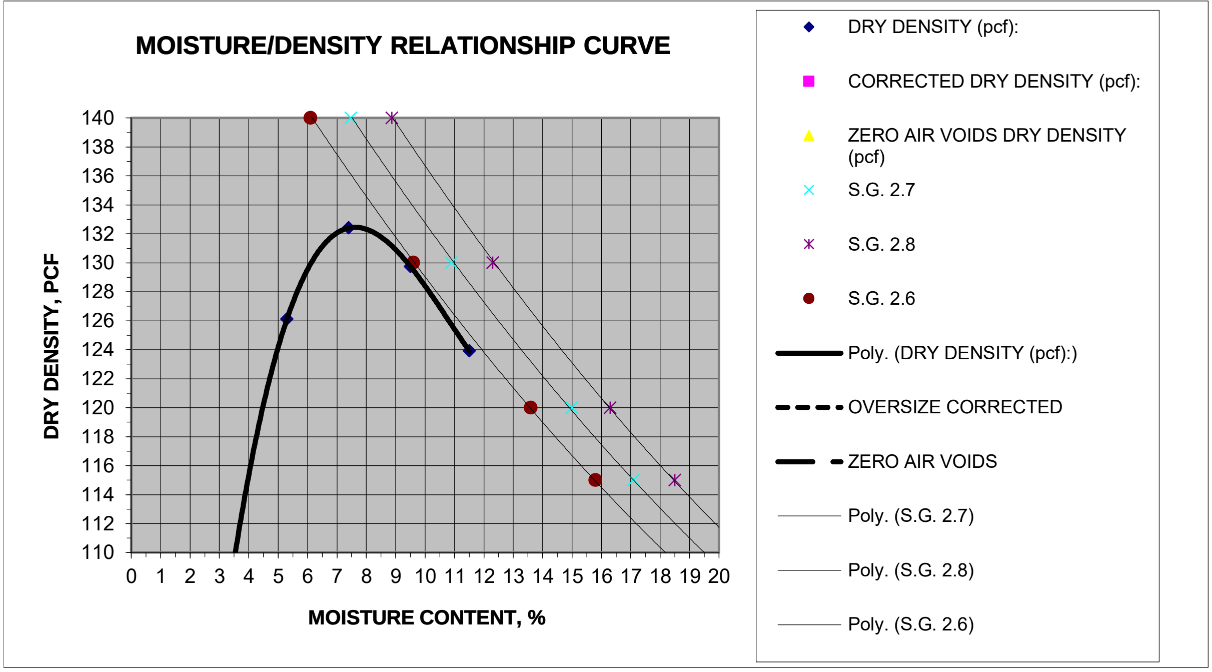
MOISTURE/DENSITY RELATIONSHIP

Client: D R Horton
Project: Winco Site
Location: Moreno Valley
Material Type: Gray Brown Gravelly Silty F-C Sand
Material Supplier: -
Material Source: -
Sample Location: B-3 @ 1 - 5 ft
-
Sampled By: DRW
Received By: DLI
Tested By: DLI
Reviewed By: -

Job No.: 2438-CR
Lab No.: Corona

Date Sampled: 7/17/2020
Date Received: 7/20/2020
Date Tested: 7/26/2020
Date Reviewed: -

Test Procedure: ASTM D1557
Method: A
Oversized Material (%): 18.0
Correction Required: ☐ **yes** ☒ **no**



MOISTURE DENSITY RELATIONSHIP VALUES

Maximum Dry Density, pcf	133.0	**@ Optimum Moisture, %**	8.0
Corrected Maximum Dry Density, pcf		**@ Optimum Moisture, %**	

MATERIAL DESCRIPTION

Grain Size Distribution:

	% Gravel (retained on No. 4)
	% Sand (Passing No. 4, Retained on No. 200)
	% Silt and Clay (Passing No. 200)

Atterberg Limits:

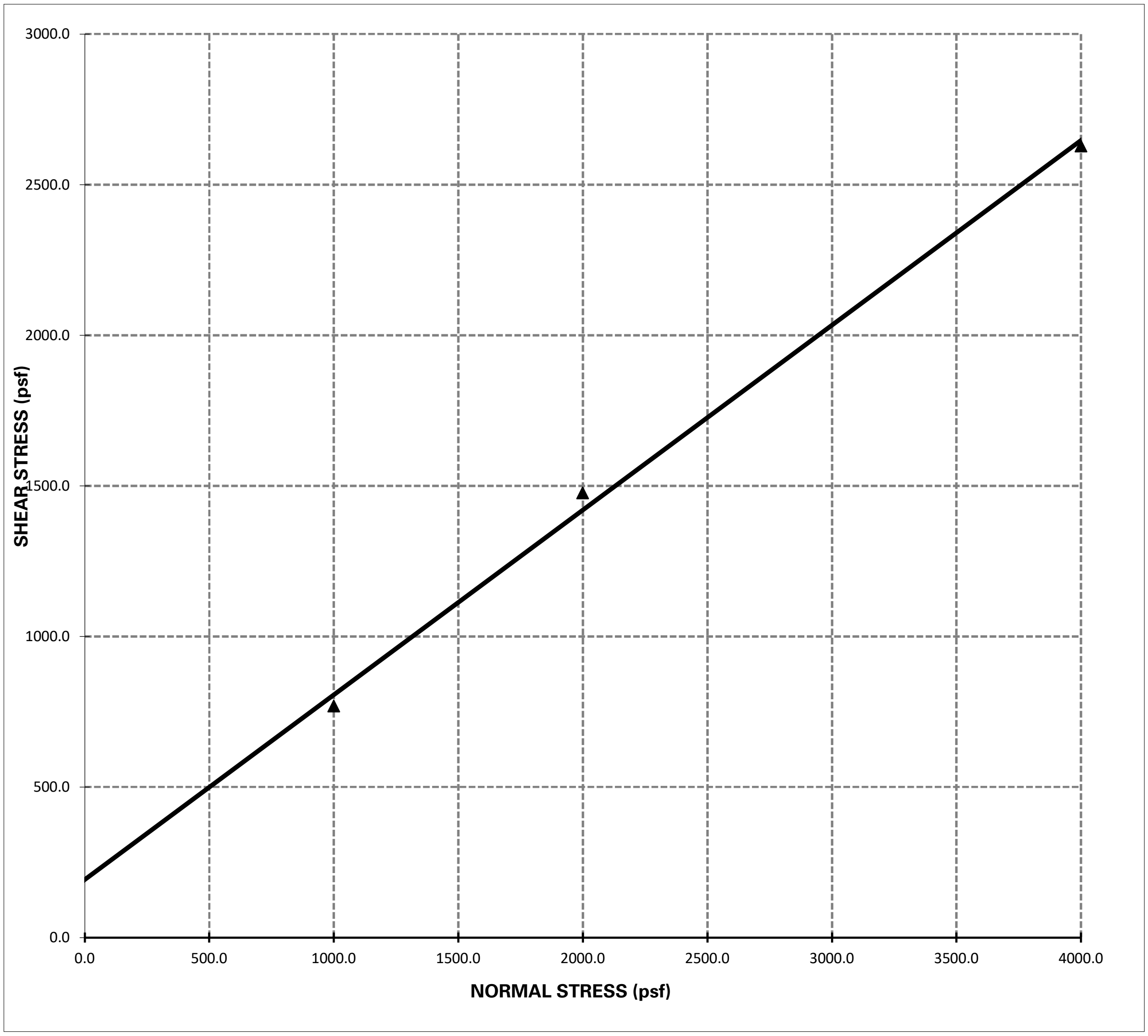
	Liquid Limit, %
	Plastic Limit, %
	Plasticity Index, %

Classification:

Unified Soils Classification:
AASHTO Soils Classification:

DIRECT SHEAR TEST

Project Name: Winco Site
Project Number: 2438-CR
Sample Location: B-3 @ 1 - 5 ft
Date Tested: 7/31/2020



Shear Strength: Φ = 31.5 °, C = 192.00 psf

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.035 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	D R Horton	***Tested/ Checked By:***	DA Lab No Corona
Project Number:	2438-CR	***Date Tested:***	7/30/2020
Project Location:	Winco Site, Moreno Valley	***Sample Source:***	B-3 @ 1 - 5 ft
		Sample Description:	

Ring #:______ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

A	Weight of compacted sample & ring (gm)	785.6
B	Weight of ring (gm)	368.4
C	Net weight of sample (gm)	**417.2**
D	Wet Density, lb / ft3 (C*0.3016)	**125.8**
E	Dry Density, lb / ft3 (D/1.F)	**116.5**

SATURATION DETERMINATION

F	Moisture Content, %	8.0
G	Specific Gravity, assumed	**2.70**
H	Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
I	% Saturation	**48.4**

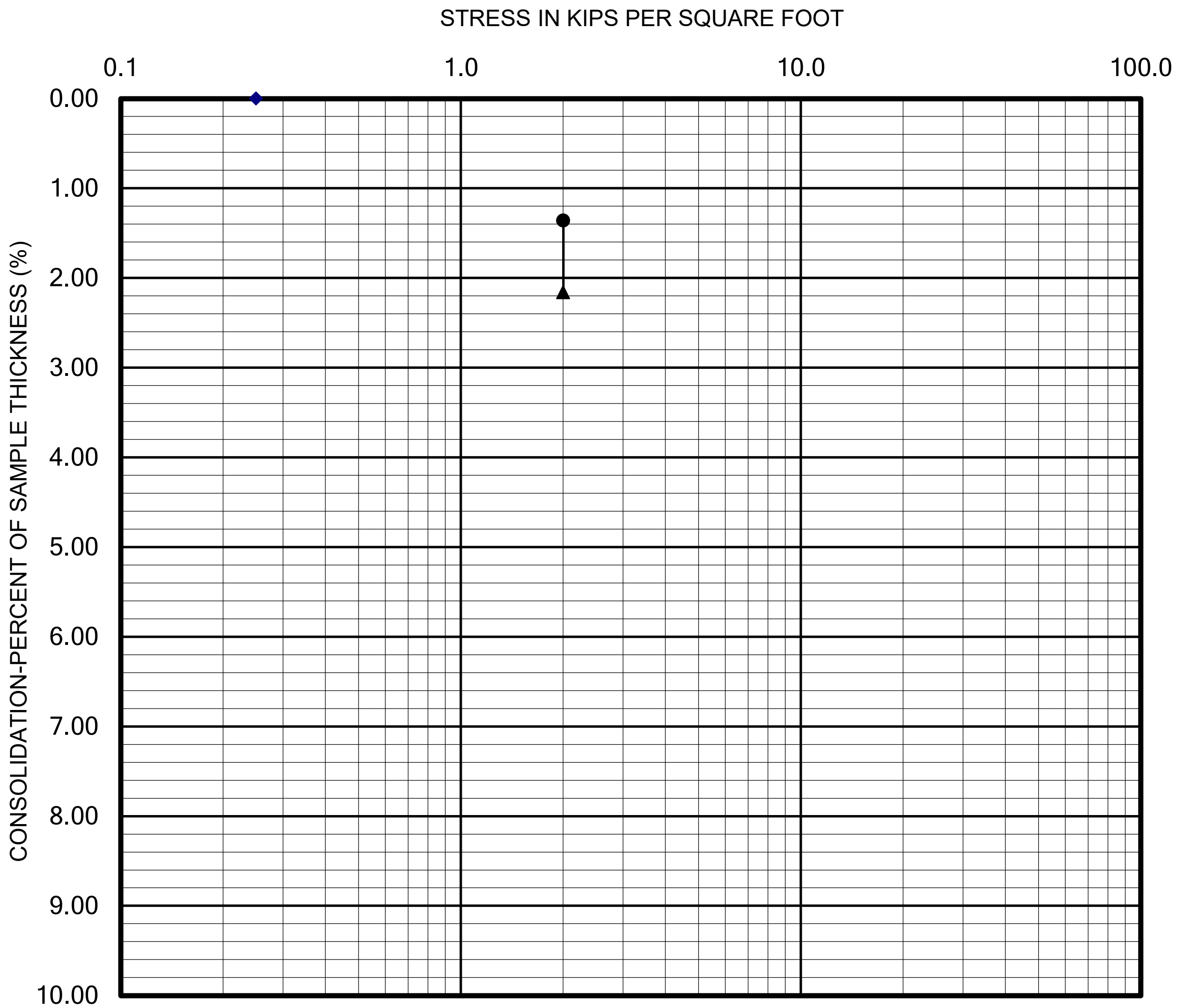
READINGS

DATE	TIME	READING	
7/30/2020	10:57	0.4640	Initial
	11:07	0.4640	10 min/Dry
7/31/2020	11:07	0.4640	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
806.0	**12.9**

EXPANSION INDEX = 0



- - -●- - - Seating Cycle
—●— Loading Prior to Inundation
—▲— Loading After Inundation
- - -▲- - - Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

COLLAPSE REPORT

Sample: B-5 @ 5 ft

CHECKED BY:
Lab: DI
PROJECT NO.: 2438-CR
Date:

APPENDIX E

SOIL CORROSIVITY STUDY

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

August 18, 2020 via email: gbogdanoff@geotekusa.com

GEOTEK, INC.
1548 N. Maple St.
Corona, CA 92880

Attention: Ms. Gaby Bogdanoff

Re: Soil Corrosivity Study
Single Family Residential Tract
Development Project
Moreno Valley, CA
HDR #20-0486SCS, GI #2438-CR

Introduction

Laboratory tests have been completed on twelve soil samples provided for the referenced project. The purpose of these tests was to determine if the soils might have deleterious effects on underground utility piping and concrete structures. HDR Engineering, Inc. (HDR) assumes that the samples provided are representative of the most corrosive soils at the site.

The proposed project consists of a residential development with single-family homes with one to two stories and no subterranean levels. The site is located northeast of the intersection of Alessandro Boulevard and Lasselle Avenue in Moreno Valley, California, and the water table is reportedly greater than 100 feet deep.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. HDR's recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, HDR will be happy to work with them as a separate phase of this project.

hdrinc.com

431 W. Baseline Road, Claremont, CA 91711-1608
(909) 626-0967

Laboratory Soil Corrosivity Tests

The electrical resistivity of each sample was measured in a soil box per ASTM G187 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated samples was measured per ASTM G51. A 5:1 water:soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil per ASTM D4327, ASTM D6919, and Standard Method 2320-B[1]. Laboratory test results are shown in the attached Table 1.

Soil Corrosivity

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:[2]

Soil Resistivity in ohm-centimeters	Corrosivity Category
Greater than 10,000	Mildly Corrosive
2,001 to 10,000	Moderately Corrosive
1,001 to 2,000	Corrosive
0 to 1,000	Severely Corrosive

---

[1] *American Public Health Association (APHA). 2012. Standard Methods of Water and Wastewater. 22nd ed. American Public Health Association, American Water Works Association, Water Environment Federation publication. APHA, Washington D.C.*

[2] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, pp. 166–167.*

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

Electrical resistivities were in the mildly corrosive category with as-received moisture. When saturated, the resistivities were in the mildly to moderately corrosive categories. The resistivities dropped considerably with added moisture because the samples were dry as-received.

Soil pH values varied from 5.9 to 7.7. This range is moderately acidic to mildly alkaline.[3] These values do not particularly increase soil corrosivity.

The soluble salt content of the samples was low. Chloride and sulfate were found at low concentrations.

The ammonium concentrations were high enough to be aggressive to copper. Nitrate was detected in low concentrations.

Tests were not made for sulfide and oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

This soil is classified as moderately corrosive to ferrous metals and aggressive to copper.

Corrosion Control Recommendations

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

The following recommendations are based on the soil conditions discussed in the Soil Corrosivity section above. Unless otherwise indicated, these recommendations apply to the entire site or alignment.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

---

[3] *Romanoff, Melvin. Underground Corrosion, NBS Circular 579. Reprinted by NACE. Houston, TX, 1989, p. 8.*

Steel Pipe

1. Underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints should be bonded for electrical continuity. Electrical continuity is necessary for corrosion monitoring and the possible future application of cathodic protection.

2. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:

    a. At each end of the pipeline.

    b. At each end of all casings.

    c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

3. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically isolate each buried steel pipeline per NACE SP0286 from:

    a. Dissimilar metals.

    b. Dissimilarly coated piping (cement-mortar vs. dielectric).

    c. Above ground steel pipe.

    d. All existing piping.

    Insulated joints should be placed above grade or in vaults where possible. Wrap all buried insulators with wax tape per AWWA C217.

4. Choose one of the following corrosion control options:

    OPTION 1

    a. Apply a suitable dielectric coating intended for underground use such as:

        i. Polyurethane per AWWA C222 *or*

        ii. Extruded polyethylene per AWWA C215 *or*

   iii. A tape coating system per AWWA C214 *or*

   iv. Hot applied coal tar enamel per AWWA C203 *or*

   v. Fusion bonded epoxy per AWWA C213.

b. Although it is customary to cathodically protect bonded dielectrically coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

OPTION 2

As an alternative to dielectric coating and possible future cathodic protection, apply a ¾-inch cement mortar coating per AWWA C205 or encase in concrete three inches thick, using any type of ASTM C150 cement. Joint bonds, test stations, and insulated joints are still recommended for this alternative.

NOTE: Some steel piping systems, such as for oil, gas, and high-pressure piping systems, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Ductile Iron Pipe

1. To prevent dissimilar metal corrosion cells and to facilitate the possible future application of cathodic protection, electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE SP0286.

2. Bond all nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and possible future application of cathodic protection.

3. Install corrosion monitoring test stations to facilitate corrosion monitoring and the possible future application of cathodic protection:

   a. At each end of the pipeline.

   b. At each end of any casings.

   c. Other locations as necessary so the interval between test stations does not exceed 1,200 feet.

4. Choose one of the following corrosion control options:

OPTION 1

a. Apply a suitable coating intended for underground use such as:

   i. Polyethylene encasement per AWWA C105; *or*

   ii. Epoxy coating; *or*

   iii. Polyurethane; *or*

   iv. Wax tape.

   NOTE: The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating.

b. Although it is customary to cathodically protect coated structures, cathodic protection is not recommended at this time due to moderately corrosive soils. Joint bonds, test stations, and insulated joints should still be installed and will facilitate the application of cathodic protection in the future if needed to control leaks.

OPTION 2

As an alternative to the coating systems described in Option 1 and possible future cathodic protection, concrete encase all buried portions of metallic piping so that there is a minimum of three inches of concrete cover provided over and around surfaces of pipe, fittings, and valves using any type of ASTM C150 cement.

NOTE: Some iron piping systems, such as for fire water piping, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Cast Iron Soil Pipe

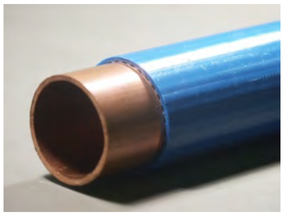
1. Protect cast iron soil pipe with either a double wrap 4-mil or single wrap 8-mil polyethylene encasement per AWWA C105.
2. It is not necessary to bond the pipe joints or apply cathodic protection.
3. Provide six inches of clean sand backfill all around the pipe.

Clean Sand Backfill

1. Clean sand backfill must have the following parameters:
    a. Minimum saturated resistivity of no less than 3,000 ohm-cm; *and*
    b. pH between 6.0 and 8.0.
2. All backfill testing should be performed by a corrosion engineering laboratory.

Copper Tubing

1. Electrically insulate underground copper pipe from dissimilar metals and from above ground copper pipe with insulating devices per NACE SP0286.
2. Electrically insulate cold water piping from hot water piping systems.
3. Protect buried copper tubing by one of the following measures:
    a. Prevention of soil contact. Soil contact may be prevented by placing the tubing above ground or encasing the tubing using PVC pipe with solvent-welded joints.
    b. Installation of a factory-coated copper pipe with a minimum 25-mil thickness such as Kamco's Aqua Shield™, Mueller's Streamline Protec™, or equal. The coating must be continuous with no cuts or defects.
    c. Installation of 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over a suitable primer. Protect wrapped copper tubing by applying cathodic protection per NACE SP0169.



Plastic and Vitrified Clay Pipe

1. No special corrosion control measures are required for plastic and vitrified clay piping placed underground.

2. Protect all metallic fittings and valves with wax tape per AWWA C217, or with epoxy and appropriately sized cathodic protection per NACE SP0169.

All Pipe

1. On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA C217 after assembly.

2. Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete Structures and Pipe

1. From a corrosion standpoint, any type of ASTM C150 cement may be used for concrete structures and pipe because the sulfate concentration is negligible, from 0 to 0.10 percent.[4,5,6]

2. Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils due to the low chloride concentrations[7] found onsite. Limit the water-soluble chloride ion content in the concrete mix design to less than 0.3 percent by weight of cement.

---

[4] *2015 International Building Code (IBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[5] *2015 International Residential Code (IRC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[6] *2016 California Building Code (CBC) which refers to American Concrete Institute (ACI) 318-14 Table 19.3.2.1*

[7] *Design Manual 303: Concrete Cylinder Pipe. Ameron. p.65*

Closure

The analysis and recommendations presented in this report are based upon data obtained from the laboratory samples. This report does not reflect variations that may occur across the site or due to the modifying effects of construction. If variations appear, HDR should be notified immediately so that further evaluation and supplemental recommendations can be provided.

HDR's services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
HDR Engineering, Inc.

MARC E. N. WEGNER
No. C73862
Exp. 06/30/21

James Keegan

Marc E N Wegner, PE

Enc: Table 1

SCS Template

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID			1 @ 1'	2 @ 1'	3 @ 1'	4 @ 1'	5 @ 1'
Resistivity		**Units**					
as-received		ohm-cm	>4,000,000	>4,000,000	>4,000,000	>4,000,000	>4,000,000
saturated		ohm-cm	6,800	9,200	10,800	6,800	8,800
pH			6.5	6.2	5.9	6.7	6.9
Electrical Conductivity		mS/cm	0.08	0.08	0.06	0.05	0.05
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	46	37	31	25	31
magnesium	Mg^{2+}	mg/kg	11	8.7	8.2	9.5	9.2
sodium	Na^{1+}	mg/kg	16	10	4.3	28	19
potassium	K^{1+}	mg/kg	33	59	34	8.9	9.1
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	192	159	137	183	143
fluoride	F^{1-}	mg/kg	5.4	4.5	2.3	2.8	2.5
chloride	Cl^{1-}	mg/kg	7.6	9.0	6.3	5.5	5.2
sulfate	SO_4^{2-}	mg/kg	15	16	17	7.6	8.0
phosphate	PO_4^{3-}	mg/kg	17	23	15	2.0	3.1
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	0.7	9.7	ND	ND
nitrate	NO_3^{1-}	mg/kg	11	10	9.3	9.5	8.1
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID

			6 @ 1'	7 @ 0.5'	8 @ 0.5'	9 @ 0.5'	10 @ 0.5'
Resistivity		**Units**					
as-received		ohm-cm	>4,000,000	>4,000,000	>4,000,000	>4,000,000	>4,000,000
saturated		ohm-cm	5,200	4,800	22,000	6,000	7,600
pH			6.5	6.7	6.2	6.5	7.1
Electrical Conductivity		mS/cm	0.06	0.07	0.04	0.10	0.05
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	36	23	16	46	31
magnesium	Mg^{2+}	mg/kg	10	9.3	5.2	14	7.8
sodium	Na^{1+}	mg/kg	14	48	5.0	28	7.7
potassium	K^{1+}	mg/kg	19	7.6	21	24	14
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	149	149	110	214	207
fluoride	F^{1-}	mg/kg	3.7	3.1	1.6	3.4	3.6
chloride	Cl^{1-}	mg/kg	5.6	13	4.4	18	3.9
sulfate	SO_4^{2-}	mg/kg	8.3	26	7.2	24	7.0
phosphate	PO_4^{3-}	mg/kg	4.7	15	4.6	14	11
Other Tests							
ammonium	NH_4^{1+}	mg/kg	ND	ND	33	ND	ND
nitrate	NO_3^{1-}	mg/kg	9.9	18	8.1	15	5.4
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 1 - Laboratory Tests on Soil Samples

Geotek, Inc.
Single Family Residential Tract Development Project
Your #2438-CR, HDR Lab #20-0486SCS
30-Jul-20

Sample ID			11 @ 1'	12 @ 1'
Resistivity		**Units**		
as-received		ohm-cm	>4,000,000	>4,000,000
saturated		ohm-cm	9,600	16,800
pH			7.7	6.8
Electrical Conductivity		mS/cm	0.05	0.02
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	44	14
magnesium	Mg^{2+}	mg/kg	6.9	4.8
sodium	Na^{1+}	mg/kg	6.4	9.1
potassium	K^{1+}	mg/kg	9.0	7.0
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	259	104
fluoride	F^{1-}	mg/kg	2.0	2.2
chloride	Cl^{1-}	mg/kg	3.3	2.8
sulfate	SO_4^{2-}	mg/kg	5.5	4.3
phosphate	PO_4^{3-}	mg/kg	ND	ND
Other Tests				
ammonium	NH_4^{1+}	mg/kg	ND	ND
nitrate	NO_3^{1-}	mg/kg	11	6.6
sulfide	S^{2-}	qual	na	na
Redox		mV	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

APPENDIX F

GENERAL GRADING GUIDELINES

Updated Geotechnical Evaluation
Winco Site, Moreno Valley, Riverside County, California
Project No. 2438-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the California Building Code, CBC (2019) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor’s overall level of efforts during grading. The contractor’s personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor’s responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will

be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.

7. Procedures for testing of fill slopes are as follows:
   a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
   b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative. Typical procedures are similar to those indicated on Plate F-4.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed (see Plates F-1, F-2 and F-3) unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Subdrainage

1. Subdrainage systems should be provided in canyon bottoms prior to placing fill, and behind buttress and stabilization fills and in other areas indicated in the report. Subdrains should conform to schematic diagrams F-1 and F-5, and be acceptable to our representative.

2. For canyon subdrains, runs less than 500 feet may use six-inch pipe. Typically, runs in excess of 500 feet should have the lower end as eight-inch minimum.
3. Filter material should be clean, 1/2 to 1-inch gravel wrapped in a suitable filter fabric. Class 2 permeable filter material per California Department of Transportation Standards tested by this office to verify its suitability, may be used without filter fabric. A sample of the material should be provided to the Soils Engineer by the contractor at least two working days before it is delivered to the site. The filter should be clean with a wide range of sizes.
4. Approximate delineation of anticipated subdrain locations may be offered at 40-scale plan review stage. During grading, this office would evaluate the necessity of placing additional drains.
5. All subdrainage systems should be observed by our representative during construction and prior to covering with compacted fill.
6. Subdrains should outlet into storm drains where possible. Outlets should be located and protected. The need for backflow preventers should be assessed during construction.
7. Consideration should be given to having subdrains located by the project surveyors.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal (see Plate G-4). On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

Keyways, Buttress and Stabilization Fills

Keyways are needed to provide support for fill slope and various corrective procedures.

1. Side-hill fills should have an equipment-width key at their toe excavated through all surficial soil and into competent material and tilted back into the hill (Plates F-2, F-3). As the fill is elevated, it should be benched through surficial soil and slopewash, and into competent bedrock or other material deemed suitable by our representatives (See Plates F-1, F-2, and F-3).
2. Fill over cut slopes should be constructed in the following manner:
    a) All surficial soils and weathered rock materials should be removed at the cut-fill interface.
    b) A key at least one and one-half (1.5) equipment width wide (or as needed for compaction), and tipped at least one (1) foot into slope, should be excavated into competent materials and observed by our representative.
    c) The cut portion of the slope should be excavated prior to fill placement to evaluate if stabilization is necessary. The contractor should be responsible for any additional earthwork created by placing fill prior to cut excavation. (see Plate F-3 for schematic details.)
3. Daylight cut lots above descending natural slopes may require removal and replacement of the outer portion of the lot. A schematic diagram for this condition is presented on Plate F-2.
4. A basal key is needed for fill slopes extending over natural slopes. A schematic diagram for this condition is presented on Plate F-2.
5. All fill slopes should be provided with a key unless within the body of a larger overall fill mass. Please refer to Plate F-3 for specific guidelines.

Anticipated buttress and stabilization fills are discussed in the text of the report. The need to stabilize other proposed cut slopes will be evaluated during construction. Plate F-5 shows a schematic of buttress construction.

1. All backcuts should be excavated at gradients of 1:1 or flatter. The backcut configuration should be determined based on the design, exposed conditions, and need to maintain a minimum fill width and provide working room for the equipment.

2. On longer slopes, backcuts and keyways should be excavated in maximum 250 feet long segments. The specific configurations will be determined during construction.
3. All keys should be a minimum of two (2) feet deep at the toe and slope toward the heel at least one foot or two (2%) percent, whichever is greater.
4. Subdrains are to be placed for all stabilization slopes exceeding 10 feet in height. Lower slopes are subject to review. Drains may be required. Guidelines for subdrains are presented on Plate F-5.
5. Benching of backcuts during fill placement is required.

Lot Capping

1. When practical, the upper three (3) feet of material placed below finish grade should be comprised of the least expansive material available. Preferably, highly and very highly expansive materials should not be used. We will attempt to offer advice based on visual evaluations of the materials during grading, but it must be realized that laboratory testing is needed to evaluate the expansive potential of soil. Minimally, this testing takes two (2) to four (4) days to complete.
2. Transition lots (cut and fill) both per plan and those created by remedial grading (e.g. lots above stabilization fills, along daylight lines, above natural slopes, etc.) should be capped with a minimum three foot thick compacted fill blanket.
3. Cut pads should be observed by our representative(s) to evaluate the need for overexcavation and replacement with fill. This may be necessary to reduce water infiltration into highly fractured bedrock or other permeable zones, and/or due to differing expansive potential of materials beneath a structure. The overexcavation should be at least three feet. Deeper overexcavation may be recommended in some cases.

ROCK PLACEMENT AND ROCK FILL GUIDELINES

It is anticipated that large quantities of oversize material would be generated during grading. It's likely that such materials may require special handling for burial. Although alternatives may be developed in the field, the following methods of rock disposal are recommended on a preliminary basis.

Limited Larger Rock

When materials encountered are principally soil with limited quantities of larger rock fragments or boulders, placement in windrows is recommended. The following procedures should be applied:

1. Oversize rock (greater than 8 inches) should be placed in windrows.
   a) Windrows are rows of single file rocks placed to avoid nesting or clusters of rock.
   b) Each adjacent rock should be approximately the same size (within ~one foot in diameter).
   c) The maximum rock size allowed in windrows is four feet
2. A minimum vertical distance of three feet between lifts should be maintained. Also, the windrows should be offset from lift to lift. Rock windrows should not be closer than 15 feet to the face of fill slopes and sufficient space must be maintained for proper slope construction (see Plate F-4).
3. Rocks greater than eight inches in diameter should not be placed within seven feet of the finished subgrade for a roadway or pads and should be held below the depth of the lowest utility. This will allow easier trenching for utility lines.

4. Rocks greater than four feet in diameter should be broken down, if possible, or they may be placed in a dozer trench. Each trench should be excavated into the compacted fill a minimum of one foot deeper than the largest diameter of rock.
   a) The rock should be placed in the trench and granular fill materials (SE>30) should be flooded into the trench to fill voids around the rock.
   b) The over size rock trenches should be no closer together than 15 feet from any slope face.
   c) Trenches at higher elevation should be staggered and there should be a minimum of four feet of compacted fill between the top of the one trench and the bottom of the next higher trench.
   d) It would be necessary to verify 90 percent relative compaction in these pits. A 24 to 72 hour delay to allow for water dissipation should be anticipated prior to additional fill placement.

Structural Rock Fills

If the materials generated for placement in structural fills contains a significant percentage of material more than six (6) inches in one dimension, then placement using conventional soil fill methods with isolated windrows would not be feasible. In such cases the following could be considered:

1. Mixes of large rock or boulders may be placed as rock fill. They should be below the depth of all utilities both on pads and in roadways and below any proposed swimming pools or other excavations. If these fills are placed within seven (7) feet of finished grade, they may affect foundation design.
2. Rock fills are required to be placed in horizontal layers that should **not exceed two feet in thickness, or the maximum rock size present, which ever is less**. All rocks exceeding two feet should be broken down to a smaller size, windrowed (see above), or disposed of in non-structural fill areas. Localized larger rock up to 3 feet in largest dimension may be placed in rock fill as follows:
   a) individual rocks are placed in a given lift so as to be roughly 50% exposed above the typical surface of the fill ,
   b) loaded rock trucks or alternate compactors are worked around the rock on all sides to the satisfaction of the soil engineer,
   c) the portion of the rock above grade is covered with a second lift.
3. Material placed in each lift should be well graded. No unfilled spaces (voids) should be permitted in the rock fill.

Compaction Procedures

Compaction of rock fills is largely procedural. The following procedures have been found to generally produce satisfactory compaction.

1. Provisions for routing of construction traffic over the fill should be implemented.
   a) Placement should be by rock trucks crossing the lift being placed and dumping at its edge.
   b) The trucks should be routed so that each pass across the fill is via a different path and that all areas are uniformly traversed.
   c) The dumped piles should be knocked down and spread by a large dozer (D-8 or larger suggested). (Water should be applied before and during spreading.)
2. Rock fill should be generously watered (sluiced)
   a) Water should be applied by water trucks to the:

   i) dump piles,
   ii) front face of the lift being placed and,
   iii) surface of the fill prior to compaction.
b) No material should be placed without adequate water.
c) The number of water trucks and water supply should be sufficient to provide constant water.
d) Rock fill placement should be suspended when water trucks are unavailable:
   i) for more than 5 minutes straight, or,
   ii) for more than 10 minutes/hour.

3. In addition to the truck pattern and at the discretion of the soil engineer, large, rubber tired compactors may be required.
   a) The need for this equipment will depend largely on the ability of the operators to provide complete and uniform coverage by wheel rolling with the trucks.
   b) Other large compactors will also be considered by the soil engineer provided that required compaction is achieved.

4. Placement and compaction of the rock fill is largely procedural. Observation by trenching should be made to check:
   a) the general segregation of rock size,
   b) for any unfilled spaces between the large blocks, and
   c) the matrix compaction and moisture content.

5. Test fills may be required to evaluate relative compaction of finer grained zones or as deemed appropriate by the soil engineer.
   a) A lift should be constructed by the methods proposed, as proposed

6. Frequency of the test trenching is to be at the discretion of the soil engineer. Control areas may be used to evaluate the contractor’s procedures.

7. A minimum horizontal distance of 15 feet should be maintained from the face of the rock fill and any finish slope face. At least the outer 15 feet should be built of conventional fill materials.

Piping Potential and Filter Blankets

Where conventional fill is placed over rock fill, the potential for piping (migration) of the fine grained material from the conventional fill into rock fills will need to be addressed.
The potential for particle migration is related to the grain size comparisons of the materials present and in contact with each other. Provided that 15 percent of the finer soil is larger than the effective pore size of the coarse soil, then particle migration is substantially mitigated. This can be accomplished with a well-graded matrix material for the rock fill and a zone of fill similar to the matrix above it. The specific gradation of the fill materials placed during grading must be known to evaluate the need for any type of filter that may be necessary to cap the rock fills. This, unfortunately, can only be accurately determined during construction.

In the event that poorly graded matrix is used in the rock fills, properly graded filter blankets 2 to 3 feet thick separating rock fills and conventional fill may be needed. As an alternative, use of two layers of filter fabric (Mirafi 700 x or equivalent) could be employed on top of the rock fill. In order to mitigate excess puncturing, the surface of the rock fill should be well broken down and smoothed prior to placing the filter fabric. The first layer of the fabric may then be placed and covered with relatively permeable fill material (with respect to overlying material) 1 to 2 feet thick. The relative permeable material should be compacted to fill standards. The second layer of fabric should be placed and conventional fill placement continued.

Subdrainage

Rock fill areas should be tied to a subdrainage system. If conventional fill is placed that separates the rock from the main canyon subdrain, then a secondary system should be installed. A system consisting of an adequately graded base (3 to 4 percent to the lower side) with a collector system and outlets may suffice.

Additionally, at approximately every 25 foot vertical interval, a collector system with outlets should be placed at the interface of the rock fill and the conventional fill blanketing a fill slope

Monitoring

Depending upon the depth of the rock fill and other factors, monitoring for settlement of the fill areas may be needed following completion of grading. Typically, if rock fill depths exceed 40 feet, monitoring would be recommend prior to construction of any settlement sensitive improvements. Delays of 3 to 6 months or longer can be expected prior to the start of construction.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractor's responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractor's procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

zones are found that are considered less compact than other areas, this would be brought to the contractor's attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

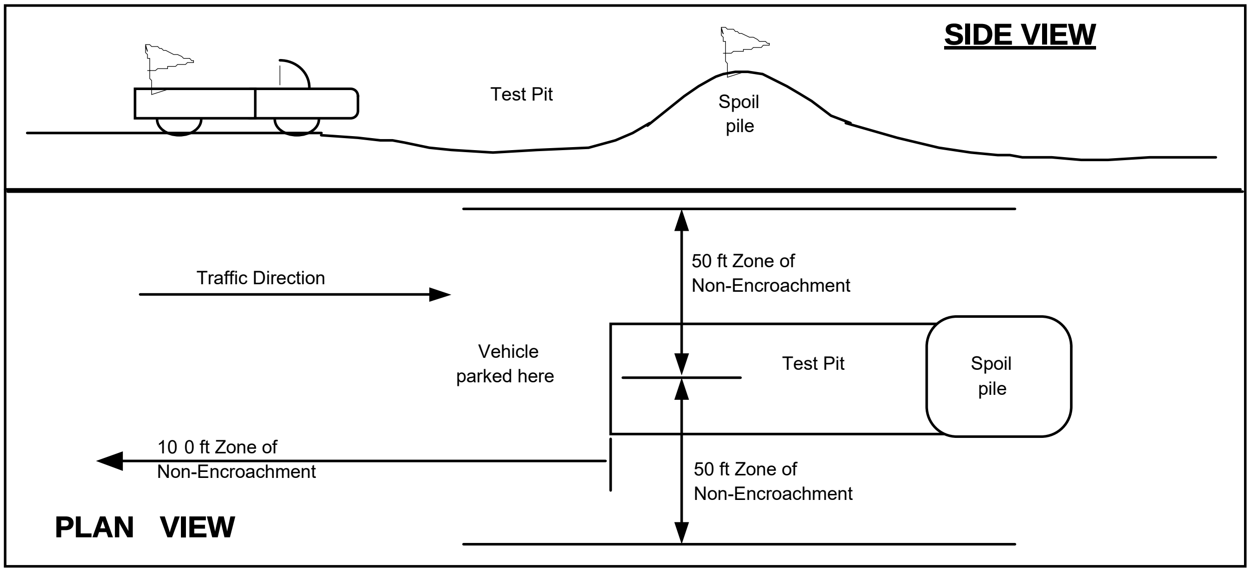
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

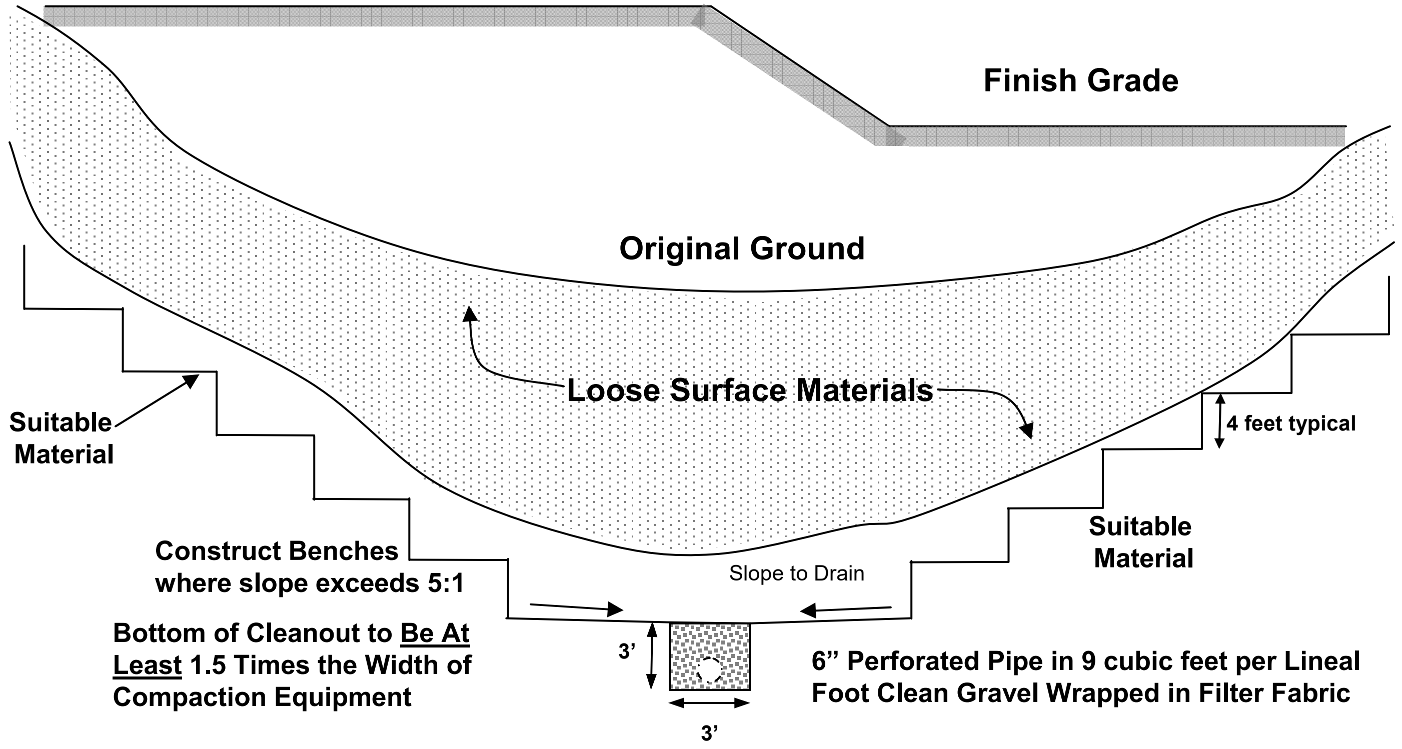
In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technician's attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

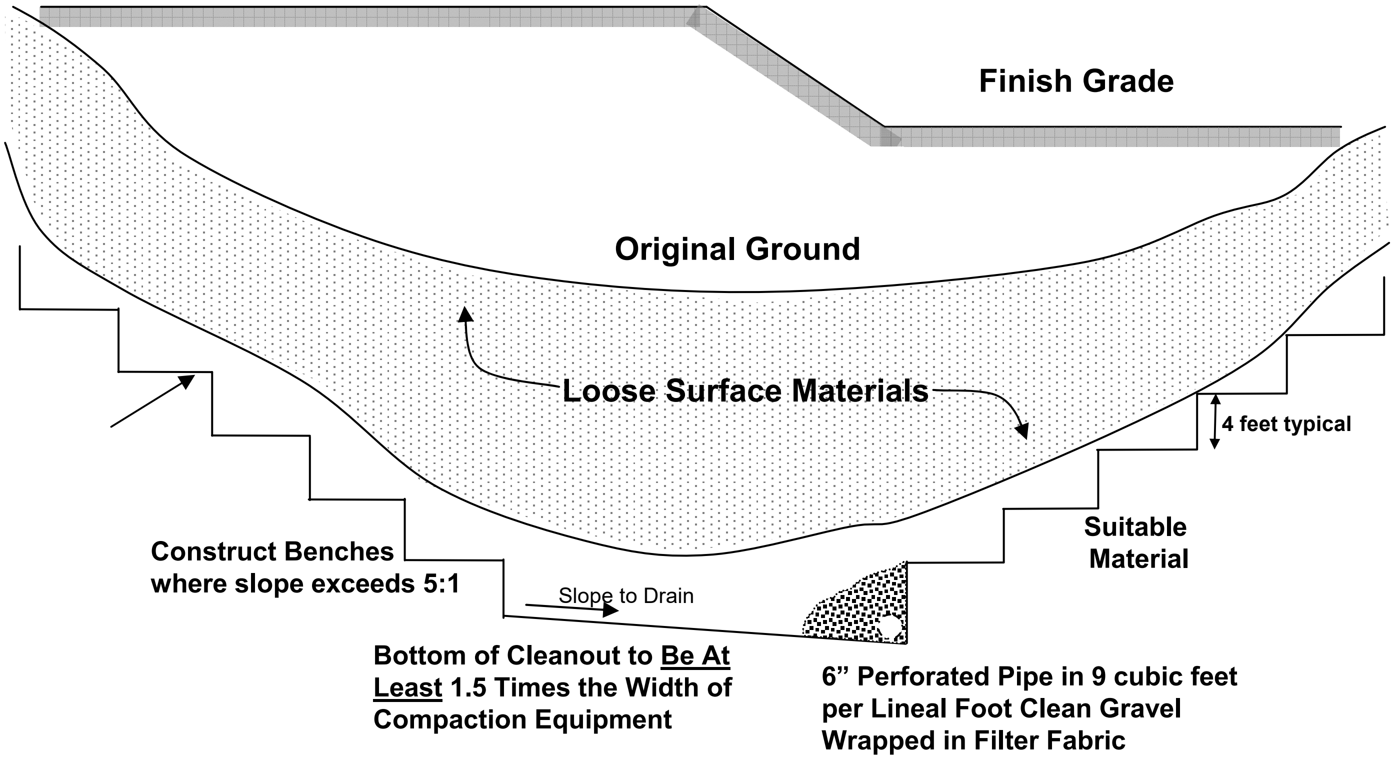
The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

ALTERNATES





GEOTEK

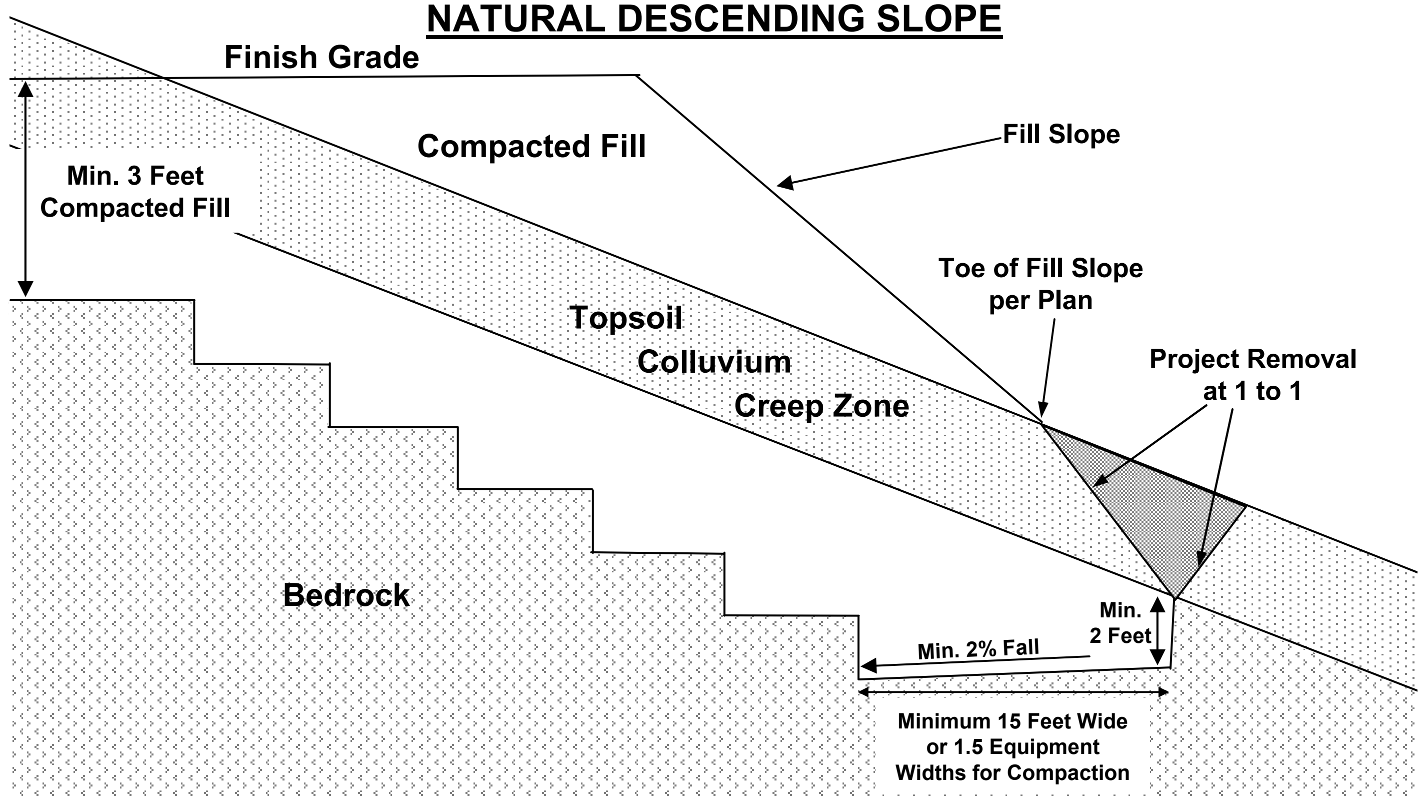
1548 North Maple Street
Corona, California 92880

TYPICAL CANYON CLEANOUT

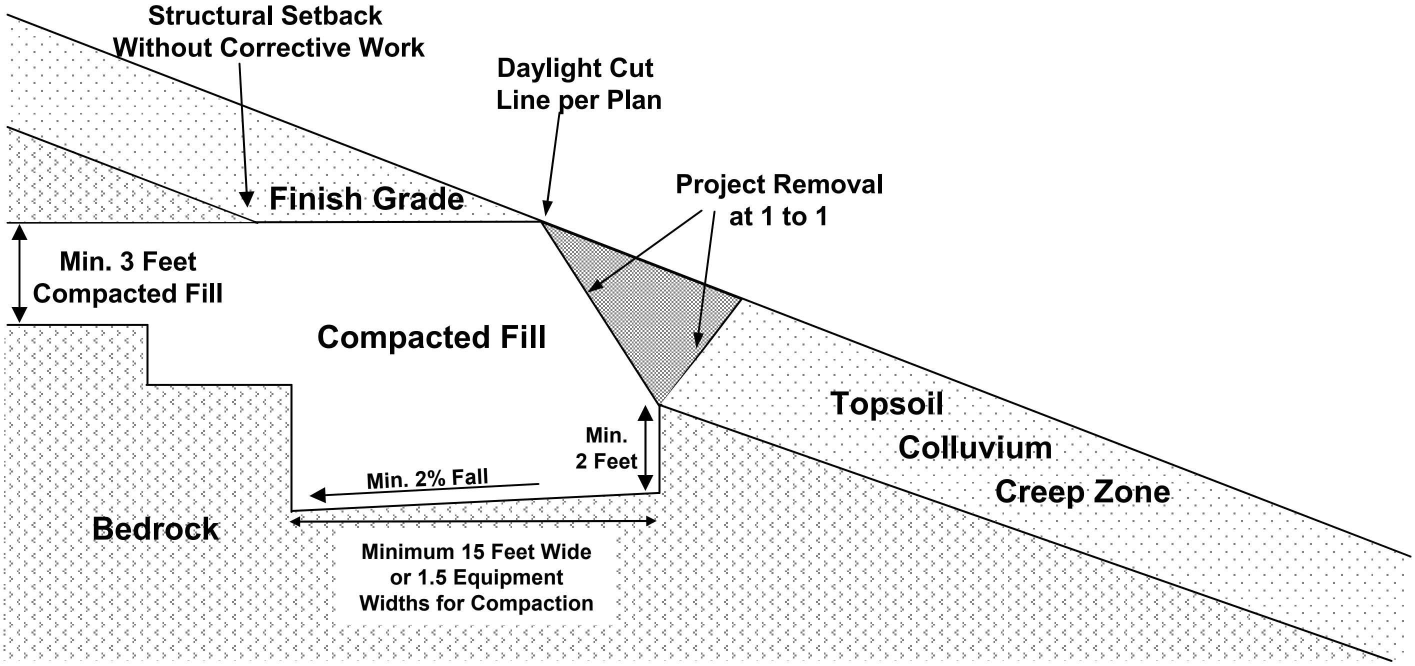
STANDARD GRADING GUIDELINES

PLATE F-1

TYPICAL FILL SLOPE OVER NATURAL DESCENDING SLOPE



DAYLIGHT CUT AREA OVER NATURAL DESCENDING SLOPE



GEOTEK

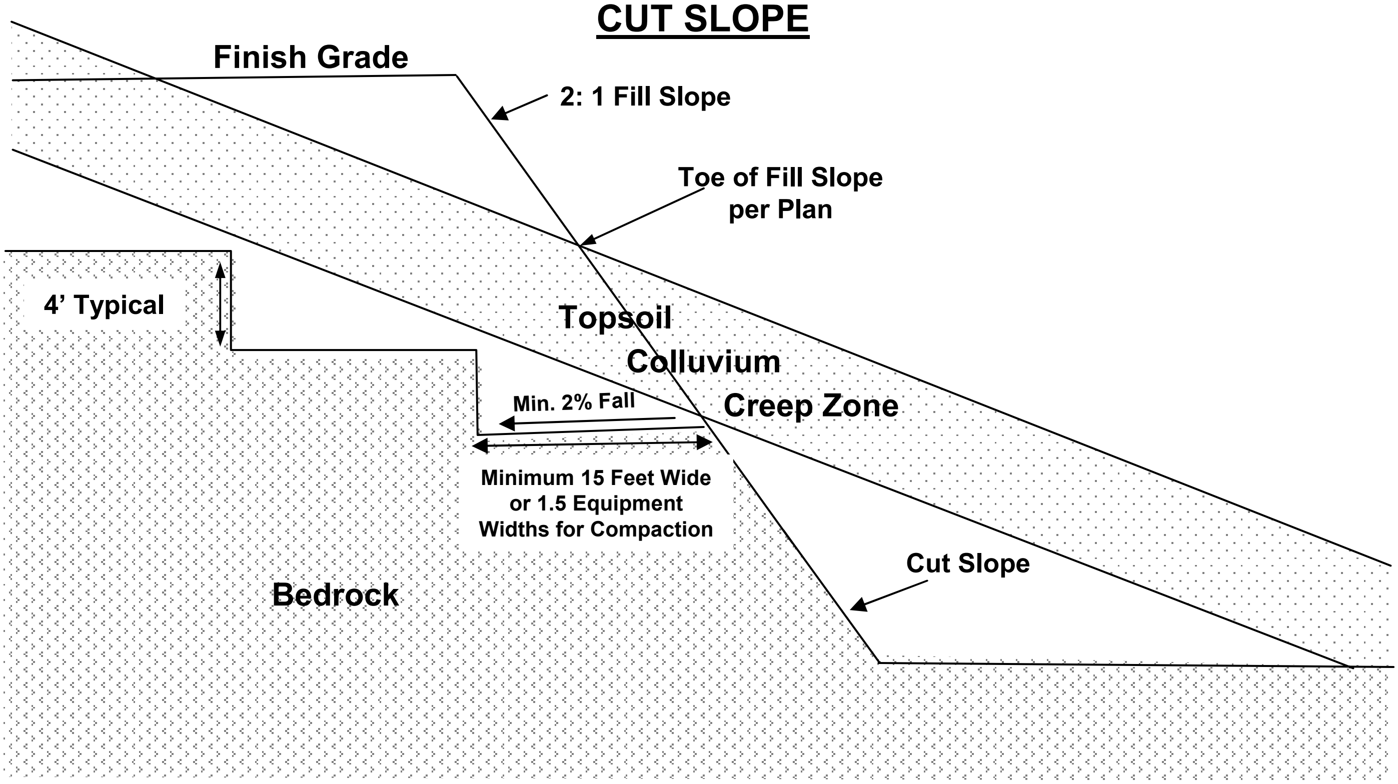
1548 North Maple Street
Corona, California 92880

TREATMENT ABOVE
NATURAL SLOPES

STANDARD GRADING
GUIDELINES

PLATE F-2

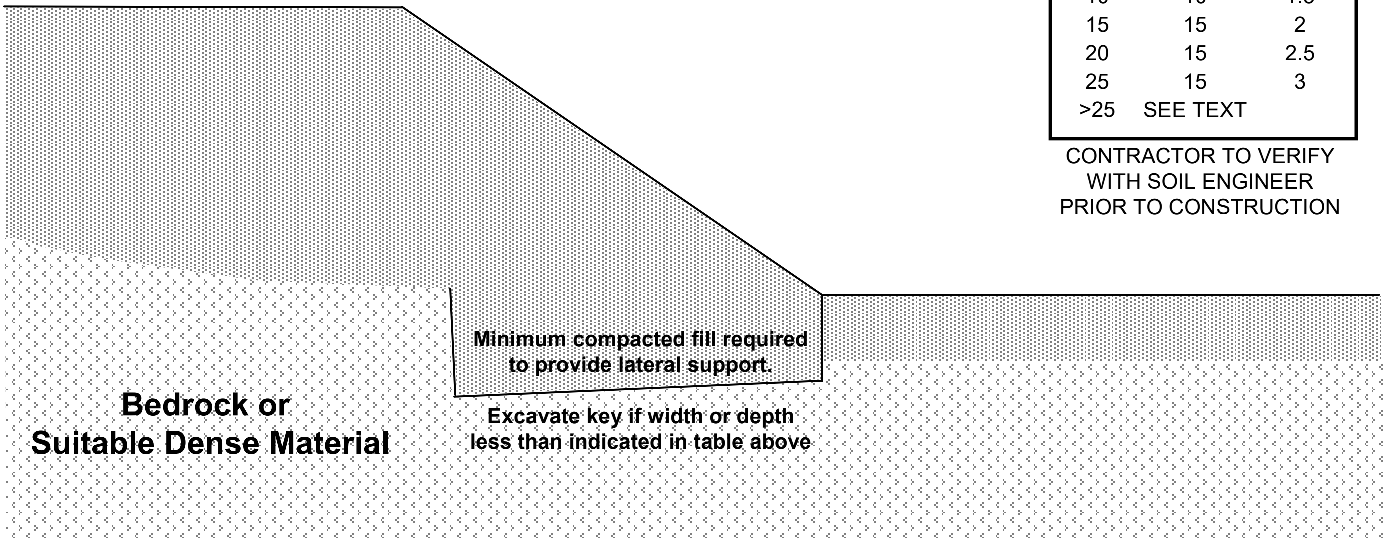
TYPICAL FILL SLOPE OVER CUT SLOPE



TYPICAL FILL SLOPE

SLOPE HEIGHT	MIN. KEY WIDTH	MIN. KEY DEPTH
5	7	1
10	10	1.5
15	15	2
20	15	2.5
25	15	3
>25	SEE TEXT	

CONTRACTOR TO VERIFY WITH SOIL ENGINEER PRIOR TO CONSTRUCTION



GEOTEK

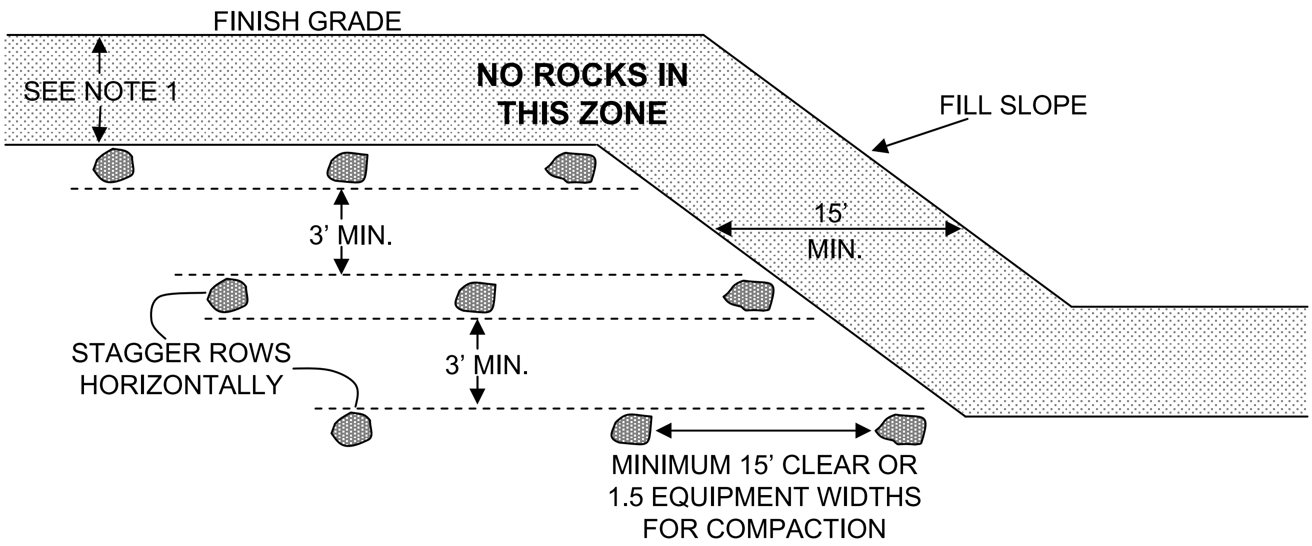
1548 North Maple Street
Corona, California 92880

COMMON FILL SLOPE KEYS

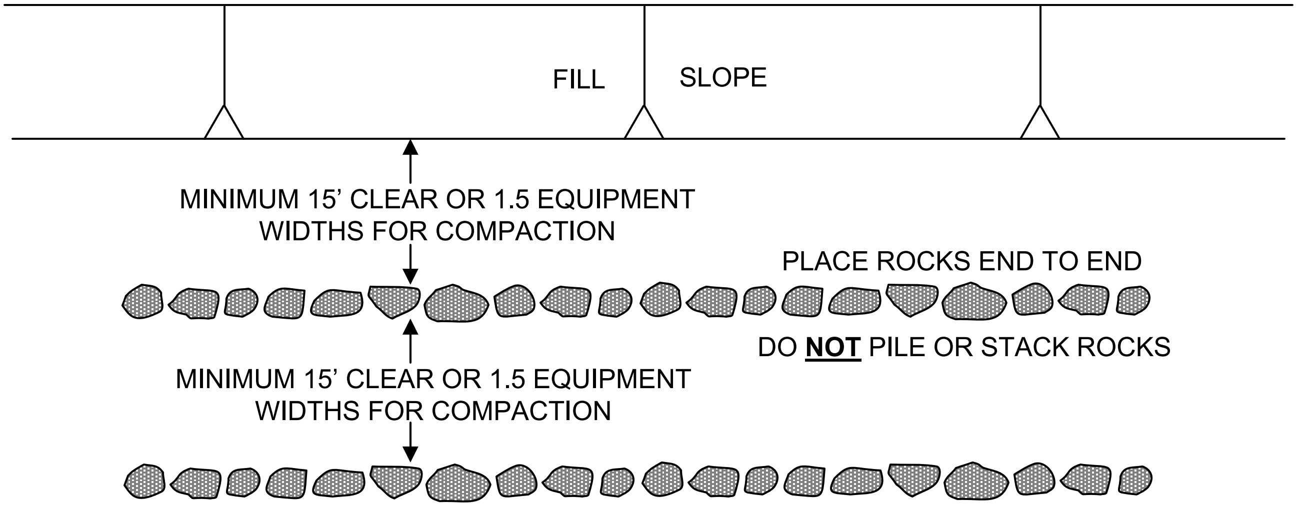
STANDARD GRADING GUIDELINES

PLATE F-3

CROSS SECTIONAL VIEW



PLAN VIEW



SOIL TO BE PLACE AROUND AND OVER ROCKS THEN FLOODED INTO VOIDS. MUST COMPACT AROUND AND OVER EACH ROCK WINDROW

NOTES:

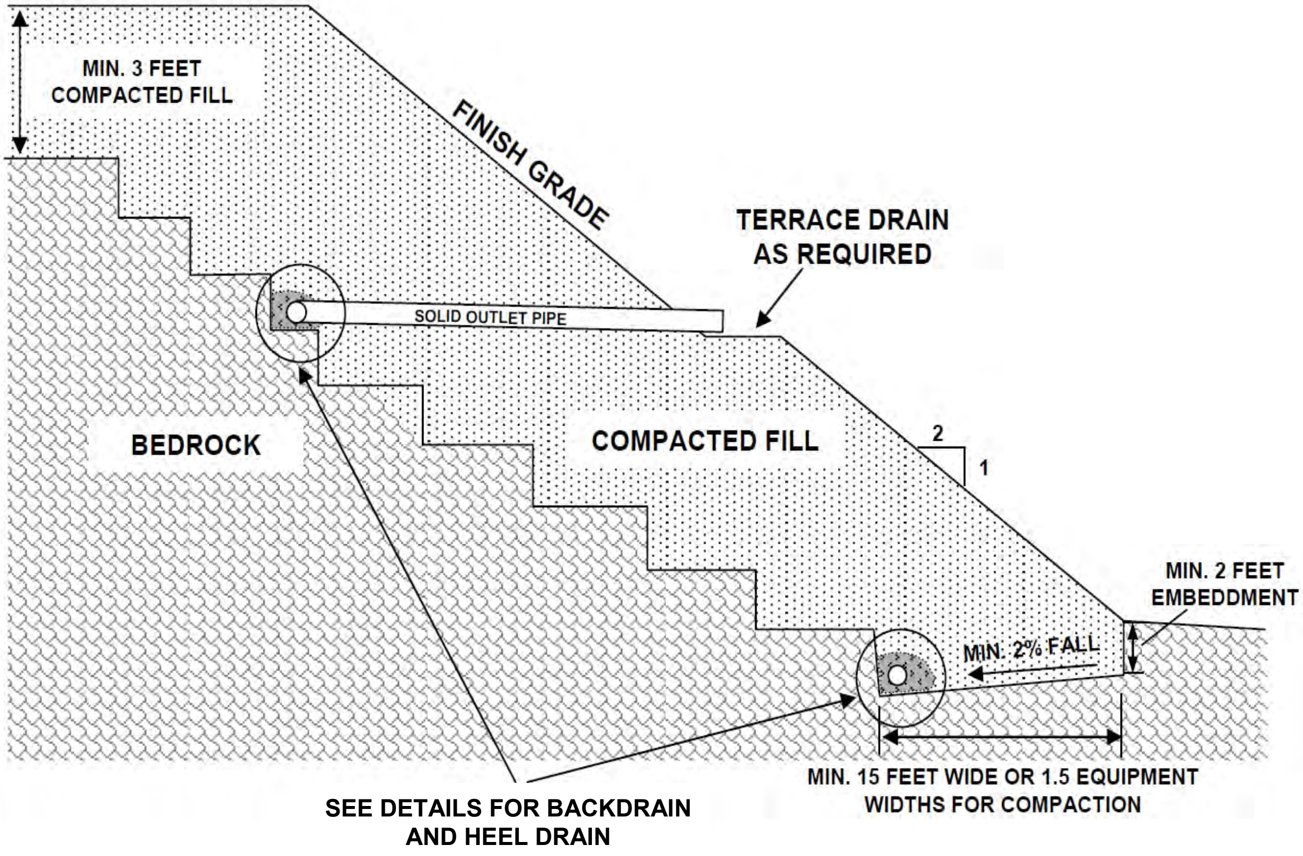
1) SOIL FILL OVER WINDROW SHOULD BE 7 FEET OR PER JURISDUICTIONAL STANDARDS AND SUFFICIENT FOR FUTURE EXCAVATIONS TO AVOID ROCKS
2) MAXIMUM ROCK SIZE IN WINDROWS IS 4 FEET IN DIAMETER
3) SOIL AROUND WINDROWS TO BE SANDY MATERIAL SUBJECT TO SOIL ENGINEER ACCEPTANCE
4) SPACING AND CLEARANCES MUST BE SUFFICIENT TO ALLOW FOR PROPER COMPACTION
5) INDIVDUAL LARGE ROCKS MAY BE BURIED IN PITS.

GEOTEK
1548 North Maple Street
Corona, California 92880

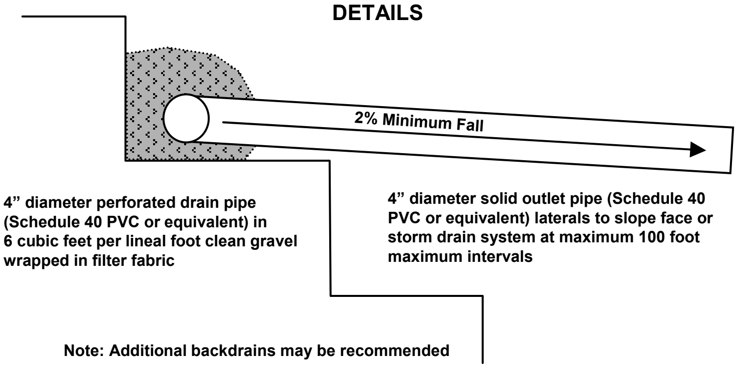
ROCK BURIAL DETAILS

STANDARD GRADING GUIDELINES

PLATE F-4



BACKDRAIN DETAILS

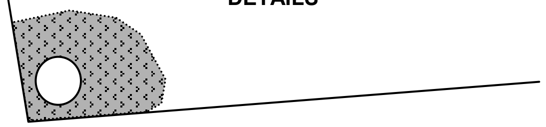


4” diameter perforated drain pipe (Schedule 40 PVC or equivalent) in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric

4” diameter solid outlet pipe (Schedule 40 PVC or equivalent) laterals to slope face or storm drain system at maximum 100 foot maximum intervals

Note: Additional backdrains may be recommended

HEEL DRAIN DETAILS



6” diameter perforated drain pipe in 6 cubic feet per lineal foot clean gravel wrapped in filter fabric, outlet pipe to gravity flow with 2% minimum fall

GEOTEK

1548 North Maple Street
Corona, California 92880

TYPICAL BUTTRESS AND STABILIZATION FILL

STANDARD GRADING GUIDELINES

PLATE F-5

Appendix 4: Historical Site Conditions (N/A)

Phase I Environmental Site Assessment or Other Information on Past Site Use

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend:
🟦 Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Mayers and Associates Civil Engineering	Date	8/20/2021
Designed by	Cesar Ramirez	Case No	
Company Project Number/Name	TR 38123		

BMP Identification

BMP NAME / ID Bioretention Basin A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.66 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1a	*315800*	*Concrete or Asphalt*	*1*	*0.89*	*281693.6*			
1b	*354385*	*Roofs*	*1*	*0.89*	*316111.4*			
1c	*691926*	*Ornamental Landscaping*	*0.1*	*0.11*	*76428.8*			
	1362111	***Total***			**674233.8**	**0.66**	***37082.9***	***37,894***

Notes:

Bioretention Facility - Design Procedure	BMP ID DMA-A	Legend:	Required Entries 🟦 Calculated Cells ▨

Company Name: Mayers and Associates Date: 8/20/2021

Designed by: C.R. County/City Case No.:

Design Volume

Enter the area tributary to this feature A_T= 31.3 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP}= 37,083 ft^3

Type of Bioretention Facility Design

● Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb w_T = 194.0 ft

Total Effective Depth, d_E

$$d_E = (0.3) \text{ x } d_S + (0.4) \text{ x } 1 - (0.7/w_T) + 0.5$$

d_E = 1.80 ft

Minimum Surface Area, A_m

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

A_M = 20,644 ft^2

Proposed Surface Area A= 22,203 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = 4 :1

Diameter of Underdrain 8 inches

Longitudinal Slope of Site (3% maximum) 0 %

6" Check Dam Spacing 0 feet

Describe Vegetation:

Notes:

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: ▭ Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: Mayers and Associates Civil Engineering
Date: 9/2/2021
Designed by: Cesar Ramirez
Case No:
Company Project Number/Name: TR 38123

BMP Identification

BMP NAME / ID: Planter Box

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.66 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1b	*19550*	*Concrete or Asphalt*	*1*	*0.89*	*17438.6*			
1b	*20632*	*Roofs*	*1*	*0.89*	*18403.7*			
1b	*32384*	*Ornamental Landscaping*	*0.1*	*0.11*	*3577.1*			
	72566	***Total***			**39419.4**	**0.66**	***2168.1***	***flowbased***

Notes:

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: ▭ Required Entries
▨ Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Mayers and Associates Civil Engineering	Date	9/2/2021
Designed by	Cesar Ramirez	Case No	

Company Project Number/Name TR 38123

BMP Identification

BMP NAME / ID Modular Wetland Unit

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.66 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1b	*30500*	*Concrete or Asphalt*	*1*	*0.89*	*27206*			
1b	*106587*	*Roofs*	*1*	*0.89*	*95075.6*			
1b	*46301*	*Ornamental Landscaping*	*0.1*	*0.11*	*5114.3*			
	183388	***Total***			**127395.9**	**0.66**	***7006.8***	***flowbased***

Notes:

Design Flow Rate DMA-B

Per WQMP Guidance Document, the design flow rate is as follows:

$$Q_{BMP} = C \cdot i \cdot A_{TRIB}$$

Where:

Q_{BMP} = the Design Flow Rate (cfs)

i = rainfall intensity (0.2 inches/hour)

C = composite rational method runoff factor for the Drainage Management Area (unitless)

ATRIB = area tributary to the BMP (acres)

$$C = 0.858 \cdot I_f^{\,3} - 0.78 \cdot I_f^{\,2} + 0.774 * I_f + 0.04$$

If = Impervious Fraction

If = 65%

C = 0.858*(0.65)^3 – 0.78*(0.65)^2 + 0.774 * 0.65 + 0.04

C = 0.45

A = 1.67 acres

Qbmp = 0.45 * 0.2 * 1.67 = 0.15 cfs

Proposed MWS-L-8-8 will be adequate to treat the 0.15 cfs flow rate.

Design Flow Rate DMA-C

Per WQMP Guidance Document, the design flow rate is as follows:

$$Q_{BMP} = C \cdot i \cdot A_{TRIB}$$

Where:

Q_{BMP} = the Design Flow Rate (cfs)

i = rainfall intensity (0.2 inches/hour)

C = composite rational method runoff factor for the Drainage Management Area (unitless)

ATRIB = area tributary to the BMP (acres)

$$C = 0.858 \cdot I_f^{\,3} - 0.78 \cdot I_f^{\,2} + 0.774 * I_f + 0.04$$

If = Impervious Fraction

If = 75%

C = 0.858*(0.75)^3 – 0.78*(0.75)^2 + 0.774 * 0.75 + 0.04

C = 0.54

A = 4.2 acres

Qbmp = 0.54 * 0.2 * 4.2 = 0.45 cfs

Proposed MWS-L-8-16 will be adequate to treat the 0.45 cfs flow rate.

Design Flow Rate DMA-OFFSITE 1

Per WQMP Guidance Document, the design flow rate is as follows:

$$Q_{BMP} = C \cdot i \cdot A_{TRIB}$$

Where:

Q_{BMP} = the Design Flow Rate (cfs)

i = rainfall intensity (0.2 inches/hour)

C = composite rational method runoff factor for the Drainage Management Area (unitless)

ATRIB = area tributary to the BMP (acres)

$$C = 0.858 \cdot I_f{}^3 - 0.78 \cdot I_f{}^2 + 0.774 * I_f + 0.04$$

If = Impervious Fraction

If = 95%

C = 0.858*(0.95)^3 – 0.78*(0.95)^2 + 0.774 * 0.95 + 0.04

C = 0.81

A = 1.1 acres

Qbmp = 0.81 * 0.2 * 1.1 = 0.18 cfs

Proposed MWS-L-8-8 will be adequate to treat the 0.18 cfs flow rate.

Design Flow Rate DMA-OFFSITE 2

Per WQMP Guidance Document, the design flow rate is as follows:

$$Q_{BMP} = C \cdot i \cdot A_{TRIB}$$

Where:

Q_{BMP} = the Design Flow Rate (cfs)

i = rainfall intensity (0.2 inches/hour)

C = composite rational method runoff factor for the Drainage Management Area (unitless)

ATRIB = area tributary to the BMP (acres)

$$C = 0.858 \cdot I_f{}^3 - 0.78 \cdot I_f{}^2 + 0.774 * I_f + 0.04$$

If = Impervious Fraction

If = 95%

C = 0.858*(0.95)^3 – 0.78*(0.95)^2 + 0.774 * 0.95 + 0.04

C = 0.81

A = 0.74 acres

Qbmp = 0.81 * 0.2 * 0.74 = 0.12 cfs

Proposed MWS-L-8-8 will be adequate to treat the 0.12 cfs flow rate.

MWS Linear | *Sizing Options*

Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

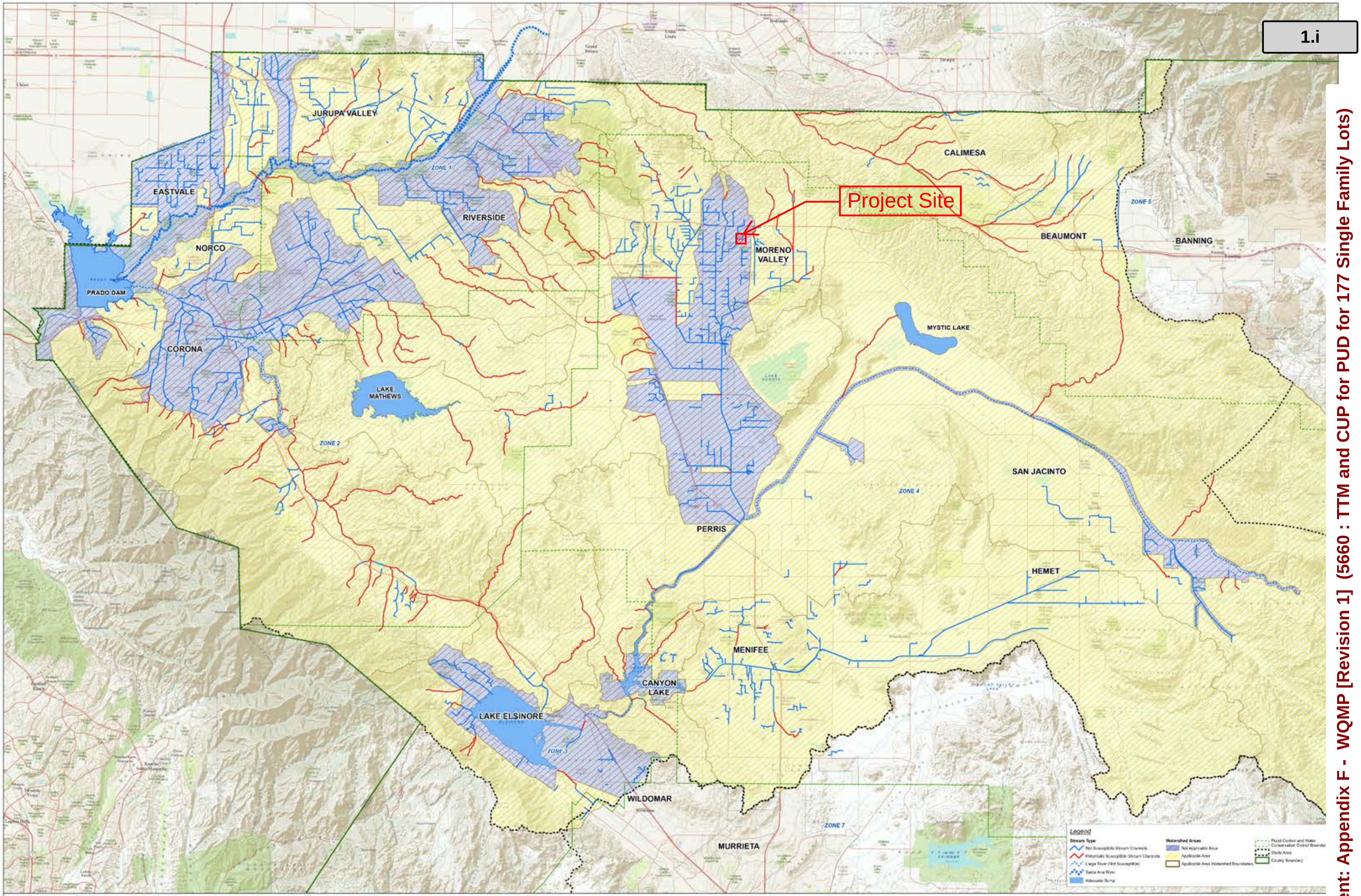
Model #	Dimensions	WetlandMEDIA Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 sq. ft.	0.052
MWS-L-4-6	4' x 6'	32 sq. ft.	0.073
MWS-L-4-8	4' x 8'	50 sq. ft.	0.115
MWS-L-4-13	4' x 13'	63 sq. ft.	0.144
MWS-L-4-15	4' x 15'	76 sq. ft.	0.175
MWS-L-4-17	4' x 17'	90 sq. ft.	0.206
MWS-L-4-19	4' x 19'	103 sq. ft.	0.237
MWS-L-4-21	4' x 21'	117 sq. ft.	0.268
MWS-L-6-8	7' x 9'	64 sq. ft.	0.147
MWS-L-8-8	8' x 8'	100 sq. ft.	0.230
MWS-L-8-12	8' x 12'	151 sq. ft.	0.346
MWS-L-8-16	8' x 16'	201 sq. ft.	0.462
MWS-L-8-20	9' x 21'	252 sq. ft.	0.577
MWS-L-8-24	9' x 25'	302 sq. ft.	0.693

DMA Offsite-1 2
&
DMA B

DMA-C

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation Distric

Map 2

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

EXHIBIT B—STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions on page 38 of the WQMP):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your WQMP. Use the format shown in Table 3-1 on page 33 of the WQMP. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	***... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE***		
1 Potential Sources of Runoff Pollutants	***2 Permanent Controls—Show on WQMP Drawings***	***3 Permanent Controls—List in WQMP Table and Narrative***	***4 Operational BMPs—Include in WQMP Table and Narrative***
■ ***A.*** On-site storm drain inlets	■ Locations of inlets.	■ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	■ Maintain and periodically repaint or replace inlet markings. ■ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☐ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at <u>www.cabmphandbooks.com</u> ☐ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☐ ***B.*** Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ ***C.*** Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
☐ **D1.** Need for future indoor & structural pest control		☐ Note building design features that discourage entry of pests.	☐ Provide Integrated Pest Management information to owners, lessees, and operators.
■ **D2.** Landscape/ Outdoor Pesticide Use	☐ Show locations of native trees or areas of shrubs and ground cover to he undisturbed and retained. ■ Show self-retaining landscape areas, if any. ☐ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ■ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ■ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ■ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ■ Consider using pest-resistant plants, especially adjacent to hardscape. ■ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	■ Maintain landscaping using minimum or no pesticides. ■ See applicable operational BMPs in "What you should know for.....Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☐ Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
☒ **E.** Pools, spas, ponds, decorative fountains, and other water features.	☒ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☒ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ **F.** Food service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
☒ **G.** Refuse areas	☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☒ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☒ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	**… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
☐ **H.** Industrial processes.	☐ Show process area.	☐ If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	☐ See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure “Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities” at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cahmphandhooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ J. Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	☐ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☐ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ☐Car dealerships and similar may rinse cars with water only.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
☐ **K.** Vehicle/Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ☐ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ☐ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☐ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ☐ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ L. Fuel Dispensing Areas	☐ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

---

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
☐ M. Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Attachment: Appendix F - WQMP [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ■ Condensate drain lines ☐ Rooftop equipment ☐ Drainage sumps ■ Roofing, gutters, and trim. ☐ Other sources		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ■ ■ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☐ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ■ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. Include controls for other sources as specified by local reviewer.	

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Appendix 10: Educational Materials

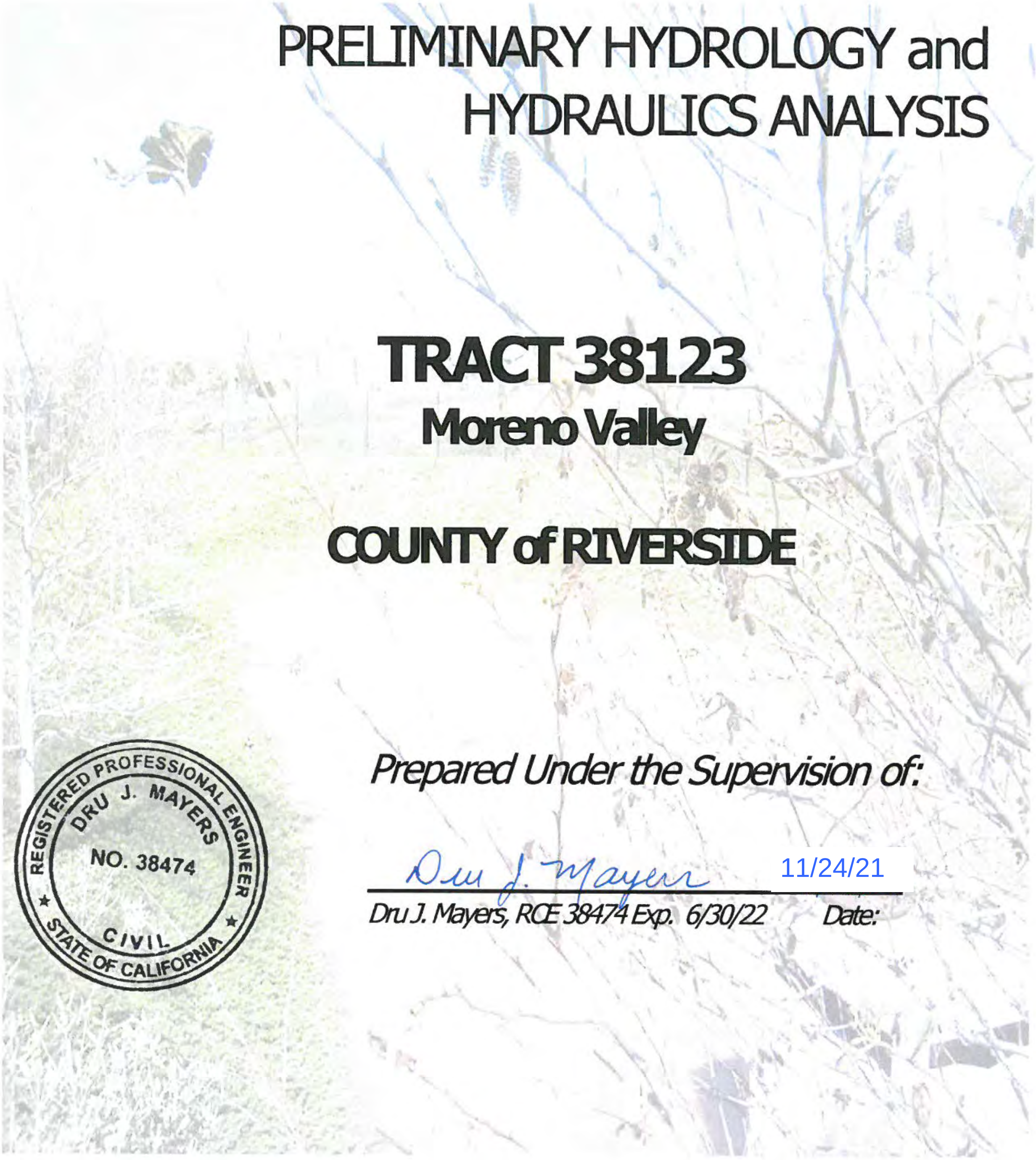
BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

MAYERS & ASSOCIATES
Civil Engineering, Inc.
PLANNING • ENGINEERING • SURVEYING

19 Spectrum Pointe Drive
Suite 609
Lake Forest, CA 92630

LST21-0019

PRELIMINARY HYDROLOGY and HYDRAULICS ANALYSIS



TRACT 38123

Moreno Valley

COUNTY of RIVERSIDE

Prepared Under the Supervision of:

REGISTERED PROFESSIONAL ENGINEER
DRU J. MAYERS
NO. 38474
CIVIL
STATE OF CALIFORNIA

Dru J. Mayers 11/24/21

Dru J. Mayers, RCE 38474 Exp. 6/30/22 *Date:*

20-0280-04

TABLE OF CONTENTS

I. DRAINAGE OVERVIEW

II. VICINITY MAP

III. APPENDICES

APPENDIX A RATIONAL HYDROLOGY ANALYSIS

AREA 'A'– Existing Drainage Calculation 10-yr & 100-yr

AREA 'B'– Existing Drainage Calculation 10-yr & 100-yr

AREA 'C'– Existing Drainage Calculation 10-yr & 100-yr

DMA 'A'– Proposed Drainage Calculation 10-yr & 100-yr

APPENDIX B HYDRAULIC CALCULATIONS ON PROPOSED FACILITIES

Biofiltration Basin Outlet Structures

Outlet Weir & Spillway Calculations

IV. EXHIBITS

I. DRAINAGE OVERVIEW

1. INTRODUCTION

A. PURPOSE

The purpose of this report is to provide a hydrology analysis for use in the design of the drainage system for development of the proposed Tract 38123 (Moreno Valley) site. This study will calculate the 10-yr & 100-yr 1-hr rational method hydrology study for the developed site. Off-site drainage like street widening will also be included in the analysis.

B. PROJECT DESCRIPTION

Tract 38123 is located within the Moreno Valley area of the San Jacinto River Watershed in the south easterly portion of Riverside County. It is located south of Bay Ave, west of Darwin Drive, east of Lasselle Street and north of Alessandro Boulvard in the Moreno Valley area of Riverside County. See the vicinity map contained in Section II of this report. The FEMA flood zone for this project is 06065C0765G.

C. EXISTING CONDITION

Existing site conditions have three separate flow paths. Area A is a 19.2 acre area which flows to the south west portion of the site. Area B is a 13.4 acre area which flows to the south east portion of the site. Area C is a 5.3 acre area on the south east side of the site and it drains to the southerly eastern corner of the site adjacent to Alessandro Boulvard. The topography of the site descends gently to the south west and south east corner of the project site. The general elevation of the property varies across the site from an elevation of 1,626 feet on the north side to 1,586 feet on the south side. Local drainage is generally directed towards Alessandro Boulevard on the south side of the subject site.

D. PROPOSED CONDITION

As proposed the site will be developed into a single family detached residential development with associated improvements, a biofiltration basin, and open space areas. The runoff from the developed portion of the site will drain southerly to the biofiltration basin through a storm drain system and then outlet into an existing storm drain located in Alessandro Boulevard. The basin is designed to store the Water Quality flows and the increase runoff mitigation flows. From the basin, water will be split to two separate drop inlets on opposite ends of the bioretention basin. Where half of the sites stormwater will drain to an existing 36" sd line on Alessandro Blvd. This existing 36" line is referred to the J-5 line on the master drainage map and falls under Line "J". Line J-5 falls under the Moreno MDP of the Riverside County Flood Control Master Drainage Map. The other half of the basin will drain to a newly built 781 linear feet of 36" RCP line which will drain south of Lasselle Street and meet with the existing 36" RCP stormdrain. This newly built stormdrain line will meet with N-2 sd line from the master drainage map and falls under Line "N". Line N-2 falls under the Sunnymead MDP of the Riverside County Flood Control Master Drainage Map. The additional stormdrain being built is to match existing conditions from the hydrology. The site currently drains to two opposite ends of the site and if we were to drain the entirety of the site to the existing 36" RCP line on Alessandro then the pipe would not be adequately sized to hold the increased acreage draining to it. For this reason we need to build new 36" RCP draining southwest of the site to match existing conditions.

2. METHODOLOGY

A. DISCUSSION

The methodology used in this report is based on the Riverside County Flood Control and Water Conservation District's Storm Water Quality Best Management Practice Design Handbook, Hydrology Manual, Civilcadd/Civildesign Engineering Software Version 7.0, and Excel software spreadsheet.

The following criteria were used in this analysis:

- ➢ All available information and improvement plans were collected.
- ➢ The drainage areas within and tributary to the project sire were defined.
- ➢ The water quality study was performed as shown in the Design Handbook.
- ➢ The existing hydrographs were prepared based on the existing and proposed drainage patterns using Civilcadd/Civildesign Engineering Software.
- ➢ The Excel spreadsheet was used to determine the water quality quantities.
- ➢ The hydrographs were prepared using the Civilcadd/Civildesign Engineering Software.

The results of this study and the print out of these calculations for this hydrological analysis are presented herein.

3. RATIONAL HYDROLOGY ANALYSIS

A. GENERAL

The hydrologic studies prepared in this report utilized the rational method and unit hydrograph method in accordance with the Riverside County Hydrology Manual.

Hydrology calculations were prepared using the "Rational Method Hydrology Computer Program Package" by Civilcadd Software based on the hydrology manual criterion.

The rational method computes the peak runoff as a function of area, rainfall intensity, and a coefficient of runoff. The basic formula in the rational method is as follows:

$$Q = CIA$$

Where:

Q = Peak runoff in cubic feet per second (cfs)
C = Coefficient of runoff
I = Average rainfall in inches per hour corresponding to the time of concentration
A = Drainage area in acres

This formula computes the peak flow rate at all points of concentration. The hydrology analysis is provided in this report.

Land use in the study area is a significant factor in the development of the hydrology study in that the coefficient of runoff used in the rational method are partially dependent upon the type of surface development proposed within the drainage area. The land use used in this study is based upon the development proposed.

The major factor affecting infiltration is the nature of the soil. Hydrologic soil types within the study area were determined from the Hydrologic Classification of Soils map contained in the Riverside County Hydrology Manual. The soil classification is based on the Soil Conservation Service criteria as follows:

Soil Group A Low runoff potential, consisting mainly of deep, well-defined sands or gravel.

Soil Group B Soils having moderate infiltration rates, consisting of moderately well drained sandy-loam soils with fine to moderate coarse textures.

Soil Group C Soils having slow infiltration rates, consisting of silty-loam soils with moderate fine textures.

Soil Group D High runoff potential with slow infiltration rates, consisting mainly of clay soils with a permanent high water table or shallow soils over impervious material.

Rainfall intensity is expressed in inches of rainfall per hour and is developed by statistical methods from historical rainfall records. The rainfall intensity data used in this study was obtained from the curves for mean precipitation intensities included in the Riverside County Hydrology Manual.

B. RATIONAL METHOD HYDROLOGY ANALYSIS

A rational method hydrology study has been prepared for the development of this site. This study will calculate the 10-year and 100-year storm discharges for the sizing of drainage facilities.

Conclusion:

Per the existing hydrology map in exhibit C, the site drains to three separate locations. 19.2 acres of the site drains south west to the corner of Alessandro Blvd and Lasselle Street, while 13.4 acres drains east towards Darwin Drive and lastly 5.5 acres drains south east towards the corner of Alessandro Blvd and Darwin Drive.

In order to mimic existing conditions and avoid over flooding of existing storm drain pipes along Alessandro Blvd, proposed conditions are split in half so that the outlet structure will equally drain easterly on Alessandro Blvd and southerly on Lasselle Street. In the proposed condition the majority of the site drains to a bio-filtration basin (DMA-A), where two outlets will be proposed on opposite ends of the basin. These two outlets will be used to drain the basin equally and mimic existing conditions. Half the site will drain to line J-5 on Alessandro Blvd while the other half will drain to line N-2 on Lasselle Street. Line J-5 pertains to the Moreno MDP while line N-2 pertains to the Sunnymead MDP.

DMA-B in the proposed condition drains towards Darwin Avenue where that flow will confluence with half the flow produced by DMA-A in node 136 of proposed hydrology map. DMA-C in the proposed conditions drains towards Lasselle Street where that flow will confluence with half the flow produced by DMA-A in node 142 of the proposed hydrology map.

See summary tables of existing and proposed conditions on the next page.

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

SUMMARY TABLE BASIN

RATIONAL METHOD ANALYSIS FOR TR 38123
EXISTING CONDITION

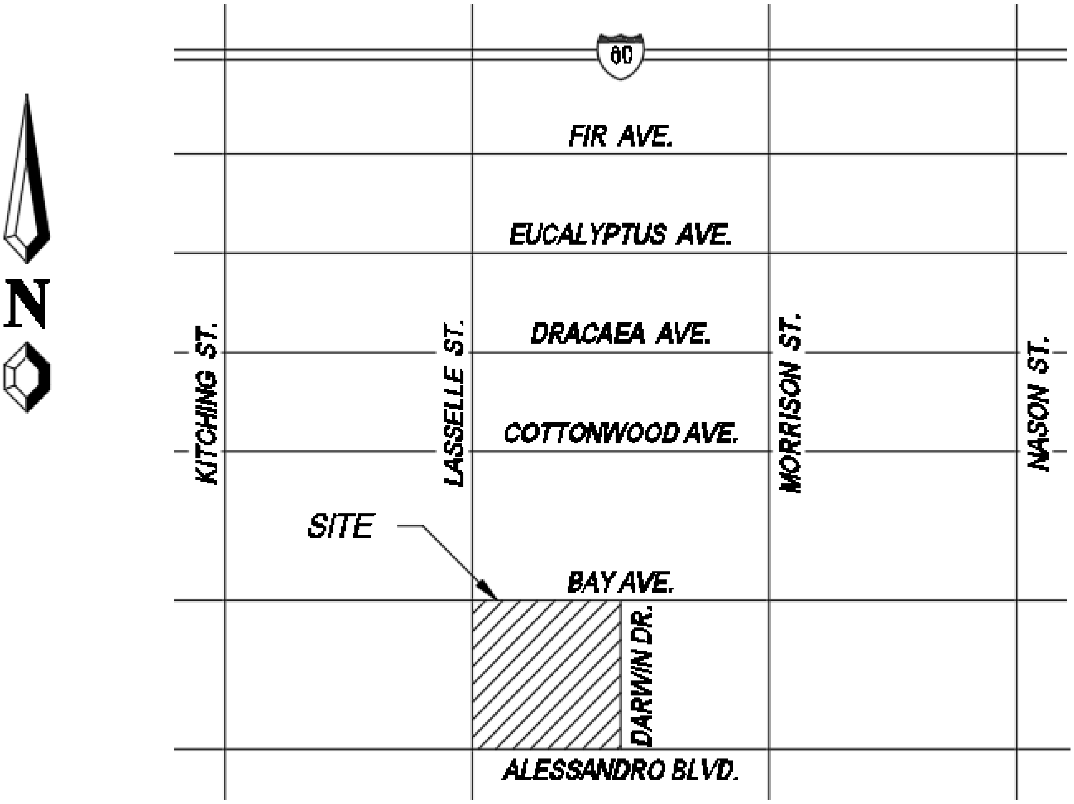
DMA	“A”	“B”	“C”
	Existing Flow (Q) (19.2 AC)	Existing Flow (Q) (13.4 AC)	Existing Flow (Q) (5.3 AC)
10-yr	26.2 CFS	15.5 CFS	6.6 CFS
100-yr	44.5 CFS	26.4 CFS	10.9 CFS

SUMMARY TABLE BASIN

RATIONAL METHOD ANALYSIS FOR TR 38123
PROPOSED CONDITION

	Half of DMA “A” combined with DMA “B”	Half of DMA “A” combined with DMA “C”
	Proposed Flow (Q) 20.0 AC	Proposed Flow (Q) 17.9 AC
10-yr	23.9 CFS	21.8 CFS
100-yr	39.5 CFS	35.0 CFS

II. VICINITY MAP



III. APPENDICES

APPENDIX A	RATIONAL HYDROLOGY ANALYSIS
	AREA 'A'– Existing Drainage Calculation 10-yr & 100-yr
	AREA 'B'– Existing Drainage Calculation 10-yr & 100-yr
	AREA 'C'– Existing Drainage Calculation 10-yr & 100-yr
	DMA 'A'– Proposed Drainage Calculation 10-yr & 100-yr
APPENDIX B	HYDRAULIC CALCULATIONS ON PROPOSED FACILITIES Infiltration Basin Outlet Structures Outlet Weir & Spillway Calculations
APPENDIX C	UNIT HYDROGRAPH ANALYSIS
	Existing Unit Hydrograph Calculations, 2-yr, 5-yr, 10-yr
	Proposed Unit Hydrograph Calculations, 2-yr, 5-yr, 10-yr
APPENDIX D	RETARDING BASIN FLOOD ROUTING ANALYSIS

APPENDIX "A"

RATIONAL HYDROLOGY ANALYSIS

AREA 'A'– Existing Drainage Calculation 10-yr & 100-yr

AREA 'B'– Existing Drainage Calculation 10-yr & 100-yr

AREA 'C'– Existing Drainage Calculation 10-yr & 100-yr

DMA 'A'– Proposed Drainage Calculation 10-yr & 100-yr

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study       Date: 12/04/20  File:20030006A.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area A
10yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   200.000(Ft.)
Top (of initial area) elevation =  1626.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =    22.000(Ft.)
Slope =    0.11000  s(percent)=      11.00
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.861 min.
Rainfall intensity =      2.425(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.670
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  80.64
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.784(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     16.010(CFS)
Depth of flow =   0.590(Ft.), Average velocity =   2.302(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              5.00
      2            100.00              0.00
      3            200.00              5.00
Manning's 'N' friction factor =   0.040
-----------------------------------------------------------------
Sub-Channel flow  =     16.010(CFS)
  '     '    flow top width =     23.586(Ft.)
  '     '    velocity=    2.302(Ft/s)
  '     '    area =      6.954(Sq.Ft)
  '     '    Froude number =     0.747

Upstream point elevation =  1604.000(Ft.)
Downstream point elevation =  1584.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    7.38 min.
Time of concentration =   14.24 min.
Depth of flow =   0.590(Ft.)
Average velocity =   2.302(Ft/s)
Total irregular channel flow =    16.010(CFS)
Irregular channel normal depth above invert elev. =   0.590(Ft.)
Average velocity of channel(s) =   2.302(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  79.60
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.683(In/Hr) for a    10.0 year storm
Subarea runoff =     20.396(CFS) for     16.200(Ac.)
Total runoff =     26.179(CFS)      Total area =      19.200(Ac.)
Depth of flow =   0.709(Ft.), Average velocity =   2.604(Ft/s)
End of computations, total study area =           19.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

```
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  79.8
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study       Date: 12/04/20  File:20030006A100.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area A
100yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   200.000(Ft.)
Top (of initial area) elevation =  1626.000(Ft.)
Bottom (of initial area) elevation =  1604.000(Ft.)
Difference in elevation =    22.000(Ft.)
Slope =    0.11000  s(percent)=      11.00
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.861 min.
Rainfall intensity =      3.549(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Decimal fraction soil group B = 0.670
Decimal fraction soil group C = 0.330
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  91.38
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.253(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     26.900(CFS)
Depth of flow =   0.716(Ft.), Average velocity =   2.621(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              5.00
      2            100.00              0.00
      3            200.00              5.00
Manning's 'N' friction factor =   0.040
-----------------------------------------------------------------
Sub-Channel flow  =     26.900(CFS)
  '     '    flow top width =     28.652(Ft.)
  '     '    velocity=    2.621(Ft/s)
  '     '    area =     10.262(Sq.Ft)
  '     '    Froude number =     0.772

Upstream point elevation =  1604.000(Ft.)
Downstream point elevation =  1584.000(Ft.)
Flow length =  1020.000(Ft.)
Travel time  =    6.49 min.
Time of concentration =   13.35 min.
Depth of flow =   0.716(Ft.)
Average velocity =   2.621(Ft/s)
Total irregular channel flow =    26.900(CFS)
Irregular channel normal depth above invert elev. =   0.716(Ft.)
Average velocity of channel(s) =   2.621(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.854
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  90.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.544(In/Hr) for a   100.0 year storm
Subarea runoff =     35.217(CFS) for     16.200(Ac.)
Total runoff =     44.471(CFS)      Total area =      19.200(Ac.)
Depth of flow =   0.865(Ft.), Average velocity =   2.972(Ft/s)
End of computations, total study area =           19.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

```
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  79.8
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study       Date: 12/04/20  File:20030006B.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area B
10yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   625.000(Ft.)
Top (of initial area) elevation =  1615.000(Ft.)
Bottom (of initial area) elevation =  1598.600(Ft.)
Difference in elevation =    16.400(Ft.)
Slope =    0.02624  s(percent)=       2.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.416 min.
Rainfall intensity =      1.673(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.735
Decimal fraction soil group A = 0.000
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.286(CFS)
Total initial stream area =        4.300(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     10.404(CFS)
Depth of flow =   0.702(Ft.), Average velocity =   2.112(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              5.00
      2             50.00              0.00
      3            100.00              5.00
Manning's 'N' friction factor =   0.040
-----------------------------------------------------------------
Sub-Channel flow  =     10.404(CFS)
  '     '    flow top width =     14.038(Ft.)
  '     '    velocity=    2.112(Ft/s)
  '     '    area =      4.926(Sq.Ft)
  '     '    Froude number =     0.628

Upstream point elevation =  1598.600(Ft.)
Downstream point elevation =  1594.000(Ft.)
Flow length =   350.000(Ft.)
Travel time  =    2.76 min.
Time of concentration =   17.18 min.
Depth of flow =   0.702(Ft.)
Average velocity =   2.112(Ft/s)
Total irregular channel flow =    10.404(CFS)
Irregular channel normal depth above invert elev. =   0.702(Ft.)
Average velocity of channel(s) =   2.112(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.729
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.533(In/Hr) for a    10.0 year storm
Subarea runoff =     10.171(CFS) for      9.100(Ac.)
Total runoff =     15.457(CFS)      Total area =      13.400(Ac.)
Depth of flow =   0.814(Ft.), Average velocity =   2.332(Ft/s)
End of computations, total study area =           13.40 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

```
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.5
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 12/04/20  File:20030006B100.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area B
100yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   625.000(Ft.)
Top (of initial area) elevation =  1615.000(Ft.)
Bottom (of initial area) elevation =  1598.600(Ft.)
Difference in elevation =    16.400(Ft.)
Slope =    0.02624  s(percent)=       2.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.416 min.
Rainfall intensity =      2.448(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  89.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.922(CFS)
Total initial stream area =        4.300(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     17.693(CFS)
Depth of flow =   0.857(Ft.), Average velocity =   2.412(Ft/s)
      ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
      1              0.00              5.00
      2             50.00              0.00
      3            100.00              5.00
Manning's 'N' friction factor =   0.040
-----------------------------------------------------------------
Sub-Channel flow  =     17.693(CFS)
  '     '    flow top width =     17.130(Ft.)
  '     '    velocity=    2.412(Ft/s)
  '     '    area =      7.336(Sq.Ft)
  '     '    Froude number =     0.649

Upstream point elevation =  1598.600(Ft.)
Downstream point elevation =  1594.000(Ft.)
Flow length =   350.000(Ft.)
Travel time  =    2.42 min.
Time of concentration =   16.83 min.
Depth of flow =   0.857(Ft.)
Average velocity =   2.412(Ft/s)
Total irregular channel flow =    17.693(CFS)
Irregular channel normal depth above invert elev. =   0.857(Ft.)
Average velocity of channel(s) =   2.412(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  90.28
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.265(In/Hr) for a   100.0 year storm
Subarea runoff =     17.449(CFS) for      9.100(Ac.)
Total runoff =     26.371(CFS)      Total area =      13.400(Ac.)
Depth of flow =   0.995(Ft.), Average velocity =   2.665(Ft/s)
End of computations, total study area =           13.40 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  78.5
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study       Date: 12/04/20  File:20030006C.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area C
10yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   600.000(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1593.000(Ft.)
Difference in elevation =    20.000(Ft.)
Slope =    0.03333  s(percent)=       3.33
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.519 min.
Rainfall intensity =      1.727(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.745
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.575(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 1.000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1593.000(Ft.)
End of street segment elevation =  1585.000(Ft.)
Length of street segment  =   535.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.650(CFS)
Depth of flow =   0.364(Ft.), Average velocity =   3.034(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.858(Ft.)
Flow velocity =   3.03(Ft/s)
Travel time =    2.94 min.     TC =   16.46  min.
 Adding area flow to street
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.784
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  85.20
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.566(In/Hr) for a    10.0 year storm
Subarea runoff =      4.051(CFS) for      3.300(Ac.)
Total runoff =      6.625(CFS)      Total area =       5.300(Ac.)
Street flow at end of street =      6.625(CFS)
Half street flow at end of street =      6.625(CFS)
Depth of flow =   0.401(Ft.), Average velocity =   3.299(Ft/s)
Flow width (from curb towards crown)=  13.716(Ft.)
End of computations, total study area =            5.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  82.8
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 12/04/20  File:20030006C100.out
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
```

Moreno Valley Rational Hydrology
Existing condition Area C
100yr-1 hr

```
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   600.000(Ft.)
Top (of initial area) elevation =  1613.000(Ft.)
Bottom (of initial area) elevation =  1593.000(Ft.)
Difference in elevation =    20.000(Ft.)
Slope =    0.03333  s(percent)=       3.33
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.519 min.
Rainfall intensity =      2.528(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  90.28
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.306(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1593.000(Ft.)
End of street segment elevation =  1585.000(Ft.)
Length of street segment  =   535.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.653(CFS)
Depth of flow =   0.417(Ft.), Average velocity =   3.416(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  14.539(Ft.)
Flow velocity =   3.42(Ft/s)
Travel time =    2.61 min.     TC =   16.13  min.
 Adding area flow to street
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.869
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.100
Decimal fraction soil group C = 0.900
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  94.08
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.314(In/Hr) for a   100.0 year storm
Subarea runoff =      6.633(CFS) for      3.300(Ac.)
Total runoff =     10.939(CFS)      Total area =       5.300(Ac.)
Street flow at end of street =     10.939(CFS)
Half street flow at end of street =     10.939(CFS)
Depth of flow =   0.462(Ft.), Average velocity =   3.724(Ft/s)
Flow width (from curb towards crown)=  16.766(Ft.)
End of computations, total study area =            5.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Area averaged RI index number =  82.8
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study       Date: 11/05/21  File:31589pr10.out
------------------------------------------------------------------------
 Moreno Valley Rational Hydrology
 Proposed condition
 10yr-1 hr
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------



Program License Serial Number 6194

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.820(In/Hr)
Slope of intensity duration curve = 0.5000





++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   830.000(Ft.)
Top (of initial area) elevation =   617.800(Ft.)
Bottom (of initial area) elevation =   603.700(Ft.)
Difference in elevation =    14.100(Ft.)
Slope =    0.01699  s(percent)=       1.70
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.962 min.
Rainfall intensity =      1.764(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.738
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.604(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   603.700(Ft.)
Downstream point/station elevation =   603.500(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.604(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.604(CFS)
Normal flow depth in pipe =    8.86(In.)
Flow top width inside pipe =   10.55(In.)
Critical Depth =    8.30(In.)
Pipe flow velocity =      4.19(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    13.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.000(Ac.)
Runoff from this stream =      2.604(CFS)
Time of concentration =   13.08 min.
Rainfall intensity =     1.756(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      103.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =   617.800(Ft.)
Bottom (of initial area) elevation =   604.800(Ft.)
Difference in elevation =    13.000(Ft.)
Slope =    0.01444  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.830 min.
Rainfall intensity =      1.708(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.746
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  59.90
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.457(CFS)
Total initial stream area =        3.500(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   604.800(Ft.)
Downstream point/station elevation =   603.500(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.457(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.457(CFS)
Normal flow depth in pipe =    8.14(In.)
Flow top width inside pipe =   14.94(In.)
Critical Depth =   10.27(In.)
Pipe flow velocity =      6.54(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    14.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.500(Ac.)
Runoff from this stream =      4.457(CFS)
Time of concentration =   14.06 min.
Rainfall intensity =     1.694(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)



1        2.604     13.08                  1.756
2        4.457     14.06                  1.694
Largest stream flow has longer time of concentration
Qp =      4.457 + sum of
        Qb         Ia/Ib
         2.604 *    0.965 =      2.511
Qp =      6.968

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.604       4.457
Area of streams before confluence:
        2.000        3.500
Results of confluence:
Total flow rate =      6.968(CFS)
Time of concentration =    14.059 min.
```

```
Effective stream area after confluence =      5.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

______________________________________________________________________
Upstream point/station elevation =   597.000(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   500.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.968(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.968(CFS)
Normal flow depth in pipe =   11.25(In.)
Flow top width inside pipe =   12.99(In.)
Critical Depth =   12.69(In.)
Pipe flow velocity =      7.06(Ft/s)
Travel time through pipe =    1.18 min.
Time of concentration (TC) =    15.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****

______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.500(Ac.)
Runoff from this stream =      6.968(CFS)
Time of concentration =   15.24 min.
Rainfall intensity =     1.627(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   950.000(Ft.)
Top (of initial area) elevation =   615.600(Ft.)
Bottom (of initial area) elevation =   602.300(Ft.)
Difference in elevation =    13.300(Ft.)
Slope =    0.01400  s(percent)=       1.40
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.221 min.
Rainfall intensity =      1.684(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.755
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.706(CFS)
Total initial stream area =       3.700(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   602.300(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.706(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.706(CFS)
Normal flow depth in pipe =    6.59(In.)
Flow top width inside pipe =   11.94(In.)
Critical Depth =   10.80(In.)
Pipe flow velocity =     10.66(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =    14.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.700(Ac.)
Runoff from this stream =      4.706(CFS)
Time of concentration =   14.60 min.
Rainfall intensity =     1.663(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        6.968     15.24                  1.627
2        4.706     14.60                  1.663
Largest stream flow has longer time of concentration
Qp =      6.968 + sum of
        Qb          Ia/Ib
         4.706 *    0.979 =      4.605
Qp =     11.573

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.968       4.706
Area of streams before confluence:
        5.500        3.700
Results of confluence:
Total flow rate =     11.573(CFS)
Time of concentration =    15.240 min.
Effective stream area after confluence =      9.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   590.000(Ft.)
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Downstream point/station elevation =   589.000(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.573(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.573(CFS)
Normal flow depth in pipe =   16.38(In.)
Flow top width inside pipe =   17.39(In.)
Critical Depth =   15.21(In.)
Pipe flow velocity =      5.75(Ft/s)
Travel time through pipe =    0.49 min.
Time of concentration (TC) =    15.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.200(Ac.)
Runoff from this stream =     11.573(CFS)
Time of concentration =   15.73 min.
Rainfall intensity =     1.601(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   840.000(Ft.)
Top (of initial area) elevation =   605.900(Ft.)
Bottom (of initial area) elevation =   597.000(Ft.)
Difference in elevation =     8.900(Ft.)
Slope =    0.01060  s(percent)=       1.06
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.314 min.
Rainfall intensity =      1.679(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.735
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.850
Decimal fraction soil group C = 0.150
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.95
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.210(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.600(Ac.)
Runoff from this stream =      3.210(CFS)
Time of concentration =   14.31 min.
```

```
Rainfall intensity =     1.679(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.573     15.73                 1.601
2        3.210     14.31                 1.679
Largest stream flow has longer time of concentration
Qp =     11.573 + sum of
        Qb         Ia/Ib
         3.210 *    0.954 =      3.062
Qp =     14.636

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.573       3.210
Area of streams before confluence:
        9.200        2.600
Results of confluence:
Total flow rate =     14.636(CFS)
Time of concentration =    15.732 min.
Effective stream area after confluence =     11.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   597.000(Ft.)
Downstream point/station elevation =   588.700(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    14.636(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    14.636(CFS)
Normal flow depth in pipe =   10.02(In.)
Flow top width inside pipe =   14.13(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.79(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    15.83 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.800(Ac.)
Runoff from this stream =     14.636(CFS)
Time of concentration =   15.83 min.
Rainfall intensity =     1.596(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      111.000
```

```
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   500.000(Ft.)
Top (of initial area) elevation =   602.300(Ft.)
Bottom (of initial area) elevation =   596.100(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.01240  s(percent)=       1.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.271 min.
Rainfall intensity =      1.892(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.740
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.379(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.700(Ac.)
Runoff from this stream =      2.379(CFS)
Time of concentration =   11.27 min.
Rainfall intensity =     1.892(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       14.636     15.83                 1.596
2        2.379     11.27                 1.892
Largest stream flow has longer time of concentration
Qp =     14.636 + sum of
        Qb         Ia/Ib
         2.379 *    0.844 =      2.007
Qp =     16.643

Total of 2 streams to confluence:
Flow rates before confluence point:
      14.636       2.379
Area of streams before confluence:
       11.800        1.700
Results of confluence:
Total flow rate =     16.643(CFS)
Time of concentration =    15.832 min.
Effective stream area after confluence =     13.500(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      117.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   588.700(Ft.)
Downstream point/station elevation =   588.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.643(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    16.643(CFS)
Normal flow depth in pipe =   23.63(In.)
Flow top width inside pipe =   29.76(In.)
Critical Depth =   16.06(In.)
Pipe flow velocity =      3.66(Ft/s)
Travel time through pipe =    0.68 min.
Time of concentration (TC) =    16.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      117.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.500(Ac.)
Runoff from this stream =     16.643(CFS)
Time of concentration =   16.52 min.
Rainfall intensity =     1.563(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   680.000(Ft.)
Top (of initial area) elevation =   601.700(Ft.)
Bottom (of initial area) elevation =   594.700(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.01029  s(percent)=       1.03
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.230 min.
Rainfall intensity =      1.746(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.731
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.788(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Process from Point/Station      121.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   594.700(Ft.)
Downstream point/station elevation =   594.200(Ft.)
Pipe length  =   220.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.788(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     1.788(CFS)
Normal flow depth in pipe =    8.20(In.)
Flow top width inside pipe =   14.93(In.)
Critical Depth =    6.38(In.)
Pipe flow velocity =      2.60(Ft/s)
Travel time through pipe =    1.41 min.
Time of concentration (TC) =    14.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.400(Ac.)
Runoff from this stream =      1.788(CFS)
Time of concentration =   14.64 min.
Rainfall intensity =     1.660(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   760.000(Ft.)
Top (of initial area) elevation =   604.600(Ft.)
Bottom (of initial area) elevation =   595.000(Ft.)
Difference in elevation =     9.600(Ft.)
Slope =    0.01263  s(percent)=       1.26
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.277 min.
Rainfall intensity =      1.743(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.742
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  58.60
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.622(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.800(Ac.)
Runoff from this stream =      3.622(CFS)
Time of concentration =   13.28 min.
Rainfall intensity =     1.743(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   380.000(Ft.)
Top (of initial area) elevation =   602.000(Ft.)
Bottom (of initial area) elevation =   595.000(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.01842  s(percent)=       1.84
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.489 min.
Rainfall intensity =      1.339(In/Hr) for a    10.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.608
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  67.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.793(CFS)
Total initial stream area =        2.200(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      2.200(Ac.)
Runoff from this stream =      1.793(CFS)
Time of concentration =   22.49 min.
Rainfall intensity =     1.339(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        1.788     14.64                 1.660
2        3.622     13.28                 1.743
3        1.793     22.49                 1.339
Largest stream flow has longer or shorter time of concentration
Qp =      3.622 + sum of
        Qa           Tb/Ta
         1.788 *    0.907 =      1.621
        Qa           Tb/Ta
         1.793 *    0.590 =      1.058
Qp =      6.302
```

```
Total of 3 streams to confluence:
Flow rates before confluence point:
       1.788       3.622       1.793
Area of streams before confluence:
        1.400        2.800        2.200
Results of confluence:
Total flow rate =      6.302(CFS)
Time of concentration =    13.277 min.
Effective stream area after confluence =      6.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   595.000(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   500.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.302(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.302(CFS)
Normal flow depth in pipe =   11.98(In.)
Flow top width inside pipe =   12.04(In.)
Critical Depth =   12.15(In.)
Pipe flow velocity =      6.00(Ft/s)
Travel time through pipe =    1.39 min.
Time of concentration (TC) =    14.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.400(Ac.)
Runoff from this stream =      6.302(CFS)
Time of concentration =   14.67 min.
Rainfall intensity =     1.659(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      125.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   770.000(Ft.)
Top (of initial area) elevation =   604.800(Ft.)
Bottom (of initial area) elevation =   596.400(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.01091  s(percent)=       1.09
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.744 min.
Rainfall intensity =      1.713(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.735
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  57.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.273(CFS)
Total initial stream area =         2.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.600(Ac.)
Runoff from this stream =      3.273(CFS)
Time of concentration =   13.74 min.
Rainfall intensity =     1.713(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        6.302     14.67                  1.659
2        3.273     13.74                  1.713
Largest stream flow has longer time of concentration
Qp =      6.302 + sum of
        Qb         Ia/Ib
         3.273 *    0.968 =      3.169
Qp =      9.471

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.302       3.273
Area of streams before confluence:
        6.400        2.600
Results of confluence:
Total flow rate =      9.471(CFS)
Time of concentration =    14.666 min.
Effective stream area after confluence =      9.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      126.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   596.400(Ft.)
Downstream point/station elevation =   596.200(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.471(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.471(CFS)
Normal flow depth in pipe =   16.27(In.)
Flow top width inside pipe =   17.55(In.)
Critical Depth =   13.73(In.)
Pipe flow velocity =      4.74(Ft/s)
```

```
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    14.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      9.000(Ac.)
Runoff from this stream =      9.471(CFS)
Time of concentration =   14.84 min.
Rainfall intensity =     1.649(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      126.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   420.000(Ft.)
Top (of initial area) elevation =   601.900(Ft.)
Bottom (of initial area) elevation =   596.200(Ft.)
Difference in elevation =     5.700(Ft.)
Slope =    0.01357  s(percent)=       1.36
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.324 min.
Rainfall intensity =      1.977(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.744
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.618(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      1.618(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     1.977(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        9.471     14.84                  1.649
2        1.618     10.32                  1.977
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Largest stream flow has longer time of concentration
Qp =      9.471 + sum of
        Qb          Ia/Ib
         1.618 *     0.834 =      1.350
Qp =     10.820

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.471       1.618
Area of streams before confluence:
        9.000        1.100
Results of confluence:
Total flow rate =     10.820(CFS)
Time of concentration =    14.842 min.
Effective stream area after confluence =     10.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      127.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   596.200(Ft.)
Downstream point/station elevation =   588.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.820(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.820(CFS)
Normal flow depth in pipe =    9.60(In.)
Flow top width inside pipe =   14.40(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.05(Ft/s)
Travel time through pipe =    0.19 min.
Time of concentration (TC) =    15.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      127.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     10.100(Ac.)
Runoff from this stream =     10.820(CFS)
Time of concentration =   15.03 min.
Rainfall intensity =     1.638(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.643     16.52               1.563
2       10.820     15.03               1.638
Largest stream flow has longer time of concentration
Qp =     16.643 + sum of
        Qb          Ia/Ib
        10.820 *     0.954 =     10.324
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Qp =     26.966

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.643      10.820
Area of streams before confluence:
       13.500       10.100


Results of confluence:
Total flow rate =     26.966(CFS)
Time of concentration =    16.515 min.
Effective stream area after confluence  =     23.600(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      136.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
_______________________________________________________________________
Rainfall intensity =      1.568(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.776
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.40 min.  Rain intensity =       1.57(In/Hr)
Total area =        13.25(Ac.)  Total runoff =     13.50(CFS)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
_______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.250(Ac.)
Runoff from this stream =     13.500(CFS)
Time of concentration =   16.40 min.
Rainfall intensity =     1.568(In/Hr)
Program is now starting with Main Stream No. 2


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      131.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =   613.100(Ft.)
Bottom (of initial area) elevation =   601.000(Ft.)
Difference in elevation =    12.100(Ft.)
Slope =    0.01330  s(percent)=       1.33
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.123 min.
```

```
Rainfall intensity =      1.690(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.728
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.952(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      131.000 to Point/Station      132.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   601.000(Ft.)
End of street segment elevation =   593.800(Ft.)
Length of street segment  =   500.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.206(CFS)
Depth of flow =   0.377(Ft.), Average velocity =   3.071(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.524(Ft.)
Flow velocity =   3.07(Ft/s)
Travel time =    2.71 min.     TC =   16.84  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.718
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.548(In/Hr) for a    10.0 year storm
Subarea runoff =      4.448(CFS) for      4.000(Ac.)
Total runoff =      7.400(CFS)      Total area =       6.400(Ac.)
Street flow at end of street =      7.400(CFS)
Half street flow at end of street =      7.400(CFS)
Depth of flow =   0.416(Ft.), Average velocity =   3.340(Ft/s)
Flow width (from curb towards crown)=  14.453(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.400(Ac.)
Runoff from this stream =      7.400(CFS)
Time of concentration =   16.84 min.
Rainfall intensity =     1.548(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      1.548(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.718
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.84 min.  Rain intensity =       1.55(In/Hr)
Total area =         4.00(Ac.)  Total runoff =      4.70(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      4.700(CFS)
Time of concentration =   16.84 min.
Rainfall intensity =     1.548(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1        7.400     16.84                 1.548
2        4.700     16.84                 1.548
Largest stream flow has longer or shorter time of concentration
Qp =      7.400 + sum of
        Qa           Tb/Ta
         4.700 *     1.000 =      4.700
Qp =     12.100

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.400       4.700
Area of streams before confluence:
```

```
        6.400        4.000
Results of confluence:
Total flow rate =     12.100(CFS)
Time of concentration =    16.837 min.
Effective stream area after confluence =     10.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      133.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   593.800(Ft.)
Downstream point/station elevation =   587.300(Ft.)
Pipe length  =   460.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.100(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.100(CFS)
Normal flow depth in pipe =   14.27(In.)
Flow top width inside pipe =   14.59(In.)
Critical Depth =   15.82(In.)
Pipe flow velocity =      8.05(Ft/s)
Travel time through pipe =    0.95 min.
Time of concentration (TC) =    17.79 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      133.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   630.000(Ft.)
Top (of initial area) elevation =   594.200(Ft.)
Bottom (of initial area) elevation =   587.300(Ft.)
Difference in elevation =     6.900(Ft.)
Slope =    0.01095  s(percent)=       1.10
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.749 min.
Rainfall intensity =      2.034(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.876
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.400
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  63.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      1.959(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      1.959(CFS)
```

```
Time of concentration =    9.75 min.
Rainfall intensity =     2.034(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      1.768(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.760
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  62.50
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  12.91 min.  Rain intensity =       1.77(In/Hr)
Total area =         1.00(Ac.)  Total runoff =      0.90(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      1.000(Ac.)
Runoff from this stream =      0.900(CFS)
Time of concentration =   12.91 min.
Rainfall intensity =     1.768(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.400     16.84                1.548
2        1.959      9.75                2.034
3        0.900     12.91                1.768
Largest stream flow has longer time of concentration
Qp =      7.400 + sum of
        Qb         Ia/Ib
         1.959 *    0.761 =      1.491
        Qb         Ia/Ib
         0.900 *    0.876 =      0.788
Qp =      9.679

Total of 3 streams to confluence:
Flow rates before confluence point:
      7.400       1.959       0.900
Area of streams before confluence:
        6.400       1.100       1.000
Results of confluence:
Total flow rate =      9.679(CFS)
Time of concentration =    16.837 min.
Effective stream area after confluence =      8.500(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   587.300(Ft.)
Downstream point/station elevation =   586.900(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.679(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.679(CFS)
Normal flow depth in pipe =   13.55(In.)
Flow top width inside pipe =   20.10(In.)
Critical Depth =   13.90(In.)
Pipe flow velocity =      5.90(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    17.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      8.500(Ac.)
Runoff from this stream =      9.679(CFS)
Time of concentration =   17.01 min.
Rainfall intensity =     1.540(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      136.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   510.000(Ft.)
Top (of initial area) elevation =   592.000(Ft.)
Bottom (of initial area) elevation =   586.900(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.01000  s(percent)=       1.00
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.860 min.
Rainfall intensity =      1.844(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.779
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  66.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.581(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.100(Ac.)
Runoff from this stream =      1.581(CFS)
Time of concentration =   11.86 min.
Rainfall intensity =     1.844(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       13.500     16.40               1.568
2        9.679     17.01               1.540
3        1.581     11.86               1.844
Largest stream flow has longer or shorter time of concentration
Qp =     13.500 + sum of
        Qa          Tb/Ta
         9.679 *    0.964 =      9.334
        Qb         Ia/Ib
         1.581 *    0.850 =      1.345
Qp =     24.179

Total of 3 main streams to confluence:
Flow rates before confluence point:
      13.500       9.679       1.581
Area of streams before confluence:
       13.250        8.500        1.100


Results of confluence:
Total flow rate =     24.179(CFS)
Time of concentration =    16.400 min.
Effective stream area after confluence  =     22.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      141.000 to Point/Station      142.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      1.568(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.776
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.40 min.  Rain intensity =       1.57(In/Hr)
Total area =        13.25(Ac.)  Total runoff =     13.50(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.250(Ac.)
Runoff from this stream =     13.500(CFS)
Time of concentration =   16.40 min.
Rainfall intensity =     1.568(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      143.000 to Point/Station      142.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =    640.000(Ft.)
Top (of initial area) elevation =    593.300(Ft.)
Bottom (of initial area) elevation =    586.500(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.01062  s(percent)=       1.06
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.870 min.
Rainfall intensity =      2.022(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.489(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      2.489(CFS)
Time of concentration =    9.87 min.
Rainfall intensity =     2.022(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      150.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   1617.000(Ft.)
Top (of initial area) elevation =    615.600(Ft.)
Bottom (of initial area) elevation =    589.000(Ft.)
Difference in elevation =    26.600(Ft.)
```

```
Slope =    0.01645  s(percent)=       1.65
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.103 min.
Rainfall intensity =      1.755(In/Hr) for a    10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.866
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  56.00
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      6.385(CFS)
Total initial stream area =        4.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      142.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =   589.000(Ft.)
Downstream point/station elevation =   586.500(Ft.)
Pipe length  =   288.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.385(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.385(CFS)
Normal flow depth in pipe =   10.59(In.)
Flow top width inside pipe =   17.72(In.)
Critical Depth =   11.71(In.)
Pipe flow velocity =      5.90(Ft/s)
Travel time through pipe =    0.81 min.
Time of concentration (TC) =    13.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 3
Stream flow area =      4.200(Ac.)
Runoff from this stream =      6.385(CFS)
Time of concentration =   13.92 min.
Rainfall intensity =     1.703(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)



1       13.500     16.40                 1.568
2        2.489      9.87                 2.022
3        6.385     13.92                 1.703
Largest stream flow has longer time of concentration
Qp =     13.500 + sum of
        Qb          Ia/Ib
         2.489 *    0.776 =      1.931
```

```
        Qb         Ia/Ib
         6.385 *    0.921 =      5.882
Qp =     21.313

Total of 3 streams to confluence:
Flow rates before confluence point:
      13.500       2.489       6.385
Area of streams before confluence:
       13.250        1.400        4.200
Results of confluence:
Total flow rate =     21.313(CFS)
Time of concentration =    16.400 min.
Effective stream area after confluence =     18.850(Ac.)
End of computations, total study area =           69.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.477
Area averaged RI index number =  62.8
```

```
            Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
      Rational Hydrology Study        Date: 11/05/21  File:31589pr100.out
------------------------------------------------------------------------
 Moreno Valley Rational Hydrology
 Proposed condition
 100yr-1 hr
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------



Program License Serial Number 6194

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 3

Standard intensity-duration curves data (Plate D-4.1)
For the [ Sunnymead-Moreno ] area used.
10 year storm 10 minute intensity =  2.010(In/Hr)
10 year storm 60 minute intensity =  0.820(In/Hr)
100 year storm 10 minute intensity =  2.940(In/Hr)
100 year storm 60 minute intensity =  1.200(In/Hr)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000





++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   830.000(Ft.)
Top (of initial area) elevation =   617.800(Ft.)
Bottom (of initial area) elevation =   603.700(Ft.)
Difference in elevation =    14.100(Ft.)
Slope =    0.01699  s(percent)=       1.70
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.962 min.
Rainfall intensity =      2.582(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.836
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  75.84
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.319(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   603.700(Ft.)
Downstream point/station elevation =   603.500(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.319(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.319(CFS)
Normal flow depth in pipe =   10.32(In.)
Flow top width inside pipe =   13.90(In.)
Critical Depth =   10.10(In.)
Pipe flow velocity =      4.79(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    13.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.000(Ac.)
Runoff from this stream =      4.319(CFS)
Time of concentration =   13.07 min.
Rainfall intensity =     2.571(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      103.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =   617.800(Ft.)
Bottom (of initial area) elevation =   604.800(Ft.)
Difference in elevation =    13.000(Ft.)
Slope =    0.01444  s(percent)=       1.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.830 min.
Rainfall intensity =      2.499(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.700
Decimal fraction soil group C = 0.300
```

```
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  77.92
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.356(CFS)
Total initial stream area =        3.500(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      106.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   604.800(Ft.)
Downstream point/station elevation =   603.500(Ft.)
Pipe length  =    90.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.356(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.356(CFS)
Normal flow depth in pipe =   11.65(In.)
Flow top width inside pipe =   12.50(In.)
Critical Depth =   12.97(In.)
Pipe flow velocity =      7.20(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    14.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      106.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.500(Ac.)
Runoff from this stream =      7.356(CFS)
Time of concentration =   14.04 min.
Rainfall intensity =     2.481(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        4.319     13.07                 2.571
2        7.356     14.04                 2.481
Largest stream flow has longer time of concentration
Qp =      7.356 + sum of
        Qb         Ia/Ib
         4.319 *    0.965 =      4.167
Qp =     11.523

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.319       7.356
Area of streams before confluence:
        2.000        3.500
Results of confluence:
Total flow rate =     11.523(CFS)
Time of concentration =    14.038 min.
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Effective stream area after confluence =      5.500(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

______________________________________________________________________
Upstream point/station elevation =   597.000(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   500.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.523(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.523(CFS)
Normal flow depth in pipe =   13.69(In.)
Flow top width inside pipe =   15.37(In.)
Critical Depth =   15.52(In.)
Pipe flow velocity =      7.99(Ft/s)
Travel time through pipe =    1.04 min.
Time of concentration (TC) =    15.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****

______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      5.500(Ac.)
Runoff from this stream =     11.523(CFS)
Time of concentration =   15.08 min.
Rainfall intensity =     2.393(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      107.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   950.000(Ft.)
Top (of initial area) elevation =   615.600(Ft.)
Bottom (of initial area) elevation =   602.300(Ft.)
Difference in elevation =    13.300(Ft.)
Slope =    0.01400  s(percent)=       1.40
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.221 min.
Rainfall intensity =      2.465(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  80.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      7.719(CFS)
Total initial stream area =        3.700(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   602.300(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   240.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.719(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     7.719(CFS)
Normal flow depth in pipe =    9.40(In.)
Flow top width inside pipe =    9.89(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.69(Ft/s)
Travel time through pipe =    0.34 min.
Time of concentration (TC) =    14.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.700(Ac.)
Runoff from this stream =      7.719(CFS)
Time of concentration =   14.56 min.
Rainfall intensity =     2.436(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.523     15.08                  2.393
2        7.719     14.56                  2.436
Largest stream flow has longer time of concentration
Qp =     11.523 + sum of
        Qb         Ia/Ib
         7.719 *    0.983 =      7.585
Qp =     19.108

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.523       7.719
Area of streams before confluence:
        5.500        3.700
Results of confluence:
Total flow rate =     19.108(CFS)
Time of concentration =    15.082 min.
Effective stream area after confluence =      9.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   590.000(Ft.)
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Downstream point/station elevation =   589.000(Ft.)
Pipe length  =   170.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.108(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.108(CFS)
Normal flow depth in pipe =   18.35(In.)
Flow top width inside pipe =   25.20(In.)
Critical Depth =   18.35(In.)
Pipe flow velocity =      6.64(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    15.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.200(Ac.)
Runoff from this stream =     19.108(CFS)
Time of concentration =   15.51 min.
Rainfall intensity =     2.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   840.000(Ft.)
Top (of initial area) elevation =   605.900(Ft.)
Bottom (of initial area) elevation =   597.000(Ft.)
Difference in elevation =     8.900(Ft.)
Slope =    0.01060  s(percent)=       1.06
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.314 min.
Rainfall intensity =      2.457(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.850
Decimal fraction soil group C = 0.150
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  76.36
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.336(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.600(Ac.)
Runoff from this stream =      5.336(CFS)
Time of concentration =   14.31 min.
```

```
Rainfall intensity =     2.457(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       19.108     15.51                 2.360
2        5.336     14.31                 2.457
Largest stream flow has longer time of concentration
Qp =     19.108 + sum of
        Qb         Ia/Ib
         5.336 *    0.961 =      5.126
Qp =     24.234

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.108       5.336
Area of streams before confluence:
        9.200        2.600
Results of confluence:
Total flow rate =     24.234(CFS)
Time of concentration =    15.508 min.
Effective stream area after confluence =     11.800(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   597.000(Ft.)
Downstream point/station elevation =   588.700(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.234(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    24.234(CFS)
Normal flow depth in pipe =   12.19(In.)
Flow top width inside pipe =   16.83(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.03(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    15.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.800(Ac.)
Runoff from this stream =     24.234(CFS)
Time of concentration =   15.60 min.
Rainfall intensity =     2.354(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      111.000
```

```
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   500.000(Ft.)
Top (of initial area) elevation =   602.300(Ft.)
Bottom (of initial area) elevation =   596.100(Ft.)
Difference in elevation =     6.200(Ft.)
Slope =    0.01240  s(percent)=       1.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.271 min.
Rainfall intensity =      2.769(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.837
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.940(CFS)
Total initial stream area =        1.700(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      111.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.700(Ac.)
Runoff from this stream =      3.940(CFS)
Time of concentration =   11.27 min.
Rainfall intensity =     2.769(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       24.234     15.60                 2.354
2        3.940     11.27                 2.769
Largest stream flow has longer time of concentration
Qp =     24.234 + sum of
        Qb         Ia/Ib
         3.940 *    0.850 =      3.350
Qp =     27.584

Total of 2 streams to confluence:
Flow rates before confluence point:
      24.234       3.940
Area of streams before confluence:
       11.800        1.700
Results of confluence:
Total flow rate =     27.584(CFS)
Time of concentration =    15.596 min.
Effective stream area after confluence =     13.500(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      117.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   588.700(Ft.)
Downstream point/station elevation =   588.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    27.584(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    27.584(CFS)
Normal flow depth in pipe =   29.34(In.)
Flow top width inside pipe =   33.67(In.)
Critical Depth =   19.90(In.)
Pipe flow velocity =      4.12(Ft/s)
Travel time through pipe =    0.61 min.
Time of concentration (TC) =    16.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      117.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.500(Ac.)
Runoff from this stream =     27.584(CFS)
Time of concentration =   16.20 min.
Rainfall intensity =     2.309(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   680.000(Ft.)
Top (of initial area) elevation =   601.700(Ft.)
Bottom (of initial area) elevation =   594.700(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.01029  s(percent)=       1.03
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.230 min.
Rainfall intensity =      2.556(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.979(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station      121.000 to Point/Station      124.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   594.700(Ft.)
Downstream point/station elevation =   594.200(Ft.)
Pipe length  =   220.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.979(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.979(CFS)
Normal flow depth in pipe =   11.88(In.)
Flow top width inside pipe =   12.17(In.)
Critical Depth =    8.33(In.)
Pipe flow velocity =      2.86(Ft/s)
Travel time through pipe =    1.28 min.
Time of concentration (TC) =    14.51 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      1.400(Ac.)
Runoff from this stream =      2.979(CFS)
Time of concentration =   14.51 min.
Rainfall intensity =     2.440(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   760.000(Ft.)
Top (of initial area) elevation =   604.600(Ft.)
Bottom (of initial area) elevation =   595.000(Ft.)
Difference in elevation =     9.600(Ft.)
Slope =    0.01263  s(percent)=       1.26
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.277 min.
Rainfall intensity =      2.551(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.839
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.800
Decimal fraction soil group C = 0.200
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  76.88
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.992(CFS)
Total initial stream area =        2.800(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.800(Ac.)
Runoff from this stream =      5.992(CFS)
Time of concentration =   13.28 min.
Rainfall intensity =     2.551(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   380.000(Ft.)
Top (of initial area) elevation =   602.000(Ft.)
Bottom (of initial area) elevation =   595.000(Ft.)
Difference in elevation =     7.000(Ft.)
Slope =    0.01842  s(percent)=       1.84
TC = k(0.940)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   22.489 min.
Rainfall intensity =      1.960(In/Hr) for a   100.0 year storm
UNDEVELOPED (good cover) subarea
Runoff Coefficient = 0.793
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  83.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.421(CFS)
Total initial stream area =        2.200(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      124.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      2.200(Ac.)
Runoff from this stream =      3.421(CFS)
Time of concentration =   22.49 min.
Rainfall intensity =     1.960(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        2.979     14.51                 2.440
2        5.992     13.28                 2.551
3        3.421     22.49                 1.960
Largest stream flow has longer or shorter time of concentration
Qp =      5.992 + sum of
        Qa           Tb/Ta
         2.979 *    0.915 =      2.726
        Qa           Tb/Ta
         3.421 *    0.590 =      2.020
Qp =     10.737
```

```
Total of 3 streams to confluence:
Flow rates before confluence point:
       2.979       5.992       3.421
Area of streams before confluence:
        1.400        2.800        2.200
Results of confluence:
Total flow rate =     10.737(CFS)
Time of concentration =    13.277 min.
Effective stream area after confluence =      6.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      125.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

______________________________________________________________________
Upstream point/station elevation =   595.000(Ft.)
Downstream point/station elevation =   590.000(Ft.)
Pipe length  =   500.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.737(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    10.737(CFS)
Normal flow depth in pipe =   12.67(In.)
Flow top width inside pipe =   20.55(In.)
Critical Depth =   14.65(In.)
Pipe flow velocity =      7.08(Ft/s)
Travel time through pipe =    1.18 min.
Time of concentration (TC) =    14.45 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****

______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.400(Ac.)
Runoff from this stream =     10.737(CFS)
Time of concentration =   14.45 min.
Rainfall intensity =     2.445(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      122.000 to Point/Station      125.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   770.000(Ft.)
Top (of initial area) elevation =   604.800(Ft.)
Bottom (of initial area) elevation =   596.400(Ft.)
Difference in elevation =     8.400(Ft.)
Slope =    0.01091  s(percent)=       1.09
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.744 min.
Rainfall intensity =      2.507(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.900
```

```
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  75.84
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.442(CFS)
Total initial stream area =        2.600(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      125.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.600(Ac.)
Runoff from this stream =      5.442(CFS)
Time of concentration =   13.74 min.
Rainfall intensity =     2.507(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       10.737     14.45                 2.445
2        5.442     13.74                 2.507
Largest stream flow has longer time of concentration
Qp =     10.737 + sum of
        Qb         Ia/Ib
         5.442 *    0.975 =      5.307
Qp =     16.044

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.737       5.442
Area of streams before confluence:
        6.400        2.600
Results of confluence:
Total flow rate =     16.044(CFS)
Time of concentration =    14.454 min.
Effective stream area after confluence =      9.000(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      125.000 to Point/Station      126.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   596.400(Ft.)
Downstream point/station elevation =   596.200(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.044(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    16.044(CFS)
Normal flow depth in pipe =   18.59(In.)
Flow top width inside pipe =   25.01(In.)
Critical Depth =   16.77(In.)
Pipe flow velocity =      5.50(Ft/s)
```

```
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    14.61 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      9.000(Ac.)
Runoff from this stream =     16.044(CFS)
Time of concentration =   14.61 min.
Rainfall intensity =     2.432(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      126.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   420.000(Ft.)
Top (of initial area) elevation =   601.900(Ft.)
Bottom (of initial area) elevation =   596.200(Ft.)
Difference in elevation =     5.700(Ft.)
Slope =    0.01357  s(percent)=       1.36
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.324 min.
Rainfall intensity =      2.893(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.672(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      126.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.672(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     2.893(In/Hr)
Summary of stream data:

Stream    Flow rate      TC            Rainfall Intensity
 No.        (CFS)       (min)                 (In/Hr)


1       16.044     14.61                  2.432
2        2.672     10.32                  2.893
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Largest stream flow has longer time of concentration
Qp =     16.044 + sum of
        Qb         Ia/Ib
         2.672 *    0.841 =      2.246
Qp =     18.290

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.044       2.672
Area of streams before confluence:
        9.000        1.100
Results of confluence:
Total flow rate =     18.290(CFS)
Time of concentration =    14.606 min.
Effective stream area after confluence =     10.100(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      126.000 to Point/Station      127.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   596.200(Ft.)
Downstream point/station elevation =   588.500(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.290(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    18.290(CFS)
Normal flow depth in pipe =   11.84(In.)
Flow top width inside pipe =   17.08(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.85(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =    14.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      117.000 to Point/Station      127.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     10.100(Ac.)
Runoff from this stream =     18.290(CFS)
Time of concentration =   14.77 min.
Rainfall intensity =     2.418(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       27.584     16.20               2.309
2       18.290     14.77               2.418
Largest stream flow has longer time of concentration
Qp =     27.584 + sum of
        Qb         Ia/Ib
        18.290 *    0.955 =     17.465
```

```
Qp =     45.049

Total of 2 main streams to confluence:
Flow rates before confluence point:
      27.584      18.290
Area of streams before confluence:
       13.500       10.100


Results of confluence:
Total flow rate =     45.049(CFS)
Time of concentration =    16.203 min.
Effective stream area after confluence  =     23.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      136.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.295(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.40 min.  Rain intensity =       2.30(In/Hr)
Total area =        13.25(Ac.)  Total runoff =     22.50(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     13.250(Ac.)
Runoff from this stream =     22.500(CFS)
Time of concentration =   16.40 min.
Rainfall intensity =     2.295(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      131.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   910.000(Ft.)
Top (of initial area) elevation =   613.100(Ft.)
Bottom (of initial area) elevation =   601.000(Ft.)
Difference in elevation =    12.100(Ft.)
Slope =    0.01330  s(percent)=       1.33
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.123 min.
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Rainfall intensity =      2.473(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.932(CFS)
Total initial stream area =        2.400(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      131.000 to Point/Station      132.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =   601.000(Ft.)
End of street segment elevation =   593.800(Ft.)
Length of street segment  =   500.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  22.000(Ft.)
Distance from crown to crossfall grade break  =  18.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =  10.000(Ft.)
Slope from curb to property line (v/hz) =   0.025
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.753(CFS)
Depth of flow =   0.436(Ft.), Average velocity =   3.478(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.460(Ft.)
Flow velocity =   3.48(Ft/s)
Travel time =    2.40 min.     TC =   16.52  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.287(In/Hr) for a   100.0 year storm
Subarea runoff =      7.557(CFS) for      4.000(Ac.)
Total runoff =     12.489(CFS)      Total area =       6.400(Ac.)
Street flow at end of street =     12.489(CFS)
Half street flow at end of street =     12.489(CFS)
Depth of flow =   0.483(Ft.), Average velocity =   3.791(Ft/s)
Flow width (from curb towards crown)=  17.797(Ft.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      6.400(Ac.)
Runoff from this stream =     12.489(CFS)
Time of concentration =   16.52 min.
Rainfall intensity =     2.287(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.265(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.84 min.  Rain intensity =       2.27(In/Hr)
Total area =         4.00(Ac.)  Total runoff =      4.70(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.000(Ac.)
Runoff from this stream =      4.700(CFS)
Time of concentration =   16.84 min.
Rainfall intensity =     2.265(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       12.489     16.52                 2.287
2        4.700     16.84                 2.265
Largest stream flow has longer or shorter time of concentration
Qp =     12.489 + sum of
        Qa           Tb/Ta
         4.700 *    0.981 =      4.611
Qp =     17.101

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.489       4.700
Area of streams before confluence:
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
        6.400        4.000
Results of confluence:
Total flow rate =     17.101(CFS)
Time of concentration =    16.519 min.
Effective stream area after confluence =     10.400(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      133.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   593.800(Ft.)
Downstream point/station elevation =   587.300(Ft.)
Pipe length  =   460.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.101(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    17.101(CFS)
Normal flow depth in pipe =   15.70(In.)
Flow top width inside pipe =   18.24(In.)
Critical Depth =   18.18(In.)
Pipe flow velocity =      8.87(Ft/s)
Travel time through pipe =    0.86 min.
Time of concentration (TC) =    17.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      124.000 to Point/Station      133.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   630.000(Ft.)
Top (of initial area) elevation =   594.200(Ft.)
Bottom (of initial area) elevation =   587.300(Ft.)
Difference in elevation =     6.900(Ft.)
Slope =    0.01095  s(percent)=       1.10
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.749 min.
Rainfall intensity =      2.977(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.891
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.400
Decimal fraction soil group C = 0.600
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  81.04
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      2.919(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.919(CFS)
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Time of concentration =    9.75 min.
Rainfall intensity =     2.977(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

______________________________________________________________________
Rainfall intensity =      2.587(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.500
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  80.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  12.91 min.  Rain intensity =       2.59(In/Hr)
Total area =         1.00(Ac.)  Total runoff =      0.90(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      133.000
**** CONFLUENCE OF MINOR STREAMS ****

______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      1.000(Ac.)
Runoff from this stream =      0.900(CFS)
Time of concentration =   12.91 min.
Rainfall intensity =     2.587(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       12.489     16.52                  2.287
2        2.919      9.75                  2.977
3        0.900     12.91                  2.587
Largest stream flow has longer time of concentration
Qp =     12.489 + sum of
        Qb         Ia/Ib
         2.919 *    0.768 =      2.243
        Qb         Ia/Ib
         0.900 *    0.884 =      0.796
Qp =     15.527

Total of 3 streams to confluence:
Flow rates before confluence point:
      12.489       2.919       0.900
Area of streams before confluence:
        6.400        1.100        1.000
Results of confluence:
Total flow rate =     15.527(CFS)
Time of concentration =    16.519 min.
Effective stream area after confluence =      8.500(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   587.300(Ft.)
Downstream point/station elevation =   586.900(Ft.)
Pipe length  =    60.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.527(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    15.527(CFS)
Normal flow depth in pipe =   16.85(In.)
Flow top width inside pipe =   21.95(In.)
Critical Depth =   17.04(In.)
Pipe flow velocity =      6.59(Ft/s)
Travel time through pipe =    0.15 min.
Time of concentration (TC) =    16.67 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      8.500(Ac.)
Runoff from this stream =     15.527(CFS)
Time of concentration =   16.67 min.
Rainfall intensity =     2.277(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      134.000 to Point/Station      136.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   510.000(Ft.)
Top (of initial area) elevation =   592.000(Ft.)
Bottom (of initial area) elevation =   586.900(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.01000  s(percent)=       1.00
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.860 min.
Rainfall intensity =      2.699(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.200
Decimal fraction soil group C = 0.800
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  82.84
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.548(CFS)
Total initial stream area =        1.100(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      1.100(Ac.)
Runoff from this stream =      2.548(CFS)
Time of concentration =   11.86 min.
Rainfall intensity =     2.699(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       22.500     16.40               2.295
2       15.527     16.67               2.277
3        2.548     11.86               2.699
Largest stream flow has longer or shorter time of concentration
Qp =     22.500 + sum of
        Qa           Tb/Ta
        15.527 *    0.984 =     15.275
        Qb          Ia/Ib
         2.548 *    0.850 =      2.167
Qp =     39.942

Total of 3 main streams to confluence:
Flow rates before confluence point:
      22.500      15.527       2.548
Area of streams before confluence:
       13.250        8.500        1.100


Results of confluence:
Total flow rate =     39.942(CFS)
Time of concentration =    16.400 min.
Effective stream area after confluence  =     22.850(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      141.000 to Point/Station      142.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.295(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.856
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
User specified values are as follows:
TC =  16.40 min.  Rain intensity =       2.30(In/Hr)
Total area =        13.25(Ac.)  Total runoff =     22.50(CFS)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     13.250(Ac.)
Runoff from this stream =     22.500(CFS)
Time of concentration =   16.40 min.
Rainfall intensity =     2.295(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      143.000 to Point/Station      142.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   640.000(Ft.)
Top (of initial area) elevation =   593.300(Ft.)
Bottom (of initial area) elevation =   586.500(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.01062  s(percent)=       1.06
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.870 min.
Rainfall intensity =      2.959(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.893
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      3.699(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      3.699(CFS)
Time of concentration =    9.87 min.
Rainfall intensity =     2.959(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      150.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =  1617.000(Ft.)
Top (of initial area) elevation =   615.600(Ft.)
Bottom (of initial area) elevation =   589.000(Ft.)
Difference in elevation =    26.600(Ft.)
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
Slope =    0.01645  s(percent)=       1.65
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.103 min.
Rainfall intensity =      2.568(In/Hr) for a   100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.887
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Initial subarea runoff =      9.562(CFS)
Total initial stream area =        4.200(Ac.)
Pervious area fraction = 0.100


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      142.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =   589.000(Ft.)
Downstream point/station elevation =   586.500(Ft.)
Pipe length  =   288.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.562(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.562(CFS)
Normal flow depth in pipe =   14.39(In.)
Flow top width inside pipe =   14.41(In.)
Critical Depth =   14.33(In.)
Pipe flow velocity =      6.31(Ft/s)
Travel time through pipe =    0.76 min.
Time of concentration (TC) =    13.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      142.000 to Point/Station      142.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      4.200(Ac.)
Runoff from this stream =      9.562(CFS)
Time of concentration =   13.86 min.
Rainfall intensity =     2.496(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       22.500     16.40                 2.295
2        3.699      9.87                 2.959
3        9.562     13.86                 2.496
Largest stream flow has longer time of concentration
Qp =     22.500 + sum of
        Qb          Ia/Ib
         3.699 *    0.776 =      2.870
```

```
        Qb          Ia/Ib
         9.562 *    0.919 =      8.791
Qp =     34.161

Total of 3 streams to confluence:
Flow rates before confluence point:
      22.500       3.699       9.562
Area of streams before confluence:
       13.250        1.400        4.200
Results of confluence:
Total flow rate =     34.161(CFS)
Time of concentration =    16.400 min.
Effective stream area after confluence =     18.850(Ac.)
End of computations, total study area =           69.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.477
Area averaged RI index number =  62.8
```

APPENDIX "B"

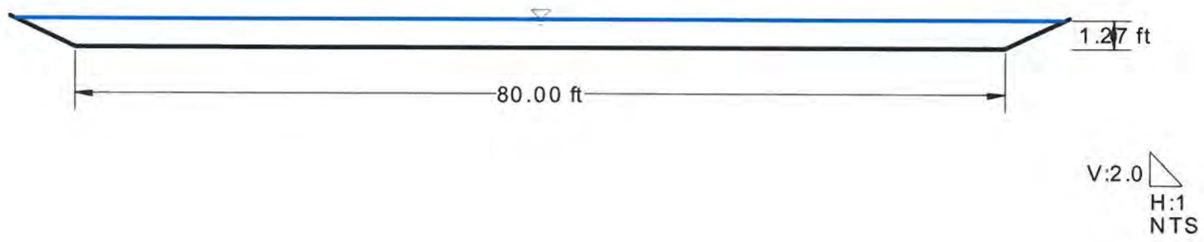
HYDRAULIC CALCULATIONS ON PROPOSED FACILITIES

Biofiltration Basin Outlet Structures
Outlet Weir & Spillway Calculations

Cross Section
Cross Section for Trapezoidal Channel

Project Description	
Worksheet	Water Quality Basin Spillway
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.015	
Slope	0.000100	ft/ft
Depth	1.27	ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	80.00	ft
Discharge	120.00	cfs



APPENDIX "C"

UNIT HYDROGRAPH ANALYSIS

Existing Unit Hydrograph Calculations, 2-yr, 5-yr, 10-yr

Proposed Unit Hydrograph Calculations, 2-yr, 5-yr, 10-yr

Tract 31589 Basin

This Table compares the Results of Flood Routing Onsite Hydrograph through Retarding Basin & Combining the Natural Offsite Hydrographs to the Point of Concentration of the Existing Hydrograph.

Peak Flow Rate (cfs)

		Existing				Flood Routed			
		37.9 AC				31.3 AC			
		1-hr	3-hr	6-hr	24-hr	1-hr	3-hr	6-hr	24-hr
2-yr	Q cfs	30.3	11.3	9.2	0.89	0.48	0.52	0.61	0.68
5-yr	Q cfs	46.4	20.1	17.0	1.2	0.53	0.64	0.73	0.81
10-yr	Q cfs	65.9	34.1	30.1	6.1	0.61	0.72	0.81	0.96

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex12.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 2 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =  37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             0.48                 18.19

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             1.18                 44.72
```

```
      STORM EVENT (YEAR) =    2.00
      Area Averaged 2-Year Rainfall =    0.480(In)
      Area Averaged 100-Year Rainfall =    1.180(In)

      Point rain (area averaged) =    0.480(In)
      Areal adjustment factor =   99.97 %
      Adjusted average point rain =    0.480(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00         0.000
          11.400           85.00         0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ----------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827         55.825             21.323
          2   0.167        583.654         37.583             14.355
          3   0.250        875.481          6.592              2.518
                                    Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     4.20      0.242       (  0.442)       0.218        0.024
   2   0.17     4.30      0.248       (  0.442)       0.223        0.025
   3   0.25     5.00      0.288       (  0.442)       0.259        0.029
   4   0.33     5.00      0.288       (  0.442)       0.259        0.029
   5   0.42     5.80      0.334       (  0.442)       0.301        0.033
   6   0.50     6.50      0.374       (  0.442)       0.337        0.037
   7   0.58     7.40      0.426       (  0.442)       0.383        0.043
   8   0.67     8.60      0.495          0.442    (  0.446)        0.053
```

```
   9   0.75    12.30      0.708          0.442    (  0.637)        0.266
  10   0.83    29.10      1.676          0.442    (  1.508)        1.234
  11   0.92     6.80      0.392       (  0.442)       0.352        0.039
  12   1.00     5.00      0.288       (  0.442)       0.259        0.029
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     1.8
      Flood volume = Effective rainfall      0.15(In)
       times area      37.9(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      0.33(In)
      Total soil loss =     1.031(Ac.Ft)
      Total rainfall =      0.48(In)
      Flood volume =       21112.7 Cubic Feet
      Total soil loss =       44901.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     30.283(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
  -----------------------------------------------------------------------
    0+ 5       0.0036      0.52  Q         |         |         |         |
    0+10       0.0096      0.88  Q         |         |         |         |
    0+15       0.0167      1.03  |Q        |         |         |         |
    0+20       0.0242      1.09  |Q        |         |         |         |
    0+25       0.0324      1.20  |QV       |         |         |         |
    0+30       0.0417      1.35  |Q V      |         |         |         |
    0+35       0.0523      1.53  |Q  V     |         |         |         |
    0+40       0.0650      1.85  |Q   V    |         |         |         |
    0+45       0.1102      6.56  |     Q  V|         |         |         |
    0+50       0.3187     30.28  |         |         |     V   Q         |
    0+55       0.4511     19.23  |         |        Q|         |      V  |
    1+ 0       0.4807      4.28  |   Q     |         |         |        V|
    1+ 5       0.4842      0.51  Q         |         |         |        V|
    1+10       0.4847      0.07  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex32.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




---------------------------------------------------------------------
```

TR 31589
Existing Condition 2 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             0.79                  29.94

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             1.85                  70.11
```

```
      STORM EVENT (YEAR) =    2.00
      Area Averaged 2-Year Rainfall =    0.790(In)
      Area Averaged 100-Year Rainfall =    1.850(In)

      Point rain (area averaged) =    0.790(In)
      Areal adjustment factor =   99.98 %
      Adjusted average point rain =    0.790(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00          0.000
          11.400           85.00          0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827          55.825             21.323
          2   0.167        583.654          37.583             14.355
          3   0.250        875.481           6.592              2.518
                                    Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1   0.08     1.30      0.123       (  0.442)      0.111        0.012
   2   0.17     1.30      0.123       (  0.442)      0.111        0.012
   3   0.25     1.10      0.104       (  0.442)      0.094        0.010
   4   0.33     1.50      0.142       (  0.442)      0.128        0.014
   5   0.42     1.50      0.142       (  0.442)      0.128        0.014
   6   0.50     1.80      0.171       (  0.442)      0.154        0.017
   7   0.58     1.50      0.142       (  0.442)      0.128        0.014
   8   0.67     1.80      0.171       (  0.442)      0.154        0.017
   9   0.75     1.80      0.171       (  0.442)      0.154        0.017
  10   0.83     1.50      0.142       (  0.442)      0.128        0.014
```

```
11   0.92     1.60      0.152       (  0.442)       0.136        0.015
12   1.00     1.80      0.171       (  0.442)       0.154        0.017
13   1.08     2.20      0.209       (  0.442)       0.188        0.021
14   1.17     2.20      0.209       (  0.442)       0.188        0.021
15   1.25     2.20      0.209       (  0.442)       0.188        0.021
16   1.33     2.00      0.190       (  0.442)       0.171        0.019
17   1.42     2.60      0.246       (  0.442)       0.222        0.025
18   1.50     2.70      0.256       (  0.442)       0.230        0.026
19   1.58     2.40      0.227       (  0.442)       0.205        0.023
20   1.67     2.70      0.256       (  0.442)       0.230        0.026
21   1.75     3.30      0.313       (  0.442)       0.282        0.031
22   1.83     3.10      0.294       (  0.442)       0.264        0.029
23   1.92     2.90      0.275       (  0.442)       0.247        0.027
24   2.00     3.00      0.284       (  0.442)       0.256        0.028
25   2.08     3.10      0.294       (  0.442)       0.264        0.029
26   2.17     4.20      0.398       (  0.442)       0.358        0.040
27   2.25     5.00      0.474       (  0.442)       0.427        0.047
28   2.33     3.50      0.332       (  0.442)       0.299        0.033
29   2.42     6.80      0.645          0.442    (  0.580)        0.203
30   2.50     7.30      0.692          0.442    (  0.623)        0.250
31   2.58     8.20      0.777          0.442    (  0.700)        0.335
32   2.67     5.90      0.559          0.442    (  0.503)        0.117
33   2.75     2.00      0.190       (  0.442)       0.171        0.019
34   2.83     1.80      0.171       (  0.442)       0.154        0.017
35   2.92     1.80      0.171       (  0.442)       0.154        0.017
36   3.00     0.60      0.057       (  0.442)       0.051        0.006
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =     1.6
    Flood volume = Effective rainfall      0.13(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
    Total soil loss =      0.66(In)
    Total soil loss =     2.077(Ac.Ft)
    Total rainfall =      0.79(In)
    Flood volume =       18186.5 Cubic Feet
    Total soil loss =       90481.4 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      11.260(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        3 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0018      0.26  Q         |         |         |         |
  0+10       0.0048      0.44  Q         |         |         |         |
  0+15       0.0078      0.43  Q         |         |         |         |
  0+20       0.0111      0.48  QV        |         |         |         |
  0+25       0.0148      0.53  |Q        |         |         |         |
  0+30       0.0190      0.60  |Q        |         |         |         |
  0+35       0.0230      0.58  |QV       |         |         |         |
  0+40       0.0272      0.61  |QV       |         |         |         |
  0+45       0.0316      0.64  |Q V      |         |         |         |
  0+50       0.0357      0.59  |Q V      |         |         |         |
```

```
    0+55       0.0397      0.57  |Q V      |         |         |         |
    1+ 0       0.0439      0.62  |Q  V     |         |         |         |
    1+ 5       0.0489      0.73  |Q  V     |         |         |         |
    1+10       0.0543      0.79  |Q   V    |         |         |         |
    1+15       0.0598      0.80  |Q   V    |         |         |         |
    1+20       0.0650      0.76  |Q    V   |         |         |         |
    1+25       0.0709      0.85  |Q    V   |         |         |         |
    1+30       0.0774      0.95  |Q     V  |         |         |         |
    1+35       0.0837      0.91  |Q      V |         |         |         |
    1+40       0.0902      0.94  |Q      V |         |         |         |
    1+45       0.0977      1.09  | Q      V|         |         |         |
    1+50       0.1056      1.14  | Q       V         |         |         |
    1+55       0.1130      1.09  | Q       V         |         |         |
    2+ 0       0.1205      1.08  | Q       |V        |         |         |
    2+ 5       0.1281      1.10  | Q       | V       |         |         |
    2+10       0.1373      1.34  | Q       |  V      |         |         |
    2+15       0.1487      1.66  |  Q      |   V     |         |         |
    2+20       0.1590      1.49  | Q       |    V    |         |         |
    2+25       0.1929      4.92  |        Q|       V |         |         |
    2+30       0.2502      8.33  |         |     Q   |  V      |         |
    2+35       0.3278     11.26  |         |         | Q       |V        |
    2+40       0.3826      7.95  |         |    Q    |         |     V   |
    2+45       0.4028      2.94  |    Q    |         |         |       V |
    2+50       0.4092      0.93  |Q        |         |         |        V|
    2+55       0.4137      0.66  |Q        |         |         |        V|
    3+ 0       0.4165      0.41  Q         |         |         |        V|
    3+ 5       0.4174      0.12  Q         |         |         |        V|
    3+10       0.4175      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex62.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589
Existing Condition 2 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.10                  41.69

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              2.50                  94.75
```

```
      STORM EVENT (YEAR) =    2.00
      Area Averaged 2-Year Rainfall =    1.100(In)
      Area Averaged 100-Year Rainfall =    2.500(In)

      Point rain (area averaged) =    1.100(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.100(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00          0.000
          11.400           85.00          0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %             (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827          55.825             21.323
          2   0.167        583.654          37.583             14.355
          3   0.250        875.481           6.592              2.518
                                 Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low          (In/Hr)
   1   0.08      0.50      0.066      (  0.442)       0.059        0.007
   2   0.17      0.60      0.079      (  0.442)       0.071        0.008
   3   0.25      0.60      0.079      (  0.442)       0.071        0.008
   4   0.33      0.60      0.079      (  0.442)       0.071        0.008
   5   0.42      0.60      0.079      (  0.442)       0.071        0.008
   6   0.50      0.70      0.092      (  0.442)       0.083        0.009
   7   0.58      0.70      0.092      (  0.442)       0.083        0.009
   8   0.67      0.70      0.092      (  0.442)       0.083        0.009
   9   0.75      0.70      0.092      (  0.442)       0.083        0.009
  10   0.83      0.70      0.092      (  0.442)       0.083        0.009
```

```
11   0.92      0.70      0.092       (  0.442)       0.083         0.009
12   1.00      0.80      0.106       (  0.442)       0.095         0.011
13   1.08      0.80      0.106       (  0.442)       0.095         0.011
14   1.17      0.80      0.106       (  0.442)       0.095         0.011
15   1.25      0.80      0.106       (  0.442)       0.095         0.011
16   1.33      0.80      0.106       (  0.442)       0.095         0.011
17   1.42      0.80      0.106       (  0.442)       0.095         0.011
18   1.50      0.80      0.106       (  0.442)       0.095         0.011
19   1.58      0.80      0.106       (  0.442)       0.095         0.011
20   1.67      0.80      0.106       (  0.442)       0.095         0.011
21   1.75      0.80      0.106       (  0.442)       0.095         0.011
22   1.83      0.80      0.106       (  0.442)       0.095         0.011
23   1.92      0.80      0.106       (  0.442)       0.095         0.011
24   2.00      0.90      0.119       (  0.442)       0.107         0.012
25   2.08      0.80      0.106       (  0.442)       0.095         0.011
26   2.17      0.90      0.119       (  0.442)       0.107         0.012
27   2.25      0.90      0.119       (  0.442)       0.107         0.012
28   2.33      0.90      0.119       (  0.442)       0.107         0.012
29   2.42      0.90      0.119       (  0.442)       0.107         0.012
30   2.50      0.90      0.119       (  0.442)       0.107         0.012
31   2.58      0.90      0.119       (  0.442)       0.107         0.012
32   2.67      0.90      0.119       (  0.442)       0.107         0.012
33   2.75      1.00      0.132       (  0.442)       0.119         0.013
34   2.83      1.00      0.132       (  0.442)       0.119         0.013
35   2.92      1.00      0.132       (  0.442)       0.119         0.013
36   3.00      1.00      0.132       (  0.442)       0.119         0.013
37   3.08      1.00      0.132       (  0.442)       0.119         0.013
38   3.17      1.10      0.145       (  0.442)       0.131         0.015
39   3.25      1.10      0.145       (  0.442)       0.131         0.015
40   3.33      1.10      0.145       (  0.442)       0.131         0.015
41   3.42      1.20      0.158       (  0.442)       0.143         0.016
42   3.50      1.30      0.172       (  0.442)       0.154         0.017
43   3.58      1.40      0.185       (  0.442)       0.166         0.018
44   3.67      1.40      0.185       (  0.442)       0.166         0.018
45   3.75      1.50      0.198       (  0.442)       0.178         0.020
46   3.83      1.50      0.198       (  0.442)       0.178         0.020
47   3.92      1.60      0.211       (  0.442)       0.190         0.021
48   4.00      1.60      0.211       (  0.442)       0.190         0.021
49   4.08      1.70      0.224       (  0.442)       0.202         0.022
50   4.17      1.80      0.238       (  0.442)       0.214         0.024
51   4.25      1.90      0.251       (  0.442)       0.226         0.025
52   4.33      2.00      0.264       (  0.442)       0.238         0.026
53   4.42      2.10      0.277       (  0.442)       0.249         0.028
54   4.50      2.10      0.277       (  0.442)       0.249         0.028
55   4.58      2.20      0.290       (  0.442)       0.261         0.029
56   4.67      2.30      0.304       (  0.442)       0.273         0.030
57   4.75      2.40      0.317       (  0.442)       0.285         0.032
58   4.83      2.40      0.317       (  0.442)       0.285         0.032
59   4.92      2.50      0.330       (  0.442)       0.297         0.033
60   5.00      2.60      0.343       (  0.442)       0.309         0.034
61   5.08      3.10      0.409       (  0.442)       0.368         0.041
62   5.17      3.60      0.475       (  0.442)       0.428         0.048
63   5.25      3.90      0.515          0.442     (  0.463)        0.073
64   5.33      4.20      0.554          0.442     (  0.499)        0.113
65   5.42      4.70      0.620          0.442     (  0.558)        0.179
66   5.50      5.60      0.739          0.442     (  0.665)        0.297
67   5.58      1.90      0.251       (  0.442)       0.226         0.025
```

```
68   5.67     0.90      0.119       (  0.442)      0.107        0.012
69   5.75     0.60      0.079       (  0.442)      0.071        0.008
70   5.83     0.50      0.066       (  0.442)      0.059        0.007
71   5.92     0.30      0.040       (  0.442)      0.036        0.004
72   6.00     0.20      0.026       (  0.442)      0.024        0.003
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =     1.7
    Flood volume = Effective rainfall      0.14(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
    Total soil loss =      0.95(In)
    Total soil loss =     3.016(Ac.Ft)
    Total rainfall =      1.10(In)
    Flood volume =       19929.0 Cubic Feet
    Total soil loss =      131385.9 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      9.190(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f     H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0010      0.14  Q         |         |         |         |
  0+10       0.0028      0.26  VQ        |         |         |         |
  0+15       0.0048      0.30  VQ        |         |         |         |
  0+20       0.0069      0.30  VQ        |         |         |         |
  0+25       0.0090      0.30  VQ        |         |         |         |
  0+30       0.0113      0.33  VQ        |         |         |         |
  0+35       0.0137      0.35  |Q        |         |         |         |
  0+40       0.0161      0.35  |Q        |         |         |         |
  0+45       0.0186      0.35  |Q        |         |         |         |
  0+50       0.0210      0.35  |Q        |         |         |         |
  0+55       0.0234      0.35  |QV       |         |         |         |
  1+ 0       0.0261      0.38  |QV       |         |         |         |
  1+ 5       0.0288      0.40  |QV       |         |         |         |
  1+10       0.0316      0.40  |QV       |         |         |         |
  1+15       0.0344      0.40  |Q V      |         |         |         |
  1+20       0.0371      0.40  |Q V      |         |         |         |
  1+25       0.0399      0.40  |Q V      |         |         |         |
  1+30       0.0427      0.40  |Q V      |         |         |         |
  1+35       0.0455      0.40  |Q V      |         |         |         |
  1+40       0.0483      0.40  |Q  V     |         |         |         |
  1+45       0.0510      0.40  |Q  V     |         |         |         |
  1+50       0.0538      0.40  |Q  V     |         |         |         |
  1+55       0.0566      0.40  |Q  V     |         |         |         |
  2+ 0       0.0596      0.43  |Q   V    |         |         |         |
  2+ 5       0.0625      0.42  |Q   V    |         |         |         |
  2+10       0.0655      0.43  |Q   V    |         |         |         |
  2+15       0.0686      0.45  |Q   V    |         |         |         |
  2+20       0.0717      0.45  |Q    V   |         |         |         |
  2+25       0.0748      0.45  |Q    V   |         |         |         |
  2+30       0.0780      0.45  |Q    V   |         |         |         |
  2+35       0.0811      0.45  |Q     V  |         |         |         |
```

```
     2+40        0.0842       0.45  |Q     V  |         |         |         |
     2+45        0.0875       0.48  |Q     V  |         |         |         |
     2+50        0.0910       0.50  | Q    V  |         |         |         |
     2+55        0.0945       0.50  | Q     V |         |         |         |
     3+ 0        0.0979       0.50  | Q     V |         |         |         |
     3+ 5        0.1014       0.50  | Q     V |         |         |         |
     3+10        0.1051       0.53  | Q      V|         |         |         |
     3+15        0.1089       0.55  | Q      V|         |         |         |
     3+20        0.1127       0.55  | Q      V|         |         |         |
     3+25        0.1167       0.58  | Q       V         |         |         |
     3+30        0.1210       0.63  | Q       V         |         |         |
     3+35        0.1257       0.68  | Q       V         |         |         |
     3+40        0.1306       0.70  | Q       |V        |         |         |
     3+45        0.1356       0.73  | Q       |V        |         |         |
     3+50        0.1408       0.75  |  Q      | V       |         |         |
     3+55        0.1462       0.78  |  Q      | V       |         |         |
     4+ 0        0.1518       0.80  |  Q      |  V      |         |         |
     4+ 5        0.1575       0.84  |  Q      |  V      |         |         |
     4+10        0.1636       0.88  |  Q      |   V     |         |         |
     4+15        0.1700       0.93  |  Q      |   V     |         |         |
     4+20        0.1768       0.98  |  Q      |    V    |         |         |
     4+25        0.1839       1.03  |   Q     |     V   |         |         |
     4+30        0.1912       1.06  |   Q     |     V   |         |         |
     4+35        0.1987       1.09  |   Q     |      V  |         |         |
     4+40        0.2065       1.13  |   Q     |       V |         |         |
     4+45        0.2146       1.18  |   Q     |       V |         |         |
     4+50        0.2229       1.21  |   Q     |        V|         |         |
     4+55        0.2315       1.24  |   Q     |         V         |         |
     5+ 0        0.2403       1.29  |    Q    |         |V        |         |
     5+ 5        0.2503       1.45  |    Q    |         |V        |         |
     5+10        0.2619       1.69  |     Q   |         | V       |         |
     5+15        0.2781       2.34  |        Q|         |   V     |         |
     5+20        0.3026       3.57  |         |   Q     |     V   |         |
     5+25        0.3413       5.61  |         |         | Q      V|         |
     5+30        0.4046       9.19  |         |         |         |    VQ   |
     5+35        0.4407       5.25  |         |         |Q        |       V |
     5+40        0.4501       1.36  |    Q    |         |         |        V|
     5+45        0.4529       0.40  |Q        |         |         |        V|
     5+50        0.4549       0.28  |Q        |         |         |        V|
     5+55        0.4562       0.20  Q         |         |         |        V|
     6+ 0        0.4571       0.13  Q         |         |         |        V|
     6+ 5        0.4575       0.05  Q         |         |         |        V|
     6+10        0.4575       0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex242.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




---------------------------------------------------------------------
```

TR 31589

Existing Condition 2 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =  37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.70                 64.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              4.30                162.97
```

```
     STORM EVENT (YEAR) =    2.00
     Area Averaged 2-Year Rainfall =    1.700(In)
     Area Averaged 100-Year Rainfall =    4.300(In)

     Point rain (area averaged) =    1.700(In)
     Areal adjustment factor =   99.99 %
     Adjusted average point rain =    1.700(In)

     Sub-Area Data:
     Area(Ac.)          Runoff Index   Impervious %
         26.500            77.00          0.000
         11.400            85.00          0.000
      Total Area Entered =     37.90(Ac.)


     RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
     AMC2 AMC-1     (In/Hr)    (Dec.%)      (In/Hr)      (Dec.)    (In/Hr)
     77.0  59.4      0.476     0.000         0.476       0.699      0.333
     85.0  70.0      0.362     0.000         0.362       0.301      0.109
                                                          Sum (F) =   0.442
     Area averaged mean soil loss (F) (In/Hr) =  0.442
     Minimum soil loss rate ((In/Hr)) =  0.221
     (for 24 hour storm duration)
     Soil low loss rate (decimal) =   0.900
     ---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
                       VALLEY S-Curve
     --------------------------------------------------------------------
                 Unit Hydrograph Data
     ---------------------------------------------------------------------
     Unit time period   Time % of lag   Distribution   Unit Hydrograph
         (hrs)                           Graph %           (CFS)
     ---------------------------------------------------------------------
         1   0.083        291.827          55.825            21.323
         2   0.167        583.654          37.583            14.355
         3   0.250        875.481           6.592             2.518
                                  Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)          Max    |   Low         (In/Hr)
   1   0.08      0.07      0.014        (  0.783)      0.012        0.001
   2   0.17      0.07      0.014        (  0.780)      0.012        0.001
   3   0.25      0.07      0.014        (  0.777)      0.012        0.001
   4   0.33      0.10      0.020        (  0.774)      0.018        0.002
   5   0.42      0.10      0.020        (  0.771)      0.018        0.002
   6   0.50      0.10      0.020        (  0.768)      0.018        0.002
   7   0.58      0.10      0.020        (  0.765)      0.018        0.002
   8   0.67      0.10      0.020        (  0.762)      0.018        0.002
   9   0.75      0.10      0.020        (  0.759)      0.018        0.002
  10   0.83      0.13      0.027        (  0.756)      0.024        0.003
```

```
11   0.92      0.13      0.027       (   0.753)       0.024       0.003
12   1.00      0.13      0.027       (   0.750)       0.024       0.003
13   1.08      0.10      0.020       (   0.747)       0.018       0.002
14   1.17      0.10      0.020       (   0.744)       0.018       0.002
15   1.25      0.10      0.020       (   0.741)       0.018       0.002
16   1.33      0.10      0.020       (   0.738)       0.018       0.002
17   1.42      0.10      0.020       (   0.735)       0.018       0.002
18   1.50      0.10      0.020       (   0.732)       0.018       0.002
19   1.58      0.10      0.020       (   0.730)       0.018       0.002
20   1.67      0.10      0.020       (   0.727)       0.018       0.002
21   1.75      0.10      0.020       (   0.724)       0.018       0.002
22   1.83      0.13      0.027       (   0.721)       0.024       0.003
23   1.92      0.13      0.027       (   0.718)       0.024       0.003
24   2.00      0.13      0.027       (   0.715)       0.024       0.003
25   2.08      0.13      0.027       (   0.712)       0.024       0.003
26   2.17      0.13      0.027       (   0.709)       0.024       0.003
27   2.25      0.13      0.027       (   0.706)       0.024       0.003
28   2.33      0.13      0.027       (   0.703)       0.024       0.003
29   2.42      0.13      0.027       (   0.701)       0.024       0.003
30   2.50      0.13      0.027       (   0.698)       0.024       0.003
31   2.58      0.17      0.034       (   0.695)       0.031       0.003
32   2.67      0.17      0.034       (   0.692)       0.031       0.003
33   2.75      0.17      0.034       (   0.689)       0.031       0.003
34   2.83      0.17      0.034       (   0.686)       0.031       0.003
35   2.92      0.17      0.034       (   0.684)       0.031       0.003
36   3.00      0.17      0.034       (   0.681)       0.031       0.003
37   3.08      0.17      0.034       (   0.678)       0.031       0.003
38   3.17      0.17      0.034       (   0.675)       0.031       0.003
39   3.25      0.17      0.034       (   0.672)       0.031       0.003
40   3.33      0.17      0.034       (   0.669)       0.031       0.003
41   3.42      0.17      0.034       (   0.667)       0.031       0.003
42   3.50      0.17      0.034       (   0.664)       0.031       0.003
43   3.58      0.17      0.034       (   0.661)       0.031       0.003
44   3.67      0.17      0.034       (   0.658)       0.031       0.003
45   3.75      0.17      0.034       (   0.656)       0.031       0.003
46   3.83      0.20      0.041       (   0.653)       0.037       0.004
47   3.92      0.20      0.041       (   0.650)       0.037       0.004
48   4.00      0.20      0.041       (   0.647)       0.037       0.004
49   4.08      0.20      0.041       (   0.645)       0.037       0.004
50   4.17      0.20      0.041       (   0.642)       0.037       0.004
51   4.25      0.20      0.041       (   0.639)       0.037       0.004
52   4.33      0.23      0.048       (   0.636)       0.043       0.005
53   4.42      0.23      0.048       (   0.634)       0.043       0.005
54   4.50      0.23      0.048       (   0.631)       0.043       0.005
55   4.58      0.23      0.048       (   0.628)       0.043       0.005
56   4.67      0.23      0.048       (   0.625)       0.043       0.005
57   4.75      0.23      0.048       (   0.623)       0.043       0.005
58   4.83      0.27      0.054       (   0.620)       0.049       0.005
59   4.92      0.27      0.054       (   0.617)       0.049       0.005
60   5.00      0.27      0.054       (   0.615)       0.049       0.005
61   5.08      0.20      0.041       (   0.612)       0.037       0.004
62   5.17      0.20      0.041       (   0.609)       0.037       0.004
63   5.25      0.20      0.041       (   0.607)       0.037       0.004
64   5.33      0.23      0.048       (   0.604)       0.043       0.005
65   5.42      0.23      0.048       (   0.601)       0.043       0.005
66   5.50      0.23      0.048       (   0.599)       0.043       0.005
67   5.58      0.27      0.054       (   0.596)       0.049       0.005
```

```
  68   5.67     0.27      0.054       (  0.594)      0.049        0.005
  69   5.75     0.27      0.054       (  0.591)      0.049        0.005
  70   5.83     0.27      0.054       (  0.588)      0.049        0.005
  71   5.92     0.27      0.054       (  0.586)      0.049        0.005
  72   6.00     0.27      0.054       (  0.583)      0.049        0.005
  73   6.08     0.30      0.061       (  0.581)      0.055        0.006
  74   6.17     0.30      0.061       (  0.578)      0.055        0.006
  75   6.25     0.30      0.061       (  0.575)      0.055        0.006
  76   6.33     0.30      0.061       (  0.573)      0.055        0.006
  77   6.42     0.30      0.061       (  0.570)      0.055        0.006
  78   6.50     0.30      0.061       (  0.568)      0.055        0.006
  79   6.58     0.33      0.068       (  0.565)      0.061        0.007
  80   6.67     0.33      0.068       (  0.563)      0.061        0.007
  81   6.75     0.33      0.068       (  0.560)      0.061        0.007
  82   6.83     0.33      0.068       (  0.558)      0.061        0.007
  83   6.92     0.33      0.068       (  0.555)      0.061        0.007
  84   7.00     0.33      0.068       (  0.553)      0.061        0.007
  85   7.08     0.33      0.068       (  0.550)      0.061        0.007
  86   7.17     0.33      0.068       (  0.548)      0.061        0.007
  87   7.25     0.33      0.068       (  0.545)      0.061        0.007
  88   7.33     0.37      0.075       (  0.543)      0.067        0.007
  89   7.42     0.37      0.075       (  0.540)      0.067        0.007
  90   7.50     0.37      0.075       (  0.538)      0.067        0.007
  91   7.58     0.40      0.082       (  0.535)      0.073        0.008
  92   7.67     0.40      0.082       (  0.533)      0.073        0.008
  93   7.75     0.40      0.082       (  0.530)      0.073        0.008
  94   7.83     0.43      0.088       (  0.528)      0.080        0.009
  95   7.92     0.43      0.088       (  0.525)      0.080        0.009
  96   8.00     0.43      0.088       (  0.523)      0.080        0.009
  97   8.08     0.50      0.102       (  0.520)      0.092        0.010
  98   8.17     0.50      0.102       (  0.518)      0.092        0.010
  99   8.25     0.50      0.102       (  0.516)      0.092        0.010
 100   8.33     0.50      0.102       (  0.513)      0.092        0.010
 101   8.42     0.50      0.102       (  0.511)      0.092        0.010
 102   8.50     0.50      0.102       (  0.508)      0.092        0.010
 103   8.58     0.53      0.109       (  0.506)      0.098        0.011
 104   8.67     0.53      0.109       (  0.504)      0.098        0.011
 105   8.75     0.53      0.109       (  0.501)      0.098        0.011
 106   8.83     0.57      0.116       (  0.499)      0.104        0.012
 107   8.92     0.57      0.116       (  0.497)      0.104        0.012
 108   9.00     0.57      0.116       (  0.494)      0.104        0.012
 109   9.08     0.63      0.129       (  0.492)      0.116        0.013
 110   9.17     0.63      0.129       (  0.489)      0.116        0.013
 111   9.25     0.63      0.129       (  0.487)      0.116        0.013
 112   9.33     0.67      0.136       (  0.485)      0.122        0.014
 113   9.42     0.67      0.136       (  0.483)      0.122        0.014
 114   9.50     0.67      0.136       (  0.480)      0.122        0.014
 115   9.58     0.70      0.143       (  0.478)      0.129        0.014
 116   9.67     0.70      0.143       (  0.476)      0.129        0.014
 117   9.75     0.70      0.143       (  0.473)      0.129        0.014
 118   9.83     0.73      0.150       (  0.471)      0.135        0.015
 119   9.92     0.73      0.150       (  0.469)      0.135        0.015
 120  10.00     0.73      0.150       (  0.467)      0.135        0.015
 121  10.08     0.50      0.102       (  0.464)      0.092        0.010
 122  10.17     0.50      0.102       (  0.462)      0.092        0.010
 123  10.25     0.50      0.102       (  0.460)      0.092        0.010
 124  10.33     0.50      0.102       (  0.458)      0.092        0.010
```

```
125  10.42      0.50      0.102        (  0.455)       0.092       0.010
126  10.50      0.50      0.102        (  0.453)       0.092       0.010
127  10.58      0.67      0.136        (  0.451)       0.122       0.014
128  10.67      0.67      0.136        (  0.449)       0.122       0.014
129  10.75      0.67      0.136        (  0.446)       0.122       0.014
130  10.83      0.67      0.136        (  0.444)       0.122       0.014
131  10.92      0.67      0.136        (  0.442)       0.122       0.014
132  11.00      0.67      0.136        (  0.440)       0.122       0.014
133  11.08      0.63      0.129        (  0.438)       0.116       0.013
134  11.17      0.63      0.129        (  0.436)       0.116       0.013
135  11.25      0.63      0.129        (  0.433)       0.116       0.013
136  11.33      0.63      0.129        (  0.431)       0.116       0.013
137  11.42      0.63      0.129        (  0.429)       0.116       0.013
138  11.50      0.63      0.129        (  0.427)       0.116       0.013
139  11.58      0.57      0.116        (  0.425)       0.104       0.012
140  11.67      0.57      0.116        (  0.423)       0.104       0.012
141  11.75      0.57      0.116        (  0.421)       0.104       0.012
142  11.83      0.60      0.122        (  0.419)       0.110       0.012
143  11.92      0.60      0.122        (  0.417)       0.110       0.012
144  12.00      0.60      0.122        (  0.414)       0.110       0.012
145  12.08      0.83      0.170        (  0.412)       0.153       0.017
146  12.17      0.83      0.170        (  0.410)       0.153       0.017
147  12.25      0.83      0.170        (  0.408)       0.153       0.017
148  12.33      0.87      0.177        (  0.406)       0.159       0.018
149  12.42      0.87      0.177        (  0.404)       0.159       0.018
150  12.50      0.87      0.177        (  0.402)       0.159       0.018
151  12.58      0.93      0.190        (  0.400)       0.171       0.019
152  12.67      0.93      0.190        (  0.398)       0.171       0.019
153  12.75      0.93      0.190        (  0.396)       0.171       0.019
154  12.83      0.97      0.197        (  0.394)       0.177       0.020
155  12.92      0.97      0.197        (  0.392)       0.177       0.020
156  13.00      0.97      0.197        (  0.390)       0.177       0.020
157  13.08      1.13      0.231        (  0.388)       0.208       0.023
158  13.17      1.13      0.231        (  0.386)       0.208       0.023
159  13.25      1.13      0.231        (  0.384)       0.208       0.023
160  13.33      1.13      0.231        (  0.382)       0.208       0.023
161  13.42      1.13      0.231        (  0.380)       0.208       0.023
162  13.50      1.13      0.231        (  0.378)       0.208       0.023
163  13.58      0.77      0.156        (  0.376)       0.141       0.016
164  13.67      0.77      0.156        (  0.375)       0.141       0.016
165  13.75      0.77      0.156        (  0.373)       0.141       0.016
166  13.83      0.77      0.156        (  0.371)       0.141       0.016
167  13.92      0.77      0.156        (  0.369)       0.141       0.016
168  14.00      0.77      0.156        (  0.367)       0.141       0.016
169  14.08      0.90      0.184        (  0.365)       0.165       0.018
170  14.17      0.90      0.184        (  0.363)       0.165       0.018
171  14.25      0.90      0.184        (  0.361)       0.165       0.018
172  14.33      0.87      0.177        (  0.360)       0.159       0.018
173  14.42      0.87      0.177        (  0.358)       0.159       0.018
174  14.50      0.87      0.177        (  0.356)       0.159       0.018
175  14.58      0.87      0.177        (  0.354)       0.159       0.018
176  14.67      0.87      0.177        (  0.352)       0.159       0.018
177  14.75      0.87      0.177        (  0.350)       0.159       0.018
178  14.83      0.83      0.170        (  0.349)       0.153       0.017
179  14.92      0.83      0.170        (  0.347)       0.153       0.017
180  15.00      0.83      0.170        (  0.345)       0.153       0.017
181  15.08      0.80      0.163        (  0.343)       0.147       0.016
```

```
182  15.17      0.80      0.163      (  0.342)      0.147      0.016
183  15.25      0.80      0.163      (  0.340)      0.147      0.016
184  15.33      0.77      0.156      (  0.338)      0.141      0.016
185  15.42      0.77      0.156      (  0.336)      0.141      0.016
186  15.50      0.77      0.156      (  0.335)      0.141      0.016
187  15.58      0.63      0.129      (  0.333)      0.116      0.013
188  15.67      0.63      0.129      (  0.331)      0.116      0.013
189  15.75      0.63      0.129      (  0.329)      0.116      0.013
190  15.83      0.63      0.129      (  0.328)      0.116      0.013
191  15.92      0.63      0.129      (  0.326)      0.116      0.013
192  16.00      0.63      0.129      (  0.324)      0.116      0.013
193  16.08      0.13      0.027      (  0.323)      0.024      0.003
194  16.17      0.13      0.027      (  0.321)      0.024      0.003
195  16.25      0.13      0.027      (  0.319)      0.024      0.003
196  16.33      0.13      0.027      (  0.318)      0.024      0.003
197  16.42      0.13      0.027      (  0.316)      0.024      0.003
198  16.50      0.13      0.027      (  0.315)      0.024      0.003
199  16.58      0.10      0.020      (  0.313)      0.018      0.002
200  16.67      0.10      0.020      (  0.311)      0.018      0.002
201  16.75      0.10      0.020      (  0.310)      0.018      0.002
202  16.83      0.10      0.020      (  0.308)      0.018      0.002
203  16.92      0.10      0.020      (  0.307)      0.018      0.002
204  17.00      0.10      0.020      (  0.305)      0.018      0.002
205  17.08      0.17      0.034      (  0.304)      0.031      0.003
206  17.17      0.17      0.034      (  0.302)      0.031      0.003
207  17.25      0.17      0.034      (  0.301)      0.031      0.003
208  17.33      0.17      0.034      (  0.299)      0.031      0.003
209  17.42      0.17      0.034      (  0.298)      0.031      0.003
210  17.50      0.17      0.034      (  0.296)      0.031      0.003
211  17.58      0.17      0.034      (  0.295)      0.031      0.003
212  17.67      0.17      0.034      (  0.293)      0.031      0.003
213  17.75      0.17      0.034      (  0.292)      0.031      0.003
214  17.83      0.13      0.027      (  0.290)      0.024      0.003
215  17.92      0.13      0.027      (  0.289)      0.024      0.003
216  18.00      0.13      0.027      (  0.287)      0.024      0.003
217  18.08      0.13      0.027      (  0.286)      0.024      0.003
218  18.17      0.13      0.027      (  0.285)      0.024      0.003
219  18.25      0.13      0.027      (  0.283)      0.024      0.003
220  18.33      0.13      0.027      (  0.282)      0.024      0.003
221  18.42      0.13      0.027      (  0.280)      0.024      0.003
222  18.50      0.13      0.027      (  0.279)      0.024      0.003
223  18.58      0.10      0.020      (  0.278)      0.018      0.002
224  18.67      0.10      0.020      (  0.276)      0.018      0.002
225  18.75      0.10      0.020      (  0.275)      0.018      0.002
226  18.83      0.07      0.014      (  0.274)      0.012      0.001
227  18.92      0.07      0.014      (  0.272)      0.012      0.001
228  19.00      0.07      0.014      (  0.271)      0.012      0.001
229  19.08      0.10      0.020      (  0.270)      0.018      0.002
230  19.17      0.10      0.020      (  0.269)      0.018      0.002
231  19.25      0.10      0.020      (  0.267)      0.018      0.002
232  19.33      0.13      0.027      (  0.266)      0.024      0.003
233  19.42      0.13      0.027      (  0.265)      0.024      0.003
234  19.50      0.13      0.027      (  0.264)      0.024      0.003
235  19.58      0.10      0.020      (  0.262)      0.018      0.002
236  19.67      0.10      0.020      (  0.261)      0.018      0.002
237  19.75      0.10      0.020      (  0.260)      0.018      0.002
238  19.83      0.07      0.014      (  0.259)      0.012      0.001
```

```
239  19.92     0.07      0.014       (  0.258)       0.012         0.001
240  20.00     0.07      0.014       (  0.257)       0.012         0.001
241  20.08     0.10      0.020       (  0.255)       0.018         0.002
242  20.17     0.10      0.020       (  0.254)       0.018         0.002
243  20.25     0.10      0.020       (  0.253)       0.018         0.002
244  20.33     0.10      0.020       (  0.252)       0.018         0.002
245  20.42     0.10      0.020       (  0.251)       0.018         0.002
246  20.50     0.10      0.020       (  0.250)       0.018         0.002
247  20.58     0.10      0.020       (  0.249)       0.018         0.002
248  20.67     0.10      0.020       (  0.248)       0.018         0.002
249  20.75     0.10      0.020       (  0.247)       0.018         0.002
250  20.83     0.07      0.014       (  0.246)       0.012         0.001
251  20.92     0.07      0.014       (  0.245)       0.012         0.001
252  21.00     0.07      0.014       (  0.244)       0.012         0.001
253  21.08     0.10      0.020       (  0.243)       0.018         0.002
254  21.17     0.10      0.020       (  0.242)       0.018         0.002
255  21.25     0.10      0.020       (  0.241)       0.018         0.002
256  21.33     0.07      0.014       (  0.240)       0.012         0.001
257  21.42     0.07      0.014       (  0.239)       0.012         0.001
258  21.50     0.07      0.014       (  0.238)       0.012         0.001
259  21.58     0.10      0.020       (  0.237)       0.018         0.002
260  21.67     0.10      0.020       (  0.237)       0.018         0.002
261  21.75     0.10      0.020       (  0.236)       0.018         0.002
262  21.83     0.07      0.014       (  0.235)       0.012         0.001
263  21.92     0.07      0.014       (  0.234)       0.012         0.001
264  22.00     0.07      0.014       (  0.233)       0.012         0.001
265  22.08     0.10      0.020       (  0.232)       0.018         0.002
266  22.17     0.10      0.020       (  0.232)       0.018         0.002
267  22.25     0.10      0.020       (  0.231)       0.018         0.002
268  22.33     0.07      0.014       (  0.230)       0.012         0.001
269  22.42     0.07      0.014       (  0.230)       0.012         0.001
270  22.50     0.07      0.014       (  0.229)       0.012         0.001
271  22.58     0.07      0.014       (  0.228)       0.012         0.001
272  22.67     0.07      0.014       (  0.228)       0.012         0.001
273  22.75     0.07      0.014       (  0.227)       0.012         0.001
274  22.83     0.07      0.014       (  0.226)       0.012         0.001
275  22.92     0.07      0.014       (  0.226)       0.012         0.001
276  23.00     0.07      0.014       (  0.225)       0.012         0.001
277  23.08     0.07      0.014       (  0.225)       0.012         0.001
278  23.17     0.07      0.014       (  0.224)       0.012         0.001
279  23.25     0.07      0.014       (  0.224)       0.012         0.001
280  23.33     0.07      0.014       (  0.223)       0.012         0.001
281  23.42     0.07      0.014       (  0.223)       0.012         0.001
282  23.50     0.07      0.014       (  0.222)       0.012         0.001
283  23.58     0.07      0.014       (  0.222)       0.012         0.001
284  23.67     0.07      0.014       (  0.222)       0.012         0.001
285  23.75     0.07      0.014       (  0.222)       0.012         0.001
286  23.83     0.07      0.014       (  0.221)       0.012         0.001
287  23.92     0.07      0.014       (  0.221)       0.012         0.001
288  24.00     0.07      0.014       (  0.221)       0.012         0.001
            (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.0
     Flood volume = Effective rainfall      0.17(In)
      times area      37.9(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
     Total soil loss =      1.53(In)
     Total soil loss =     4.832(Ac.Ft)
     Total rainfall =      1.70(In)
```

```
    Flood volume =       23386.4 Cubic Feet
    Total soil loss =      210477.2 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      0.883(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0002      0.03  Q         |         |         |         |
  0+10       0.0005      0.05  Q         |         |         |         |
  0+15       0.0009      0.05  Q         |         |         |         |
  0+20       0.0013      0.07  Q         |         |         |         |
  0+25       0.0019      0.08  Q         |         |         |         |
  0+30       0.0024      0.08  Q         |         |         |         |
  0+35       0.0029      0.08  Q         |         |         |         |
  0+40       0.0035      0.08  Q         |         |         |         |
  0+45       0.0040      0.08  Q         |         |         |         |
  0+50       0.0047      0.09  Q         |         |         |         |
  0+55       0.0054      0.10  Q         |         |         |         |
  1+ 0       0.0061      0.10  Q         |         |         |         |
  1+ 5       0.0067      0.09  Q         |         |         |         |
  1+10       0.0072      0.08  Q         |         |         |         |
  1+15       0.0078      0.08  Q         |         |         |         |
  1+20       0.0083      0.08  Q         |         |         |         |
  1+25       0.0089      0.08  Q         |         |         |         |
  1+30       0.0094      0.08  Q         |         |         |         |
  1+35       0.0099      0.08  Q         |         |         |         |
  1+40       0.0105      0.08  Q         |         |         |         |
  1+45       0.0110      0.08  Q         |         |         |         |
  1+50       0.0116      0.09  Q         |         |         |         |
  1+55       0.0123      0.10  Q         |         |         |         |
  2+ 0       0.0131      0.10  Q         |         |         |         |
  2+ 5       0.0138      0.10  QV        |         |         |         |
  2+10       0.0145      0.10  QV        |         |         |         |
  2+15       0.0152      0.10  QV        |         |         |         |
  2+20       0.0159      0.10  QV        |         |         |         |
  2+25       0.0166      0.10  QV        |         |         |         |
  2+30       0.0174      0.10  QV        |         |         |         |
  2+35       0.0182      0.12  QV        |         |         |         |
  2+40       0.0191      0.13  QV        |         |         |         |
  2+45       0.0199      0.13  QV        |         |         |         |
  2+50       0.0208      0.13  QV        |         |         |         |
  2+55       0.0217      0.13  QV        |         |         |         |
  3+ 0       0.0226      0.13  QV        |         |         |         |
  3+ 5       0.0235      0.13  QV        |         |         |         |
  3+10       0.0244      0.13  QV        |         |         |         |
  3+15       0.0253      0.13  QV        |         |         |         |
  3+20       0.0262      0.13  QV        |         |         |         |
  3+25       0.0271      0.13  Q V       |         |         |         |
  3+30       0.0280      0.13  Q V       |         |         |         |
  3+35       0.0289      0.13  Q V       |         |         |         |
```

```
3+40       0.0298      0.13  Q V       |         |         |         |
3+45       0.0307      0.13  Q V       |         |         |         |
3+50       0.0317      0.14  Q V       |         |         |         |
3+55       0.0327      0.15  Q V       |         |         |         |
4+ 0       0.0338      0.16  Q V       |         |         |         |
4+ 5       0.0349      0.16  Q V       |         |         |         |
4+10       0.0360      0.16  Q V       |         |         |         |
4+15       0.0370      0.16  Q V       |         |         |         |
4+20       0.0382      0.17  Q V       |         |         |         |
4+25       0.0395      0.18  Q V       |         |         |         |
4+30       0.0407      0.18  Q  V      |         |         |         |
4+35       0.0420      0.18  Q  V      |         |         |         |
4+40       0.0432      0.18  Q  V      |         |         |         |
4+45       0.0445      0.18  Q  V      |         |         |         |
4+50       0.0458      0.20  Q  V      |         |         |         |
4+55       0.0472      0.21  Q  V      |         |         |         |
5+ 0       0.0487      0.21  Q  V      |         |         |         |
5+ 5       0.0499      0.18  Q  V      |         |         |         |
5+10       0.0510      0.16  Q  V      |         |         |         |
5+15       0.0521      0.16  Q  V      |         |         |         |
5+20       0.0532      0.17  Q  V      |         |         |         |
5+25       0.0545      0.18  Q   V     |         |         |         |
5+30       0.0557      0.18  Q   V     |         |         |         |
5+35       0.0571      0.20  Q   V     |         |         |         |
5+40       0.0585      0.21  Q   V     |         |         |         |
5+45       0.0599      0.21  Q   V     |         |         |         |
5+50       0.0614      0.21  Q   V     |         |         |         |
5+55       0.0628      0.21  Q   V     |         |         |         |
6+ 0       0.0642      0.21  Q   V     |         |         |         |
6+ 5       0.0658      0.22  Q   V     |         |         |         |
6+10       0.0674      0.23  Q    V    |         |         |         |
6+15       0.0690      0.23  Q    V    |         |         |         |
6+20       0.0706      0.23  Q    V    |         |         |         |
6+25       0.0722      0.23  Q    V    |         |         |         |
6+30       0.0738      0.23  Q    V    |         |         |         |
6+35       0.0755      0.25  Q    V    |         |         |         |
6+40       0.0773      0.26  |Q   V    |         |         |         |
6+45       0.0791      0.26  |Q   V    |         |         |         |
6+50       0.0809      0.26  |Q    V   |         |         |         |
6+55       0.0827      0.26  |Q    V   |         |         |         |
7+ 0       0.0845      0.26  |Q    V   |         |         |         |
7+ 5       0.0862      0.26  |Q    V   |         |         |         |
7+10       0.0880      0.26  |Q    V   |         |         |         |
7+15       0.0898      0.26  |Q    V   |         |         |         |
7+20       0.0917      0.27  |Q    V   |         |         |         |
7+25       0.0937      0.28  |Q    V   |         |         |         |
7+30       0.0956      0.29  |Q     V  |         |         |         |
7+35       0.0977      0.30  |Q     V  |         |         |         |
7+40       0.0998      0.31  |Q     V  |         |         |         |
7+45       0.1020      0.31  |Q     V  |         |         |         |
7+50       0.1042      0.33  |Q     V  |         |         |         |
7+55       0.1066      0.34  |Q     V  |         |         |         |
8+ 0       0.1089      0.34  |Q      V |         |         |         |
8+ 5       0.1114      0.37  |Q      V |         |         |         |
8+10       0.1141      0.39  |Q      V |         |         |         |
8+15       0.1168      0.39  |Q      V |         |         |         |
8+20       0.1194      0.39  |Q      V |         |         |         |
```

```
 8+25       0.1221      0.39  |Q       V|         |         |         |
 8+30       0.1248      0.39  |Q       V|         |         |         |
 8+35       0.1276      0.40  |Q       V|         |         |         |
 8+40       0.1304      0.41  |Q       V|         |         |         |
 8+45       0.1333      0.42  |Q       V|         |         |         |
 8+50       0.1363      0.43  |Q        V         |         |         |
 8+55       0.1393      0.44  |Q        V         |         |         |
 9+ 0       0.1423      0.44  |Q        V         |         |         |
 9+ 5       0.1456      0.47  |Q        V         |         |         |
 9+10       0.1490      0.49  |Q        |V        |         |         |
 9+15       0.1524      0.49  |Q        |V        |         |         |
 9+20       0.1559      0.51  | Q       |V        |         |         |
 9+25       0.1594      0.52  | Q       |V        |         |         |
 9+30       0.1630      0.52  | Q       | V       |         |         |
 9+35       0.1667      0.53  | Q       | V       |         |         |
 9+40       0.1704      0.54  | Q       | V       |         |         |
 9+45       0.1742      0.55  | Q       | V       |         |         |
 9+50       0.1780      0.56  | Q       |  V      |         |         |
 9+55       0.1820      0.57  | Q       |  V      |         |         |
10+ 0       0.1859      0.57  | Q       |  V      |         |         |
10+ 5       0.1891      0.47  |Q        |   V     |         |         |
10+10       0.1919      0.40  |Q        |   V     |         |         |
10+15       0.1946      0.39  |Q        |   V     |         |         |
10+20       0.1973      0.39  |Q        |   V     |         |         |
10+25       0.2000      0.39  |Q        |   V     |         |         |
10+30       0.2027      0.39  |Q        |    V    |         |         |
10+35       0.2058      0.46  |Q        |    V    |         |         |
10+40       0.2094      0.51  | Q       |    V    |         |         |
10+45       0.2129      0.52  | Q       |    V    |         |         |
10+50       0.2165      0.52  | Q       |     V   |         |         |
10+55       0.2201      0.52  | Q       |     V   |         |         |
11+ 0       0.2237      0.52  | Q       |     V   |         |         |
11+ 5       0.2272      0.51  | Q       |     V   |         |         |
11+10       0.2306      0.50  |Q        |      V  |         |         |
11+15       0.2340      0.49  |Q        |      V  |         |         |
11+20       0.2374      0.49  |Q        |      V  |         |         |
11+25       0.2408      0.49  |Q        |      V  |         |         |
11+30       0.2442      0.49  |Q        |       V |         |         |
11+35       0.2474      0.46  |Q        |       V |         |         |
11+40       0.2504      0.45  |Q        |       V |         |         |
11+45       0.2535      0.44  |Q        |       V |         |         |
11+50       0.2566      0.46  |Q        |        V|         |         |
11+55       0.2598      0.47  |Q        |        V|         |         |
12+ 0       0.2630      0.47  |Q        |        V|         |         |
12+ 5       0.2670      0.57  | Q       |        V|         |         |
12+10       0.2714      0.64  | Q       |         V         |         |
12+15       0.2758      0.65  | Q       |         V         |         |
12+20       0.2804      0.66  | Q       |         V         |         |
12+25       0.2850      0.67  | Q       |         |V        |         |
12+30       0.2897      0.68  | Q       |         |V        |         |
12+35       0.2946      0.70  | Q       |         |V        |         |
12+40       0.2995      0.72  | Q       |         | V       |         |
12+45       0.3045      0.73  | Q       |         | V       |         |
12+50       0.3097      0.74  | Q       |         |  V      |         |
12+55       0.3148      0.75  |  Q      |         |  V      |         |
13+ 0       0.3200      0.75  |  Q      |         |  V      |         |
13+ 5       0.3257      0.83  |  Q      |         |   V     |         |
```

```
13+10       0.3317      0.87  |  Q      |         |   V     |         |
13+15       0.3378      0.88  |  Q      |         |    V    |         |
13+20       0.3439      0.88  |  Q      |         |    V    |         |
13+25       0.3500      0.88  |  Q      |         |     V   |         |
13+30       0.3561      0.88  |  Q      |         |     V   |         |
13+35       0.3611      0.72  | Q       |         |     V   |         |
13+40       0.3653      0.62  | Q       |         |      V  |         |
13+45       0.3694      0.60  | Q       |         |      V  |         |
13+50       0.3735      0.60  | Q       |         |      V  |         |
13+55       0.3777      0.60  | Q       |         |       V |         |
14+ 0       0.3818      0.60  | Q       |         |       V |         |
14+ 5       0.3863      0.66  | Q       |         |       V |         |
14+10       0.3911      0.69  | Q       |         |        V|         |
14+15       0.3959      0.70  | Q       |         |        V|         |
14+20       0.4006      0.69  | Q       |         |        V|         |
14+25       0.4053      0.68  | Q       |         |         V         |
14+30       0.4100      0.68  | Q       |         |         V         |
14+35       0.4146      0.68  | Q       |         |         V         |
14+40       0.4193      0.68  | Q       |         |         |V        |
14+45       0.4239      0.68  | Q       |         |         |V        |
14+50       0.4285      0.66  | Q       |         |         |V        |
14+55       0.4330      0.65  | Q       |         |         | V       |
15+ 0       0.4374      0.65  | Q       |         |         | V       |
15+ 5       0.4418      0.64  | Q       |         |         | V       |
15+10       0.4461      0.63  | Q       |         |         |  V      |
15+15       0.4504      0.62  | Q       |         |         |  V      |
15+20       0.4546      0.61  | Q       |         |         |  V      |
15+25       0.4587      0.60  | Q       |         |         |   V     |
15+30       0.4628      0.60  | Q       |         |         |   V     |
15+35       0.4666      0.54  | Q       |         |         |   V     |
15+40       0.4700      0.50  | Q       |         |         |    V    |
15+45       0.4734      0.49  |Q        |         |         |    V    |
15+50       0.4768      0.49  |Q        |         |         |    V    |
15+55       0.4802      0.49  |Q        |         |         |    V    |
16+ 0       0.4836      0.49  |Q        |         |         |     V   |
16+ 5       0.4855      0.28  |Q        |         |         |     V   |
16+10       0.4864      0.13  Q         |         |         |     V   |
16+15       0.4871      0.10  Q         |         |         |     V   |
16+20       0.4878      0.10  Q         |         |         |     V   |
16+25       0.4886      0.10  Q         |         |         |     V   |
16+30       0.4893      0.10  Q         |         |         |     V   |
16+35       0.4899      0.09  Q         |         |         |     V   |
16+40       0.4904      0.08  Q         |         |         |     V   |
16+45       0.4910      0.08  Q         |         |         |     V   |
16+50       0.4915      0.08  Q         |         |         |     V   |
16+55       0.4920      0.08  Q         |         |         |     V   |
17+ 0       0.4926      0.08  Q         |         |         |     V   |
17+ 5       0.4933      0.11  Q         |         |         |     V   |
17+10       0.4942      0.13  Q         |         |         |     V   |
17+15       0.4951      0.13  Q         |         |         |     V   |
17+20       0.4960      0.13  Q         |         |         |     V   |
17+25       0.4969      0.13  Q         |         |         |      V  |
17+30       0.4978      0.13  Q         |         |         |      V  |
17+35       0.4987      0.13  Q         |         |         |      V  |
17+40       0.4996      0.13  Q         |         |         |      V  |
17+45       0.5005      0.13  Q         |         |         |      V  |
17+50       0.5012      0.12  Q         |         |         |      V  |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17+55       0.5020      0.11  Q         |         |         |      V  |
18+ 0       0.5027      0.10  Q         |         |         |      V  |
18+ 5       0.5034      0.10  Q         |         |         |      V  |
18+10       0.5041      0.10  Q         |         |         |      V  |
18+15       0.5048      0.10  Q         |         |         |      V  |
18+20       0.5056      0.10  Q         |         |         |      V  |
18+25       0.5063      0.10  Q         |         |         |      V  |
18+30       0.5070      0.10  Q         |         |         |      V  |
18+35       0.5076      0.09  Q         |         |         |      V  |
18+40       0.5081      0.08  Q         |         |         |      V  |
18+45       0.5087      0.08  Q         |         |         |      V  |
18+50       0.5091      0.06  Q         |         |         |      V  |
18+55       0.5095      0.05  Q         |         |         |      V  |
19+ 0       0.5099      0.05  Q         |         |         |      V  |
19+ 5       0.5103      0.07  Q         |         |         |       V |
19+10       0.5108      0.08  Q         |         |         |       V |
19+15       0.5114      0.08  Q         |         |         |       V |
19+20       0.5120      0.09  Q         |         |         |       V |
19+25       0.5127      0.10  Q         |         |         |       V |
19+30       0.5134      0.10  Q         |         |         |       V |
19+35       0.5140      0.09  Q         |         |         |       V |
19+40       0.5146      0.08  Q         |         |         |       V |
19+45       0.5151      0.08  Q         |         |         |       V |
19+50       0.5156      0.06  Q         |         |         |       V |
19+55       0.5159      0.05  Q         |         |         |       V |
20+ 0       0.5163      0.05  Q         |         |         |       V |
20+ 5       0.5168      0.07  Q         |         |         |       V |
20+10       0.5173      0.08  Q         |         |         |       V |
20+15       0.5178      0.08  Q         |         |         |       V |
20+20       0.5184      0.08  Q         |         |         |       V |
20+25       0.5189      0.08  Q         |         |         |       V |
20+30       0.5194      0.08  Q         |         |         |       V |
20+35       0.5200      0.08  Q         |         |         |       V |
20+40       0.5205      0.08  Q         |         |         |       V |
20+45       0.5210      0.08  Q         |         |         |       V |
20+50       0.5215      0.06  Q         |         |         |       V |
20+55       0.5218      0.05  Q         |         |         |       V |
21+ 0       0.5222      0.05  Q         |         |         |       V |
21+ 5       0.5227      0.07  Q         |         |         |       V |
21+10       0.5232      0.08  Q         |         |         |       V |
21+15       0.5237      0.08  Q         |         |         |        V|
21+20       0.5242      0.06  Q         |         |         |        V|
21+25       0.5245      0.05  Q         |         |         |        V|
21+30       0.5249      0.05  Q         |         |         |        V|
21+35       0.5253      0.07  Q         |         |         |        V|
21+40       0.5259      0.08  Q         |         |         |        V|
21+45       0.5264      0.08  Q         |         |         |        V|
21+50       0.5268      0.06  Q         |         |         |        V|
21+55       0.5272      0.05  Q         |         |         |        V|
22+ 0       0.5276      0.05  Q         |         |         |        V|
22+ 5       0.5280      0.07  Q         |         |         |        V|
22+10       0.5286      0.08  Q         |         |         |        V|
22+15       0.5291      0.08  Q         |         |         |        V|
22+20       0.5295      0.06  Q         |         |         |        V|
22+25       0.5299      0.05  Q         |         |         |        V|
22+30       0.5303      0.05  Q         |         |         |        V|
22+35       0.5306      0.05  Q         |         |         |        V|
```

```
   22+40      0.5310      0.05  Q         |         |         |        V|
   22+45      0.5313      0.05  Q         |         |         |        V|
   22+50      0.5317      0.05  Q         |         |         |        V|
   22+55      0.5320      0.05  Q         |         |         |        V|
   23+ 0      0.5324      0.05  Q         |         |         |        V|
   23+ 5      0.5328      0.05  Q         |         |         |        V|
   23+10      0.5331      0.05  Q         |         |         |        V|
   23+15      0.5335      0.05  Q         |         |         |        V|
   23+20      0.5338      0.05  Q         |         |         |        V|
   23+25      0.5342      0.05  Q         |         |         |        V|
   23+30      0.5345      0.05  Q         |         |         |        V|
   23+35      0.5349      0.05  Q         |         |         |        V|
   23+40      0.5353      0.05  Q         |         |         |        V|
   23+45      0.5356      0.05  Q         |         |         |        V|
   23+50      0.5360      0.05  Q         |         |         |        V|
   23+55      0.5363      0.05  Q         |         |         |        V|
   24+ 0      0.5367      0.05  Q         |         |         |        V|
   24+ 5      0.5369      0.02  Q         |         |         |        V|
   24+10      0.5369      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex15.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 5 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              0.48                 18.19

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.18                 44.72
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    0.480(In)
      Area Averaged 100-Year Rainfall =    1.180(In)

      Point rain (area averaged) =    0.644(In)
      Areal adjustment factor =   99.97 %
      Adjusted average point rain =    0.644(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00         0.000
          11.400           85.00         0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ----------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %             (CFS)
      ---------------------------------------------------------------------
          1   0.083       291.827         55.825           21.323
          2   0.167       583.654         37.583           14.355
          3   0.250       875.481          6.592            2.518
                                    Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     4.20      0.324       (  0.442)      0.292       0.032
   2   0.17     4.30      0.332       (  0.442)      0.299       0.033
   3   0.25     5.00      0.386       (  0.442)      0.348       0.039
   4   0.33     5.00      0.386       (  0.442)      0.348       0.039
   5   0.42     5.80      0.448       (  0.442)      0.403       0.045
   6   0.50     6.50      0.502          0.442    (  0.452)      0.060
   7   0.58     7.40      0.572          0.442    (  0.514)      0.130
   8   0.67     8.60      0.664          0.442    (  0.598)      0.223
```

```
   9   0.75    12.30      0.950          0.442    (  0.855)       0.508
  10   0.83    29.10      2.248          0.442    (  2.023)       1.806
  11   0.92     6.80      0.525          0.442    (  0.473)       0.083
  12   1.00     5.00      0.386      (  0.442)      0.348        0.039
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     3.0
      Flood volume = Effective rainfall      0.25(In)
       times area      37.9(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
      Total soil loss =      0.39(In)
      Total soil loss =     1.234(Ac.Ft)
      Total rainfall =      0.64(In)
      Flood volume =       34818.8 Cubic Feet
      Total soil loss =       53744.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     46.394(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
  -----------------------------------------------------------------------
    0+ 5       0.0048      0.69  Q         |         |         |         |
    0+10       0.0129      1.17  Q         |         |         |         |
    0+15       0.0224      1.38  |Q        |         |         |         |
    0+20       0.0325      1.46  |Q        |         |         |         |
    0+25       0.0435      1.61  |QV       |         |         |         |
    0+30       0.0575      2.03  |QV       |         |         |         |
    0+35       0.0833      3.75  | Q V     |         |         |         |
    0+40       0.1299      6.76  |    QV   |         |         |         |
    0+45       0.2289     14.37  |         |Q        |         |         |
    0+50       0.5484     46.39  |         |         |      V  |      Q  |
    0+55       0.7481     29.00  |         |         |  Q      |      V  |
    1+ 0       0.7934      6.57  |    Q    |         |         |        V|
    1+ 5       0.7987      0.77  Q         |         |         |        V|
    1+10       0.7993      0.10  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex35.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




---------------------------------------------------------------------
```

TR 31589
Existing Condition 5 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              0.79                  29.94

100 YEAR Area rainfall data:
```

```
      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
             37.90              1.85                   70.11

      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    0.790(In)
      Area Averaged 100-Year Rainfall =    1.850(In)

      Point rain (area averaged) =    1.038(In)
      Areal adjustment factor =   99.98 %
      Adjusted average point rain =    1.038(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00         0.000
          11.400           85.00         0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2  AMC-1    (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                          Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083       291.827         55.825           21.323
          2   0.167       583.654         37.583           14.355
          3   0.250       875.481          6.592            2.518
                                    Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     1.30      0.162      (  0.442)      0.146        0.016
   2   0.17     1.30      0.162      (  0.442)      0.146        0.016
   3   0.25     1.10      0.137      (  0.442)      0.123        0.014
   4   0.33     1.50      0.187      (  0.442)      0.168        0.019
   5   0.42     1.50      0.187      (  0.442)      0.168        0.019
   6   0.50     1.80      0.224      (  0.442)      0.202        0.022
   7   0.58     1.50      0.187      (  0.442)      0.168        0.019
   8   0.67     1.80      0.224      (  0.442)      0.202        0.022
```

```
 9   0.75     1.80      0.224       (  0.442)      0.202        0.022
10   0.83     1.50      0.187       (  0.442)      0.168        0.019
11   0.92     1.60      0.199       (  0.442)      0.179        0.020
12   1.00     1.80      0.224       (  0.442)      0.202        0.022
13   1.08     2.20      0.274       (  0.442)      0.247        0.027
14   1.17     2.20      0.274       (  0.442)      0.247        0.027
15   1.25     2.20      0.274       (  0.442)      0.247        0.027
16   1.33     2.00      0.249       (  0.442)      0.224        0.025
17   1.42     2.60      0.324       (  0.442)      0.292        0.032
18   1.50     2.70      0.336       (  0.442)      0.303        0.034
19   1.58     2.40      0.299       (  0.442)      0.269        0.030
20   1.67     2.70      0.336       (  0.442)      0.303        0.034
21   1.75     3.30      0.411       (  0.442)      0.370        0.041
22   1.83     3.10      0.386       (  0.442)      0.348        0.039
23   1.92     2.90      0.361       (  0.442)      0.325        0.036
24   2.00     3.00      0.374       (  0.442)      0.336        0.037
25   2.08     3.10      0.386       (  0.442)      0.348        0.039
26   2.17     4.20      0.523          0.442    (  0.471)       0.081
27   2.25     5.00      0.623          0.442    (  0.561)       0.181
28   2.33     3.50      0.436       (  0.442)      0.392        0.044
29   2.42     6.80      0.847          0.442    (  0.762)       0.405
30   2.50     7.30      0.909          0.442    (  0.818)       0.468
31   2.58     8.20      1.021          0.442    (  0.919)       0.580
32   2.67     5.90      0.735          0.442    (  0.661)       0.293
33   2.75     2.00      0.249       (  0.442)      0.224        0.025
34   2.83     1.80      0.224       (  0.442)      0.202        0.022
35   2.92     1.80      0.224       (  0.442)      0.202        0.022
36   3.00     0.60      0.075       (  0.442)      0.067        0.007
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =     2.8
    Flood volume = Effective rainfall      0.23(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       0.7(Ac.Ft)
    Total soil loss =      0.81(In)
    Total soil loss =     2.545(Ac.Ft)
    Total rainfall =      1.04(In)
    Flood volume =       31964.6 Cubic Feet
    Total soil loss =      110854.8 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     20.104(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        3 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0024      0.35  Q         |         |         |         |
  0+10       0.0064      0.58  Q         |         |         |         |
  0+15       0.0103      0.57  Q         |         |         |         |
  0+20       0.0146      0.64  Q         |         |         |         |
  0+25       0.0195      0.70  QV        |         |         |         |
  0+30       0.0249      0.79  |Q        |         |         |         |
  0+35       0.0302      0.77  |Q        |         |         |         |
  0+40       0.0358      0.80  |Q        |         |         |         |
```

```
    0+45       0.0416      0.85  |QV       |         |         |         |
    0+50       0.0469      0.78  |QV       |         |         |         |
    0+55       0.0521      0.75  |QV       |         |         |         |
    1+ 0       0.0577      0.81  |Q V      |         |         |         |
    1+ 5       0.0643      0.96  |Q V      |         |         |         |
    1+10       0.0714      1.03  |Q V      |         |         |         |
    1+15       0.0786      1.05  |Q  V     |         |         |         |
    1+20       0.0855      0.99  |Q  V     |         |         |         |
    1+25       0.0932      1.12  |Q   V    |         |         |         |
    1+30       0.1018      1.25  |Q   V    |         |         |         |
    1+35       0.1100      1.20  |Q   V    |         |         |         |
    1+40       0.1185      1.23  |Q    V   |         |         |         |
    1+45       0.1284      1.44  |Q    V   |         |         |         |
    1+50       0.1387      1.50  |Q     V  |         |         |         |
    1+55       0.1486      1.43  |Q      V |         |         |         |
    2+ 0       0.1583      1.41  |Q      V |         |         |         |
    2+ 5       0.1683      1.45  |Q       V|         |         |         |
    2+10       0.1847      2.39  |  Q      V         |         |         |
    2+15       0.2201      5.13  |     Q   |V        |         |         |
    2+20       0.2458      3.74  |   Q     |  V      |         |         |
    2+25       0.3128      9.73  |         | Q   V   |         |         |
    2+30       0.4223     15.91  |         |         |Q V      |         |
    2+35       0.5608     20.10  |         |         |     Q   V         |
    2+40       0.6693     15.76  |         |         |Q        |     V   |
    2+45       0.7121      6.20  |       Q |         |         |       V |
    2+50       0.7229      1.57  | Q       |         |         |        V|
    2+55       0.7288      0.86  |Q        |         |         |        V|
    3+ 0       0.7325      0.54  Q         |         |         |        V|
    3+ 5       0.7337      0.16  Q         |         |         |        V|
    3+10       0.7338      0.02  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex65.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 5 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =  37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.10                  41.69

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              2.50                  94.75
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    1.100(In)
      Area Averaged 100-Year Rainfall =    2.500(In)

      Point rain (area averaged) =    1.428(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.428(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00         0.000
          11.400           85.00         0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                            Graph %             (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827         55.825             21.323
          2   0.167        583.654         37.583             14.355
          3   0.250        875.481          6.592              2.518
                                      Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08      0.50      0.086       (  0.442)       0.077        0.009
   2   0.17      0.60      0.103       (  0.442)       0.093        0.010
   3   0.25      0.60      0.103       (  0.442)       0.093        0.010
   4   0.33      0.60      0.103       (  0.442)       0.093        0.010
   5   0.42      0.60      0.103       (  0.442)       0.093        0.010
   6   0.50      0.70      0.120       (  0.442)       0.108        0.012
   7   0.58      0.70      0.120       (  0.442)       0.108        0.012
   8   0.67      0.70      0.120       (  0.442)       0.108        0.012
   9   0.75      0.70      0.120       (  0.442)       0.108        0.012
  10   0.83      0.70      0.120       (  0.442)       0.108        0.012
```

```
 11   0.92      0.70      0.120       (   0.442)       0.108        0.012
 12   1.00      0.80      0.137       (   0.442)       0.123        0.014
 13   1.08      0.80      0.137       (   0.442)       0.123        0.014
 14   1.17      0.80      0.137       (   0.442)       0.123        0.014
 15   1.25      0.80      0.137       (   0.442)       0.123        0.014
 16   1.33      0.80      0.137       (   0.442)       0.123        0.014
 17   1.42      0.80      0.137       (   0.442)       0.123        0.014
 18   1.50      0.80      0.137       (   0.442)       0.123        0.014
 19   1.58      0.80      0.137       (   0.442)       0.123        0.014
 20   1.67      0.80      0.137       (   0.442)       0.123        0.014
 21   1.75      0.80      0.137       (   0.442)       0.123        0.014
 22   1.83      0.80      0.137       (   0.442)       0.123        0.014
 23   1.92      0.80      0.137       (   0.442)       0.123        0.014
 24   2.00      0.90      0.154       (   0.442)       0.139        0.015
 25   2.08      0.80      0.137       (   0.442)       0.123        0.014
 26   2.17      0.90      0.154       (   0.442)       0.139        0.015
 27   2.25      0.90      0.154       (   0.442)       0.139        0.015
 28   2.33      0.90      0.154       (   0.442)       0.139        0.015
 29   2.42      0.90      0.154       (   0.442)       0.139        0.015
 30   2.50      0.90      0.154       (   0.442)       0.139        0.015
 31   2.58      0.90      0.154       (   0.442)       0.139        0.015
 32   2.67      0.90      0.154       (   0.442)       0.139        0.015
 33   2.75      1.00      0.171       (   0.442)       0.154        0.017
 34   2.83      1.00      0.171       (   0.442)       0.154        0.017
 35   2.92      1.00      0.171       (   0.442)       0.154        0.017
 36   3.00      1.00      0.171       (   0.442)       0.154        0.017
 37   3.08      1.00      0.171       (   0.442)       0.154        0.017
 38   3.17      1.10      0.188       (   0.442)       0.170        0.019
 39   3.25      1.10      0.188       (   0.442)       0.170        0.019
 40   3.33      1.10      0.188       (   0.442)       0.170        0.019
 41   3.42      1.20      0.206       (   0.442)       0.185        0.021
 42   3.50      1.30      0.223       (   0.442)       0.200        0.022
 43   3.58      1.40      0.240       (   0.442)       0.216        0.024
 44   3.67      1.40      0.240       (   0.442)       0.216        0.024
 45   3.75      1.50      0.257       (   0.442)       0.231        0.026
 46   3.83      1.50      0.257       (   0.442)       0.231        0.026
 47   3.92      1.60      0.274       (   0.442)       0.247        0.027
 48   4.00      1.60      0.274       (   0.442)       0.247        0.027
 49   4.08      1.70      0.291       (   0.442)       0.262        0.029
 50   4.17      1.80      0.308       (   0.442)       0.278        0.031
 51   4.25      1.90      0.326       (   0.442)       0.293        0.033
 52   4.33      2.00      0.343       (   0.442)       0.308        0.034
 53   4.42      2.10      0.360       (   0.442)       0.324        0.036
 54   4.50      2.10      0.360       (   0.442)       0.324        0.036
 55   4.58      2.20      0.377       (   0.442)       0.339        0.038
 56   4.67      2.30      0.394       (   0.442)       0.355        0.039
 57   4.75      2.40      0.411       (   0.442)       0.370        0.041
 58   4.83      2.40      0.411       (   0.442)       0.370        0.041
 59   4.92      2.50      0.428       (   0.442)       0.385        0.043
 60   5.00      2.60      0.445       (   0.442)       0.401        0.045
 61   5.08      3.10      0.531           0.442    (   0.478)       0.089
 62   5.17      3.60      0.617           0.442    (   0.555)       0.175
 63   5.25      3.90      0.668           0.442    (   0.601)       0.226
 64   5.33      4.20      0.720           0.442    (   0.648)       0.278
 65   5.42      4.70      0.805           0.442    (   0.725)       0.363
 66   5.50      5.60      0.959           0.442    (   0.863)       0.518
 67   5.58      1.90      0.326       (   0.442)       0.293        0.033
```

```
68   5.67     0.90      0.154       (  0.442)      0.139         0.015
69   5.75     0.60      0.103       (  0.442)      0.093         0.010
70   5.83     0.50      0.086       (  0.442)      0.077         0.009
71   5.92     0.30      0.051       (  0.442)      0.046         0.005
72   6.00     0.20      0.034       (  0.442)      0.031         0.003
           (Loss Rate Not Used)
   Sum =     100.0                                  Sum =     2.9
    Flood volume = Effective rainfall      0.24(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
    Total soil loss =      1.18(In)
    Total soil loss =     3.737(Ac.Ft)
    Total rainfall =      1.43(In)
    Flood volume =       33623.8 Cubic Feet
    Total soil loss =      162798.7 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     16.963(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0013      0.18  Q         |         |         |         |
  0+10       0.0036      0.34  Q         |         |         |         |
  0+15       0.0063      0.39  Q         |         |         |         |
  0+20       0.0090      0.39  Q         |         |         |         |
  0+25       0.0117      0.39  Q         |         |         |         |
  0+30       0.0147      0.43  Q         |         |         |         |
  0+35       0.0178      0.45  Q         |         |         |         |
  0+40       0.0209      0.46  QV        |         |         |         |
  0+45       0.0241      0.46  QV        |         |         |         |
  0+50       0.0273      0.46  QV        |         |         |         |
  0+55       0.0304      0.46  QV        |         |         |         |
  1+ 0       0.0338      0.49  QV        |         |         |         |
  1+ 5       0.0374      0.52  |Q        |         |         |         |
  1+10       0.0410      0.52  |QV       |         |         |         |
  1+15       0.0446      0.52  |QV       |         |         |         |
  1+20       0.0482      0.52  |QV       |         |         |         |
  1+25       0.0518      0.52  |QV       |         |         |         |
  1+30       0.0554      0.52  |QV       |         |         |         |
  1+35       0.0590      0.52  |Q V      |         |         |         |
  1+40       0.0627      0.52  |Q V      |         |         |         |
  1+45       0.0663      0.52  |Q V      |         |         |         |
  1+50       0.0699      0.52  |Q V      |         |         |         |
  1+55       0.0735      0.52  |Q V      |         |         |         |
  2+ 0       0.0773      0.56  |Q  V     |         |         |         |
  2+ 5       0.0811      0.55  |Q  V     |         |         |         |
  2+10       0.0850      0.56  |Q  V     |         |         |         |
  2+15       0.0890      0.58  |Q  V     |         |         |         |
  2+20       0.0931      0.59  |Q  V     |         |         |         |
  2+25       0.0971      0.59  |Q   V    |         |         |         |
  2+30       0.1012      0.59  |Q   V    |         |         |         |
  2+35       0.1053      0.59  |Q   V    |         |         |         |
```

```
    2+40       0.1093       0.59  |Q   V    |         |         |         |
    2+45       0.1136       0.63  |Q   V    |         |         |         |
    2+50       0.1181       0.65  |Q    V   |         |         |         |
    2+55       0.1226       0.65  |Q    V   |         |         |         |
    3+ 0       0.1271       0.65  |Q    V   |         |         |         |
    3+ 5       0.1316       0.65  |Q    V   |         |         |         |
    3+10       0.1364       0.69  |Q     V  |         |         |         |
    3+15       0.1413       0.72  |Q     V  |         |         |         |
    3+20       0.1463       0.72  |Q     V  |         |         |         |
    3+25       0.1515       0.76  |Q     V  |         |         |         |
    3+30       0.1571       0.82  |Q      V |         |         |         |
    3+35       0.1632       0.88  |Q      V |         |         |         |
    3+40       0.1695       0.91  |Q      V |         |         |         |
    3+45       0.1761       0.95  |Q       V|         |         |         |
    3+50       0.1828       0.98  |Q       V|         |         |         |
    3+55       0.1898       1.02  | Q      V|         |         |         |
    4+ 0       0.1970       1.04  | Q       V         |         |         |
    4+ 5       0.2045       1.08  | Q       V         |         |         |
    4+10       0.2124       1.15  | Q       |V        |         |         |
    4+15       0.2207       1.21  | Q       |V        |         |         |
    4+20       0.2295       1.28  | Q       |V        |         |         |
    4+25       0.2387       1.34  | Q       | V       |         |         |
    4+30       0.2482       1.37  | Q       | V       |         |         |
    4+35       0.2579       1.41  | Q       |  V      |         |         |
    4+40       0.2680       1.47  | Q       |  V      |         |         |
    4+45       0.2786       1.54  |  Q      |   V     |         |         |
    4+50       0.2894       1.57  |  Q      |   V     |         |         |
    4+55       0.3005       1.61  |  Q      |    V    |         |         |
    5+ 0       0.3120       1.67  |  Q      |     V   |         |         |
    5+ 5       0.3303       2.65  |    Q    |      V  |         |         |
    5+10       0.3656       5.13  |         Q       V |         |         |
    5+15       0.4177       7.57  |         |    Q    |V        |         |
    5+20       0.4839       9.62  |         |        Q|    V    |         |
    5+25       0.5687      12.31  |         |         |   Q    V|         |
    5+30       0.6856      16.96  |         |         |         |  Q V    |
    5+35       0.7479       9.04  |         |       Q |         |       V |
    5+40       0.7623       2.10  |   Q     |         |         |        V|
    5+45       0.7659       0.52  |Q        |         |         |        V|
    5+50       0.7685       0.37  Q         |         |         |        V|
    5+55       0.7702       0.26  Q         |         |         |        V|
    6+ 0       0.7714       0.17  Q         |         |         |        V|
    6+ 5       0.7718       0.06  Q         |         |         |        V|
    6+10       0.7719       0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex245.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 5 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             1.70                  64.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             4.30                 162.97
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    1.700(In)
      Area Averaged 100-Year Rainfall =    4.300(In)

      Point rain (area averaged) =    2.309(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    2.309(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00         0.000
          11.400           85.00         0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  59.4      0.476     0.000        0.476       0.699      0.333
      85.0  70.0      0.362     0.000        0.362       0.301      0.109
                                                          Sum (F) =   0.442
      Area averaged mean soil loss (F) (In/Hr) =  0.442
      Minimum soil loss rate ((In/Hr)) =  0.221
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827          55.825            21.323
          2   0.167        583.654          37.583            14.355
          3   0.250        875.481           6.592             2.518
                                    Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     0.07      0.018        (  0.783)      0.017        0.002
   2   0.17     0.07      0.018        (  0.780)      0.017        0.002
   3   0.25     0.07      0.018        (  0.777)      0.017        0.002
   4   0.33     0.10      0.028        (  0.774)      0.025        0.003
   5   0.42     0.10      0.028        (  0.771)      0.025        0.003
   6   0.50     0.10      0.028        (  0.768)      0.025        0.003
   7   0.58     0.10      0.028        (  0.765)      0.025        0.003
   8   0.67     0.10      0.028        (  0.762)      0.025        0.003
   9   0.75     0.10      0.028        (  0.759)      0.025        0.003
  10   0.83     0.13      0.037        (  0.756)      0.033        0.004
```

```
 11   0.92      0.13       0.037        (   0.753)        0.033          0.004
 12   1.00      0.13       0.037        (   0.750)        0.033          0.004
 13   1.08      0.10       0.028        (   0.747)        0.025          0.003
 14   1.17      0.10       0.028        (   0.744)        0.025          0.003
 15   1.25      0.10       0.028        (   0.741)        0.025          0.003
 16   1.33      0.10       0.028        (   0.738)        0.025          0.003
 17   1.42      0.10       0.028        (   0.735)        0.025          0.003
 18   1.50      0.10       0.028        (   0.732)        0.025          0.003
 19   1.58      0.10       0.028        (   0.730)        0.025          0.003
 20   1.67      0.10       0.028        (   0.727)        0.025          0.003
 21   1.75      0.10       0.028        (   0.724)        0.025          0.003
 22   1.83      0.13       0.037        (   0.721)        0.033          0.004
 23   1.92      0.13       0.037        (   0.718)        0.033          0.004
 24   2.00      0.13       0.037        (   0.715)        0.033          0.004
 25   2.08      0.13       0.037        (   0.712)        0.033          0.004
 26   2.17      0.13       0.037        (   0.709)        0.033          0.004
 27   2.25      0.13       0.037        (   0.706)        0.033          0.004
 28   2.33      0.13       0.037        (   0.703)        0.033          0.004
 29   2.42      0.13       0.037        (   0.701)        0.033          0.004
 30   2.50      0.13       0.037        (   0.698)        0.033          0.004
 31   2.58      0.17       0.046        (   0.695)        0.042          0.005
 32   2.67      0.17       0.046        (   0.692)        0.042          0.005
 33   2.75      0.17       0.046        (   0.689)        0.042          0.005
 34   2.83      0.17       0.046        (   0.686)        0.042          0.005
 35   2.92      0.17       0.046        (   0.684)        0.042          0.005
 36   3.00      0.17       0.046        (   0.681)        0.042          0.005
 37   3.08      0.17       0.046        (   0.678)        0.042          0.005
 38   3.17      0.17       0.046        (   0.675)        0.042          0.005
 39   3.25      0.17       0.046        (   0.672)        0.042          0.005
 40   3.33      0.17       0.046        (   0.669)        0.042          0.005
 41   3.42      0.17       0.046        (   0.667)        0.042          0.005
 42   3.50      0.17       0.046        (   0.664)        0.042          0.005
 43   3.58      0.17       0.046        (   0.661)        0.042          0.005
 44   3.67      0.17       0.046        (   0.658)        0.042          0.005
 45   3.75      0.17       0.046        (   0.656)        0.042          0.005
 46   3.83      0.20       0.055        (   0.653)        0.050          0.006
 47   3.92      0.20       0.055        (   0.650)        0.050          0.006
 48   4.00      0.20       0.055        (   0.647)        0.050          0.006
 49   4.08      0.20       0.055        (   0.645)        0.050          0.006
 50   4.17      0.20       0.055        (   0.642)        0.050          0.006
 51   4.25      0.20       0.055        (   0.639)        0.050          0.006
 52   4.33      0.23       0.065        (   0.636)        0.058          0.006
 53   4.42      0.23       0.065        (   0.634)        0.058          0.006
 54   4.50      0.23       0.065        (   0.631)        0.058          0.006
 55   4.58      0.23       0.065        (   0.628)        0.058          0.006
 56   4.67      0.23       0.065        (   0.625)        0.058          0.006
 57   4.75      0.23       0.065        (   0.623)        0.058          0.006
 58   4.83      0.27       0.074        (   0.620)        0.066          0.007
 59   4.92      0.27       0.074        (   0.617)        0.066          0.007
 60   5.00      0.27       0.074        (   0.615)        0.066          0.007
 61   5.08      0.20       0.055        (   0.612)        0.050          0.006
 62   5.17      0.20       0.055        (   0.609)        0.050          0.006
 63   5.25      0.20       0.055        (   0.607)        0.050          0.006
 64   5.33      0.23       0.065        (   0.604)        0.058          0.006
 65   5.42      0.23       0.065        (   0.601)        0.058          0.006
 66   5.50      0.23       0.065        (   0.599)        0.058          0.006
 67   5.58      0.27       0.074        (   0.596)        0.066          0.007
```

```
  68   5.67      0.27       0.074       (   0.594)       0.066        0.007
  69   5.75      0.27       0.074       (   0.591)       0.066        0.007
  70   5.83      0.27       0.074       (   0.588)       0.066        0.007
  71   5.92      0.27       0.074       (   0.586)       0.066        0.007
  72   6.00      0.27       0.074       (   0.583)       0.066        0.007
  73   6.08      0.30       0.083       (   0.581)       0.075        0.008
  74   6.17      0.30       0.083       (   0.578)       0.075        0.008
  75   6.25      0.30       0.083       (   0.575)       0.075        0.008
  76   6.33      0.30       0.083       (   0.573)       0.075        0.008
  77   6.42      0.30       0.083       (   0.570)       0.075        0.008
  78   6.50      0.30       0.083       (   0.568)       0.075        0.008
  79   6.58      0.33       0.092       (   0.565)       0.083        0.009
  80   6.67      0.33       0.092       (   0.563)       0.083        0.009
  81   6.75      0.33       0.092       (   0.560)       0.083        0.009
  82   6.83      0.33       0.092       (   0.558)       0.083        0.009
  83   6.92      0.33       0.092       (   0.555)       0.083        0.009
  84   7.00      0.33       0.092       (   0.553)       0.083        0.009
  85   7.08      0.33       0.092       (   0.550)       0.083        0.009
  86   7.17      0.33       0.092       (   0.548)       0.083        0.009
  87   7.25      0.33       0.092       (   0.545)       0.083        0.009
  88   7.33      0.37       0.102       (   0.543)       0.091        0.010
  89   7.42      0.37       0.102       (   0.540)       0.091        0.010
  90   7.50      0.37       0.102       (   0.538)       0.091        0.010
  91   7.58      0.40       0.111       (   0.535)       0.100        0.011
  92   7.67      0.40       0.111       (   0.533)       0.100        0.011
  93   7.75      0.40       0.111       (   0.530)       0.100        0.011
  94   7.83      0.43       0.120       (   0.528)       0.108        0.012
  95   7.92      0.43       0.120       (   0.525)       0.108        0.012
  96   8.00      0.43       0.120       (   0.523)       0.108        0.012
  97   8.08      0.50       0.139       (   0.520)       0.125        0.014
  98   8.17      0.50       0.139       (   0.518)       0.125        0.014
  99   8.25      0.50       0.139       (   0.516)       0.125        0.014
 100   8.33      0.50       0.139       (   0.513)       0.125        0.014
 101   8.42      0.50       0.139       (   0.511)       0.125        0.014
 102   8.50      0.50       0.139       (   0.508)       0.125        0.014
 103   8.58      0.53       0.148       (   0.506)       0.133        0.015
 104   8.67      0.53       0.148       (   0.504)       0.133        0.015
 105   8.75      0.53       0.148       (   0.501)       0.133        0.015
 106   8.83      0.57       0.157       (   0.499)       0.141        0.016
 107   8.92      0.57       0.157       (   0.497)       0.141        0.016
 108   9.00      0.57       0.157       (   0.494)       0.141        0.016
 109   9.08      0.63       0.175       (   0.492)       0.158        0.018
 110   9.17      0.63       0.175       (   0.489)       0.158        0.018
 111   9.25      0.63       0.175       (   0.487)       0.158        0.018
 112   9.33      0.67       0.185       (   0.485)       0.166        0.018
 113   9.42      0.67       0.185       (   0.483)       0.166        0.018
 114   9.50      0.67       0.185       (   0.480)       0.166        0.018
 115   9.58      0.70       0.194       (   0.478)       0.175        0.019
 116   9.67      0.70       0.194       (   0.476)       0.175        0.019
 117   9.75      0.70       0.194       (   0.473)       0.175        0.019
 118   9.83      0.73       0.203       (   0.471)       0.183        0.020
 119   9.92      0.73       0.203       (   0.469)       0.183        0.020
 120  10.00      0.73       0.203       (   0.467)       0.183        0.020
 121  10.08      0.50       0.139       (   0.464)       0.125        0.014
 122  10.17      0.50       0.139       (   0.462)       0.125        0.014
 123  10.25      0.50       0.139       (   0.460)       0.125        0.014
 124  10.33      0.50       0.139       (   0.458)       0.125        0.014
```

```
125  10.42      0.50      0.139      (  0.455)      0.125      0.014
126  10.50      0.50      0.139      (  0.453)      0.125      0.014
127  10.58      0.67      0.185      (  0.451)      0.166      0.018
128  10.67      0.67      0.185      (  0.449)      0.166      0.018
129  10.75      0.67      0.185      (  0.446)      0.166      0.018
130  10.83      0.67      0.185      (  0.444)      0.166      0.018
131  10.92      0.67      0.185      (  0.442)      0.166      0.018
132  11.00      0.67      0.185      (  0.440)      0.166      0.018
133  11.08      0.63      0.175      (  0.438)      0.158      0.018
134  11.17      0.63      0.175      (  0.436)      0.158      0.018
135  11.25      0.63      0.175      (  0.433)      0.158      0.018
136  11.33      0.63      0.175      (  0.431)      0.158      0.018
137  11.42      0.63      0.175      (  0.429)      0.158      0.018
138  11.50      0.63      0.175      (  0.427)      0.158      0.018
139  11.58      0.57      0.157      (  0.425)      0.141      0.016
140  11.67      0.57      0.157      (  0.423)      0.141      0.016
141  11.75      0.57      0.157      (  0.421)      0.141      0.016
142  11.83      0.60      0.166      (  0.419)      0.150      0.017
143  11.92      0.60      0.166      (  0.417)      0.150      0.017
144  12.00      0.60      0.166      (  0.414)      0.150      0.017
145  12.08      0.83      0.231      (  0.412)      0.208      0.023
146  12.17      0.83      0.231      (  0.410)      0.208      0.023
147  12.25      0.83      0.231      (  0.408)      0.208      0.023
148  12.33      0.87      0.240      (  0.406)      0.216      0.024
149  12.42      0.87      0.240      (  0.404)      0.216      0.024
150  12.50      0.87      0.240      (  0.402)      0.216      0.024
151  12.58      0.93      0.259      (  0.400)      0.233      0.026
152  12.67      0.93      0.259      (  0.398)      0.233      0.026
153  12.75      0.93      0.259      (  0.396)      0.233      0.026
154  12.83      0.97      0.268      (  0.394)      0.241      0.027
155  12.92      0.97      0.268      (  0.392)      0.241      0.027
156  13.00      0.97      0.268      (  0.390)      0.241      0.027
157  13.08      1.13      0.314      (  0.388)      0.283      0.031
158  13.17      1.13      0.314      (  0.386)      0.283      0.031
159  13.25      1.13      0.314      (  0.384)      0.283      0.031
160  13.33      1.13      0.314      (  0.382)      0.283      0.031
161  13.42      1.13      0.314      (  0.380)      0.283      0.031
162  13.50      1.13      0.314      (  0.378)      0.283      0.031
163  13.58      0.77      0.212      (  0.376)      0.191      0.021
164  13.67      0.77      0.212      (  0.375)      0.191      0.021
165  13.75      0.77      0.212      (  0.373)      0.191      0.021
166  13.83      0.77      0.212      (  0.371)      0.191      0.021
167  13.92      0.77      0.212      (  0.369)      0.191      0.021
168  14.00      0.77      0.212      (  0.367)      0.191      0.021
169  14.08      0.90      0.249      (  0.365)      0.224      0.025
170  14.17      0.90      0.249      (  0.363)      0.224      0.025
171  14.25      0.90      0.249      (  0.361)      0.224      0.025
172  14.33      0.87      0.240      (  0.360)      0.216      0.024
173  14.42      0.87      0.240      (  0.358)      0.216      0.024
174  14.50      0.87      0.240      (  0.356)      0.216      0.024
175  14.58      0.87      0.240      (  0.354)      0.216      0.024
176  14.67      0.87      0.240      (  0.352)      0.216      0.024
177  14.75      0.87      0.240      (  0.350)      0.216      0.024
178  14.83      0.83      0.231      (  0.349)      0.208      0.023
179  14.92      0.83      0.231      (  0.347)      0.208      0.023
180  15.00      0.83      0.231      (  0.345)      0.208      0.023
181  15.08      0.80      0.222      (  0.343)      0.199      0.022
```

```
 182  15.17      0.80      0.222      (  0.342)      0.199      0.022
 183  15.25      0.80      0.222      (  0.340)      0.199      0.022
 184  15.33      0.77      0.212      (  0.338)      0.191      0.021
 185  15.42      0.77      0.212      (  0.336)      0.191      0.021
 186  15.50      0.77      0.212      (  0.335)      0.191      0.021
 187  15.58      0.63      0.175      (  0.333)      0.158      0.018
 188  15.67      0.63      0.175      (  0.331)      0.158      0.018
 189  15.75      0.63      0.175      (  0.329)      0.158      0.018
 190  15.83      0.63      0.175      (  0.328)      0.158      0.018
 191  15.92      0.63      0.175      (  0.326)      0.158      0.018
 192  16.00      0.63      0.175      (  0.324)      0.158      0.018
 193  16.08      0.13      0.037      (  0.323)      0.033      0.004
 194  16.17      0.13      0.037      (  0.321)      0.033      0.004
 195  16.25      0.13      0.037      (  0.319)      0.033      0.004
 196  16.33      0.13      0.037      (  0.318)      0.033      0.004
 197  16.42      0.13      0.037      (  0.316)      0.033      0.004
 198  16.50      0.13      0.037      (  0.315)      0.033      0.004
 199  16.58      0.10      0.028      (  0.313)      0.025      0.003
 200  16.67      0.10      0.028      (  0.311)      0.025      0.003
 201  16.75      0.10      0.028      (  0.310)      0.025      0.003
 202  16.83      0.10      0.028      (  0.308)      0.025      0.003
 203  16.92      0.10      0.028      (  0.307)      0.025      0.003
 204  17.00      0.10      0.028      (  0.305)      0.025      0.003
 205  17.08      0.17      0.046      (  0.304)      0.042      0.005
 206  17.17      0.17      0.046      (  0.302)      0.042      0.005
 207  17.25      0.17      0.046      (  0.301)      0.042      0.005
 208  17.33      0.17      0.046      (  0.299)      0.042      0.005
 209  17.42      0.17      0.046      (  0.298)      0.042      0.005
 210  17.50      0.17      0.046      (  0.296)      0.042      0.005
 211  17.58      0.17      0.046      (  0.295)      0.042      0.005
 212  17.67      0.17      0.046      (  0.293)      0.042      0.005
 213  17.75      0.17      0.046      (  0.292)      0.042      0.005
 214  17.83      0.13      0.037      (  0.290)      0.033      0.004
 215  17.92      0.13      0.037      (  0.289)      0.033      0.004
 216  18.00      0.13      0.037      (  0.287)      0.033      0.004
 217  18.08      0.13      0.037      (  0.286)      0.033      0.004
 218  18.17      0.13      0.037      (  0.285)      0.033      0.004
 219  18.25      0.13      0.037      (  0.283)      0.033      0.004
 220  18.33      0.13      0.037      (  0.282)      0.033      0.004
 221  18.42      0.13      0.037      (  0.280)      0.033      0.004
 222  18.50      0.13      0.037      (  0.279)      0.033      0.004
 223  18.58      0.10      0.028      (  0.278)      0.025      0.003
 224  18.67      0.10      0.028      (  0.276)      0.025      0.003
 225  18.75      0.10      0.028      (  0.275)      0.025      0.003
 226  18.83      0.07      0.018      (  0.274)      0.017      0.002
 227  18.92      0.07      0.018      (  0.272)      0.017      0.002
 228  19.00      0.07      0.018      (  0.271)      0.017      0.002
 229  19.08      0.10      0.028      (  0.270)      0.025      0.003
 230  19.17      0.10      0.028      (  0.269)      0.025      0.003
 231  19.25      0.10      0.028      (  0.267)      0.025      0.003
 232  19.33      0.13      0.037      (  0.266)      0.033      0.004
 233  19.42      0.13      0.037      (  0.265)      0.033      0.004
 234  19.50      0.13      0.037      (  0.264)      0.033      0.004
 235  19.58      0.10      0.028      (  0.262)      0.025      0.003
 236  19.67      0.10      0.028      (  0.261)      0.025      0.003
 237  19.75      0.10      0.028      (  0.260)      0.025      0.003
 238  19.83      0.07      0.018      (  0.259)      0.017      0.002
```

```
239  19.92     0.07      0.018       (  0.258)       0.017        0.002
240  20.00     0.07      0.018       (  0.257)       0.017        0.002
241  20.08     0.10      0.028       (  0.255)       0.025        0.003
242  20.17     0.10      0.028       (  0.254)       0.025        0.003
243  20.25     0.10      0.028       (  0.253)       0.025        0.003
244  20.33     0.10      0.028       (  0.252)       0.025        0.003
245  20.42     0.10      0.028       (  0.251)       0.025        0.003
246  20.50     0.10      0.028       (  0.250)       0.025        0.003
247  20.58     0.10      0.028       (  0.249)       0.025        0.003
248  20.67     0.10      0.028       (  0.248)       0.025        0.003
249  20.75     0.10      0.028       (  0.247)       0.025        0.003
250  20.83     0.07      0.018       (  0.246)       0.017        0.002
251  20.92     0.07      0.018       (  0.245)       0.017        0.002
252  21.00     0.07      0.018       (  0.244)       0.017        0.002
253  21.08     0.10      0.028       (  0.243)       0.025        0.003
254  21.17     0.10      0.028       (  0.242)       0.025        0.003
255  21.25     0.10      0.028       (  0.241)       0.025        0.003
256  21.33     0.07      0.018       (  0.240)       0.017        0.002
257  21.42     0.07      0.018       (  0.239)       0.017        0.002
258  21.50     0.07      0.018       (  0.238)       0.017        0.002
259  21.58     0.10      0.028       (  0.237)       0.025        0.003
260  21.67     0.10      0.028       (  0.237)       0.025        0.003
261  21.75     0.10      0.028       (  0.236)       0.025        0.003
262  21.83     0.07      0.018       (  0.235)       0.017        0.002
263  21.92     0.07      0.018       (  0.234)       0.017        0.002
264  22.00     0.07      0.018       (  0.233)       0.017        0.002
265  22.08     0.10      0.028       (  0.232)       0.025        0.003
266  22.17     0.10      0.028       (  0.232)       0.025        0.003
267  22.25     0.10      0.028       (  0.231)       0.025        0.003
268  22.33     0.07      0.018       (  0.230)       0.017        0.002
269  22.42     0.07      0.018       (  0.230)       0.017        0.002
270  22.50     0.07      0.018       (  0.229)       0.017        0.002
271  22.58     0.07      0.018       (  0.228)       0.017        0.002
272  22.67     0.07      0.018       (  0.228)       0.017        0.002
273  22.75     0.07      0.018       (  0.227)       0.017        0.002
274  22.83     0.07      0.018       (  0.226)       0.017        0.002
275  22.92     0.07      0.018       (  0.226)       0.017        0.002
276  23.00     0.07      0.018       (  0.225)       0.017        0.002
277  23.08     0.07      0.018       (  0.225)       0.017        0.002
278  23.17     0.07      0.018       (  0.224)       0.017        0.002
279  23.25     0.07      0.018       (  0.224)       0.017        0.002
280  23.33     0.07      0.018       (  0.223)       0.017        0.002
281  23.42     0.07      0.018       (  0.223)       0.017        0.002
282  23.50     0.07      0.018       (  0.222)       0.017        0.002
283  23.58     0.07      0.018       (  0.222)       0.017        0.002
284  23.67     0.07      0.018       (  0.222)       0.017        0.002
285  23.75     0.07      0.018       (  0.222)       0.017        0.002
286  23.83     0.07      0.018       (  0.221)       0.017        0.002
287  23.92     0.07      0.018       (  0.221)       0.017        0.002
288  24.00     0.07      0.018       (  0.221)       0.017        0.002
            (Loss Rate Not Used)
    Sum =     100.0                               Sum =     2.8
     Flood volume = Effective rainfall      0.23(In)
      times area      37.9(Ac.)/[(In)/(Ft.)] =       0.7(Ac.Ft)
     Total soil loss =      2.08(In)
     Total soil loss =     6.563(Ac.Ft)
     Total rainfall =      2.31(In)
```

```
    Flood volume =       31763.9 Cubic Feet
    Total soil loss =      285875.5 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      1.200(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0003      0.04  Q         |         |         |         |
  0+10       0.0007      0.07  Q         |         |         |         |
  0+15       0.0012      0.07  Q         |         |         |         |
  0+20       0.0018      0.09  Q         |         |         |         |
  0+25       0.0025      0.10  Q         |         |         |         |
  0+30       0.0033      0.11  Q         |         |         |         |
  0+35       0.0040      0.11  Q         |         |         |         |
  0+40       0.0047      0.11  Q         |         |         |         |
  0+45       0.0055      0.11  Q         |         |         |         |
  0+50       0.0063      0.13  Q         |         |         |         |
  0+55       0.0073      0.14  Q         |         |         |         |
  1+ 0       0.0083      0.14  Q         |         |         |         |
  1+ 5       0.0091      0.12  Q         |         |         |         |
  1+10       0.0098      0.11  Q         |         |         |         |
  1+15       0.0106      0.11  Q         |         |         |         |
  1+20       0.0113      0.11  Q         |         |         |         |
  1+25       0.0120      0.11  Q         |         |         |         |
  1+30       0.0128      0.11  Q         |         |         |         |
  1+35       0.0135      0.11  Q         |         |         |         |
  1+40       0.0142      0.11  Q         |         |         |         |
  1+45       0.0149      0.11  Q         |         |         |         |
  1+50       0.0158      0.13  Q         |         |         |         |
  1+55       0.0168      0.14  Q         |         |         |         |
  2+ 0       0.0177      0.14  Q         |         |         |         |
  2+ 5       0.0187      0.14  QV        |         |         |         |
  2+10       0.0197      0.14  QV        |         |         |         |
  2+15       0.0207      0.14  QV        |         |         |         |
  2+20       0.0216      0.14  QV        |         |         |         |
  2+25       0.0226      0.14  QV        |         |         |         |
  2+30       0.0236      0.14  QV        |         |         |         |
  2+35       0.0247      0.16  QV        |         |         |         |
  2+40       0.0259      0.17  QV        |         |         |         |
  2+45       0.0271      0.18  QV        |         |         |         |
  2+50       0.0283      0.18  QV        |         |         |         |
  2+55       0.0295      0.18  QV        |         |         |         |
  3+ 0       0.0307      0.18  QV        |         |         |         |
  3+ 5       0.0320      0.18  QV        |         |         |         |
  3+10       0.0332      0.18  QV        |         |         |         |
  3+15       0.0344      0.18  QV        |         |         |         |
  3+20       0.0356      0.18  QV        |         |         |         |
  3+25       0.0368      0.18  Q V       |         |         |         |
  3+30       0.0380      0.18  Q V       |         |         |         |
  3+35       0.0392      0.18  Q V       |         |         |         |
```

```
3+40       0.0405      0.18  Q V       |         |         |         |
3+45       0.0417      0.18  Q V       |         |         |         |
3+50       0.0430      0.20  Q V       |         |         |         |
3+55       0.0445      0.21  Q V       |         |         |         |
4+ 0       0.0459      0.21  Q V       |         |         |         |
4+ 5       0.0474      0.21  Q V       |         |         |         |
4+10       0.0488      0.21  Q V       |         |         |         |
4+15       0.0503      0.21  Q V       |         |         |         |
4+20       0.0519      0.23  Q V       |         |         |         |
4+25       0.0536      0.24  Q V       |         |         |         |
4+30       0.0553      0.25  Q  V      |         |         |         |
4+35       0.0570      0.25  Q  V      |         |         |         |
4+40       0.0587      0.25  Q  V      |         |         |         |
4+45       0.0604      0.25  Q  V      |         |         |         |
4+50       0.0622      0.27  |Q V      |         |         |         |
4+55       0.0642      0.28  |Q V      |         |         |         |
5+ 0       0.0661      0.28  |Q V      |         |         |         |
5+ 5       0.0678      0.24  Q  V      |         |         |         |
5+10       0.0693      0.22  Q  V      |         |         |         |
5+15       0.0707      0.21  Q  V      |         |         |         |
5+20       0.0723      0.23  Q  V      |         |         |         |
5+25       0.0740      0.24  Q   V     |         |         |         |
5+30       0.0757      0.25  Q   V     |         |         |         |
5+35       0.0775      0.27  |Q  V     |         |         |         |
5+40       0.0795      0.28  |Q  V     |         |         |         |
5+45       0.0814      0.28  |Q  V     |         |         |         |
5+50       0.0834      0.28  |Q  V     |         |         |         |
5+55       0.0853      0.28  |Q  V     |         |         |         |
6+ 0       0.0872      0.28  |Q  V     |         |         |         |
6+ 5       0.0893      0.30  |Q  V     |         |         |         |
6+10       0.0915      0.32  |Q   V    |         |         |         |
6+15       0.0937      0.32  |Q   V    |         |         |         |
6+20       0.0959      0.32  |Q   V    |         |         |         |
6+25       0.0981      0.32  |Q   V    |         |         |         |
6+30       0.1002      0.32  |Q   V    |         |         |         |
6+35       0.1026      0.34  |Q   V    |         |         |         |
6+40       0.1050      0.35  |Q   V    |         |         |         |
6+45       0.1074      0.35  |Q   V    |         |         |         |
6+50       0.1098      0.35  |Q    V   |         |         |         |
6+55       0.1123      0.35  |Q    V   |         |         |         |
7+ 0       0.1147      0.35  |Q    V   |         |         |         |
7+ 5       0.1171      0.35  |Q    V   |         |         |         |
7+10       0.1196      0.35  |Q    V   |         |         |         |
7+15       0.1220      0.35  |Q    V   |         |         |         |
7+20       0.1246      0.37  |Q    V   |         |         |         |
7+25       0.1272      0.39  |Q    V   |         |         |         |
7+30       0.1299      0.39  |Q     V  |         |         |         |
7+35       0.1327      0.41  |Q     V  |         |         |         |
7+40       0.1356      0.42  |Q     V  |         |         |         |
7+45       0.1385      0.42  |Q     V  |         |         |         |
7+50       0.1416      0.44  |Q     V  |         |         |         |
7+55       0.1447      0.46  |Q     V  |         |         |         |
8+ 0       0.1479      0.46  |Q      V |         |         |         |
8+ 5       0.1513      0.50  |Q      V |         |         |         |
8+10       0.1549      0.52  | Q     V |         |         |         |
8+15       0.1586      0.53  | Q     V |         |         |         |
8+20       0.1622      0.53  | Q     V |         |         |         |
```

```
 8+25       0.1659      0.53  | Q      V|         |         |         |
 8+30       0.1695      0.53  | Q      V|         |         |         |
 8+35       0.1733      0.55  | Q      V|         |         |         |
 8+40       0.1772      0.56  | Q      V|         |         |         |
 8+45       0.1811      0.56  | Q      V|         |         |         |
 8+50       0.1851      0.58  | Q       V         |         |         |
 8+55       0.1892      0.60  | Q       V         |         |         |
 9+ 0       0.1933      0.60  | Q       V         |         |         |
 9+ 5       0.1977      0.64  | Q       V         |         |         |
 9+10       0.2023      0.67  | Q       |V        |         |         |
 9+15       0.2069      0.67  | Q       |V        |         |         |
 9+20       0.2117      0.69  | Q       |V        |         |         |
 9+25       0.2165      0.70  | Q       |V        |         |         |
 9+30       0.2214      0.71  | Q       | V       |         |         |
 9+35       0.2264      0.73  | Q       | V       |         |         |
 9+40       0.2315      0.74  | Q       | V       |         |         |
 9+45       0.2366      0.74  | Q       | V       |         |         |
 9+50       0.2418      0.76  |  Q      |  V      |         |         |
 9+55       0.2472      0.77  |  Q      |  V      |         |         |
10+ 0       0.2525      0.78  |  Q      |  V      |         |         |
10+ 5       0.2569      0.64  | Q       |   V     |         |         |
10+10       0.2607      0.55  | Q       |   V     |         |         |
10+15       0.2643      0.53  | Q       |   V     |         |         |
10+20       0.2680      0.53  | Q       |   V     |         |         |
10+25       0.2716      0.53  | Q       |   V     |         |         |
10+30       0.2752      0.53  | Q       |    V    |         |         |
10+35       0.2796      0.63  | Q       |    V    |         |         |
10+40       0.2844      0.69  | Q       |    V    |         |         |
10+45       0.2892      0.71  | Q       |    V    |         |         |
10+50       0.2941      0.71  | Q       |     V   |         |         |
10+55       0.2989      0.71  | Q       |     V   |         |         |
11+ 0       0.3038      0.71  | Q       |     V   |         |         |
11+ 5       0.3085      0.69  | Q       |     V   |         |         |
11+10       0.3132      0.67  | Q       |      V  |         |         |
11+15       0.3178      0.67  | Q       |      V  |         |         |
11+20       0.3224      0.67  | Q       |      V  |         |         |
11+25       0.3270      0.67  | Q       |      V  |         |         |
11+30       0.3316      0.67  | Q       |       V |         |         |
11+35       0.3360      0.63  | Q       |       V |         |         |
11+40       0.3401      0.60  | Q       |       V |         |         |
11+45       0.3443      0.60  | Q       |       V |         |         |
11+50       0.3485      0.62  | Q       |        V|         |         |
11+55       0.3529      0.63  | Q       |        V|         |         |
12+ 0       0.3573      0.64  | Q       |        V|         |         |
12+ 5       0.3626      0.77  |  Q      |        V|         |         |
12+10       0.3686      0.87  |  Q      |         V         |         |
12+15       0.3746      0.88  |  Q      |         V         |         |
12+20       0.3809      0.90  |  Q      |         V         |         |
12+25       0.3872      0.92  |  Q      |         |V        |         |
12+30       0.3935      0.92  |  Q      |         |V        |         |
12+35       0.4001      0.96  |  Q      |         |V        |         |
12+40       0.4068      0.98  |  Q      |         | V       |         |
12+45       0.4136      0.99  |  Q      |         | V       |         |
12+50       0.4206      1.01  |   Q     |         |  V      |         |
12+55       0.4276      1.02  |   Q     |         |  V      |         |
13+ 0       0.4347      1.02  |   Q     |         |  V      |         |
13+ 5       0.4424      1.12  |   Q     |         |   V     |         |
```

```
13+10       0.4506      1.19  |   Q     |         |   V     |         |
13+15       0.4588      1.20  |   Q     |         |    V    |         |
13+20       0.4671      1.20  |   Q     |         |    V    |         |
13+25       0.4754      1.20  |   Q     |         |     V   |         |
13+30       0.4836      1.20  |   Q     |         |     V   |         |
13+35       0.4904      0.98  |  Q      |         |     V   |         |
13+40       0.4962      0.84  |  Q      |         |      V  |         |
13+45       0.5018      0.81  |  Q      |         |      V  |         |
13+50       0.5074      0.81  |  Q      |         |      V  |         |
13+55       0.5129      0.81  |  Q      |         |       V |         |
14+ 0       0.5185      0.81  |  Q      |         |       V |         |
14+ 5       0.5247      0.89  |  Q      |         |       V |         |
14+10       0.5312      0.94  |  Q      |         |        V|         |
14+15       0.5377      0.95  |  Q      |         |        V|         |
14+20       0.5442      0.93  |  Q      |         |        V|         |
14+25       0.5505      0.92  |  Q      |         |         V         |
14+30       0.5568      0.92  |  Q      |         |         V         |
14+35       0.5631      0.92  |  Q      |         |         V         |
14+40       0.5695      0.92  |  Q      |         |         |V        |
14+45       0.5758      0.92  |  Q      |         |         |V        |
14+50       0.5820      0.90  |  Q      |         |         |V        |
14+55       0.5881      0.88  |  Q      |         |         | V       |
15+ 0       0.5941      0.88  |  Q      |         |         | V       |
15+ 5       0.6001      0.86  |  Q      |         |         | V       |
15+10       0.6059      0.85  |  Q      |         |         |  V      |
15+15       0.6118      0.85  |  Q      |         |         |  V      |
15+20       0.6175      0.83  |  Q      |         |         |  V      |
15+25       0.6231      0.81  |  Q      |         |         |   V     |
15+30       0.6286      0.81  |  Q      |         |         |   V     |
15+35       0.6337      0.73  | Q       |         |         |   V     |
15+40       0.6384      0.68  | Q       |         |         |    V    |
15+45       0.6430      0.67  | Q       |         |         |    V    |
15+50       0.6476      0.67  | Q       |         |         |    V    |
15+55       0.6522      0.67  | Q       |         |         |    V    |
16+ 0       0.6569      0.67  | Q       |         |         |     V   |
16+ 5       0.6594      0.38  |Q        |         |         |     V   |
16+10       0.6606      0.18  Q         |         |         |     V   |
16+15       0.6616      0.14  Q         |         |         |     V   |
16+20       0.6626      0.14  Q         |         |         |     V   |
16+25       0.6636      0.14  Q         |         |         |     V   |
16+30       0.6645      0.14  Q         |         |         |     V   |
16+35       0.6654      0.12  Q         |         |         |     V   |
16+40       0.6661      0.11  Q         |         |         |     V   |
16+45       0.6668      0.11  Q         |         |         |     V   |
16+50       0.6676      0.11  Q         |         |         |     V   |
16+55       0.6683      0.11  Q         |         |         |     V   |
17+ 0       0.6690      0.11  Q         |         |         |     V   |
17+ 5       0.6700      0.15  Q         |         |         |     V   |
17+10       0.6712      0.17  Q         |         |         |     V   |
17+15       0.6724      0.18  Q         |         |         |     V   |
17+20       0.6736      0.18  Q         |         |         |     V   |
17+25       0.6749      0.18  Q         |         |         |      V  |
17+30       0.6761      0.18  Q         |         |         |      V  |
17+35       0.6773      0.18  Q         |         |         |      V  |
17+40       0.6785      0.18  Q         |         |         |      V  |
17+45       0.6797      0.18  Q         |         |         |      V  |
17+50       0.6808      0.16  Q         |         |         |      V  |
```

```
17+55       0.6818      0.14  Q         |         |         |      V  |
18+ 0       0.6828      0.14  Q         |         |         |      V  |
18+ 5       0.6837      0.14  Q         |         |         |      V  |
18+10       0.6847      0.14  Q         |         |         |      V  |
18+15       0.6857      0.14  Q         |         |         |      V  |
18+20       0.6867      0.14  Q         |         |         |      V  |
18+25       0.6876      0.14  Q         |         |         |      V  |
18+30       0.6886      0.14  Q         |         |         |      V  |
18+35       0.6894      0.12  Q         |         |         |      V  |
18+40       0.6902      0.11  Q         |         |         |      V  |
18+45       0.6909      0.11  Q         |         |         |      V  |
18+50       0.6915      0.09  Q         |         |         |      V  |
18+55       0.6920      0.07  Q         |         |         |      V  |
19+ 0       0.6925      0.07  Q         |         |         |      V  |
19+ 5       0.6931      0.09  Q         |         |         |       V |
19+10       0.6938      0.10  Q         |         |         |       V |
19+15       0.6946      0.11  Q         |         |         |       V |
19+20       0.6954      0.13  Q         |         |         |       V |
19+25       0.6964      0.14  Q         |         |         |       V |
19+30       0.6974      0.14  Q         |         |         |       V |
19+35       0.6982      0.12  Q         |         |         |       V |
19+40       0.6989      0.11  Q         |         |         |       V |
19+45       0.6997      0.11  Q         |         |         |       V |
19+50       0.7003      0.09  Q         |         |         |       V |
19+55       0.7008      0.07  Q         |         |         |       V |
20+ 0       0.7012      0.07  Q         |         |         |       V |
20+ 5       0.7019      0.09  Q         |         |         |       V |
20+10       0.7026      0.10  Q         |         |         |       V |
20+15       0.7033      0.11  Q         |         |         |       V |
20+20       0.7040      0.11  Q         |         |         |       V |
20+25       0.7048      0.11  Q         |         |         |       V |
20+30       0.7055      0.11  Q         |         |         |       V |
20+35       0.7062      0.11  Q         |         |         |       V |
20+40       0.7070      0.11  Q         |         |         |       V |
20+45       0.7077      0.11  Q         |         |         |       V |
20+50       0.7083      0.09  Q         |         |         |       V |
20+55       0.7088      0.07  Q         |         |         |       V |
21+ 0       0.7093      0.07  Q         |         |         |       V |
21+ 5       0.7099      0.09  Q         |         |         |       V |
21+10       0.7106      0.10  Q         |         |         |       V |
21+15       0.7113      0.11  Q         |         |         |        V|
21+20       0.7119      0.09  Q         |         |         |        V|
21+25       0.7124      0.07  Q         |         |         |        V|
21+30       0.7129      0.07  Q         |         |         |        V|
21+35       0.7135      0.09  Q         |         |         |        V|
21+40       0.7142      0.10  Q         |         |         |        V|
21+45       0.7150      0.11  Q         |         |         |        V|
21+50       0.7156      0.09  Q         |         |         |        V|
21+55       0.7161      0.07  Q         |         |         |        V|
22+ 0       0.7166      0.07  Q         |         |         |        V|
22+ 5       0.7172      0.09  Q         |         |         |        V|
22+10       0.7179      0.10  Q         |         |         |        V|
22+15       0.7186      0.11  Q         |         |         |        V|
22+20       0.7192      0.09  Q         |         |         |        V|
22+25       0.7197      0.07  Q         |         |         |        V|
22+30       0.7202      0.07  Q         |         |         |        V|
22+35       0.7207      0.07  Q         |         |         |        V|
```

```
   22+40        0.7212       0.07  Q          |         |         |      V|
   22+45        0.7217       0.07  Q          |         |         |      V|
   22+50        0.7221       0.07  Q          |         |         |      V|
   22+55        0.7226       0.07  Q          |         |         |      V|
   23+ 0        0.7231       0.07  Q          |         |         |      V|
   23+ 5        0.7236       0.07  Q          |         |         |      V|
   23+10        0.7241       0.07  Q          |         |         |      V|
   23+15        0.7246       0.07  Q          |         |         |      V|
   23+20        0.7251       0.07  Q          |         |         |      V|
   23+25        0.7256       0.07  Q          |         |         |      V|
   23+30        0.7260       0.07  Q          |         |         |      V|
   23+35        0.7265       0.07  Q          |         |         |      V|
   23+40        0.7270       0.07  Q          |         |         |      V|
   23+45        0.7275       0.07  Q          |         |         |      V|
   23+50        0.7280       0.07  Q          |         |         |      V|
   23+55        0.7285       0.07  Q          |         |         |      V|
   24+ 0        0.7290       0.07  Q          |         |         |      V|
   24+ 5        0.7292       0.03  Q          |         |         |      V|
   24+10        0.7292       0.00  Q          |         |         |      V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex110.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589
Existing Condition 10 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              0.48                  18.19

100 YEAR Area rainfall data:
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
      Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
             37.90              1.18                   44.72

      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    0.480(In)
      Area Averaged 100-Year Rainfall =    1.180(In)

      Point rain (area averaged) =    0.768(In)
      Areal adjustment factor =   99.97 %
      Adjusted average point rain =    0.768(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00          0.000
          11.400           85.00          0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)      (In/Hr)      (Dec.)    (In/Hr)
      77.0  77.0      0.279     0.000        0.279       0.699      0.195
      85.0  85.0      0.187     0.000        0.187       0.301      0.056
                                                          Sum (F) =   0.252
      Area averaged mean soil loss (F) (In/Hr) =  0.252
      Minimum soil loss rate ((In/Hr)) =  0.126
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ----------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %           (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827         55.825             21.323
          2   0.167        583.654         37.583             14.355
          3   0.250        875.481          6.592              2.518
                                    Sum = 100.000   Sum=      38.196
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)         Max    |   Low        (In/Hr)
   1   0.08      4.20      0.387          0.252     (  0.348)       0.135
   2   0.17      4.30      0.396          0.252     (  0.357)       0.145
   3   0.25      5.00      0.461          0.252     (  0.415)       0.209
   4   0.33      5.00      0.461          0.252     (  0.415)       0.209
   5   0.42      5.80      0.534          0.252     (  0.481)       0.283
   6   0.50      6.50      0.599          0.252     (  0.539)       0.347
```

```
   7   0.58     7.40      0.682          0.252    (  0.614)        0.430
   8   0.67     8.60      0.792          0.252    (  0.713)        0.541
   9   0.75    12.30      1.133          0.252    (  1.020)        0.882
  10   0.83    29.10      2.681          0.252    (  2.413)        2.429
  11   0.92     6.80      0.626          0.252    (  0.564)        0.375
  12   1.00     5.00      0.461          0.252    (  0.415)        0.209
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     6.2
      Flood volume = Effective rainfall      0.52(In)
       times area      37.9(Ac.)/[(In)/(Ft.)] =       1.6(Ac.Ft)
      Total soil loss =      0.25(In)
      Total soil loss =     0.795(Ac.Ft)
      Total rainfall =      0.77(In)
      Flood volume =       71005.6 Cubic Feet
      Total soil loss =       34615.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     65.850(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       17.5      35.0      52.5      70.0
  -----------------------------------------------------------------------
    0+ 5       0.0199      2.89  VQ        |         |         |         |
    0+10       0.0545      5.03  |VQ       |         |         |         |
    0+15       0.1019      6.88  | VQ      |         |         |         |
    0+20       0.1558      7.83  |  VQ     |         |         |         |
    0+25       0.2216      9.56  |    Q    |         |         |         |
    0+30       0.3042     11.99  |     QV  |         |         |         |
    0+35       0.4067     14.88  |       QV|         |         |         |
    0+40       0.5347     18.59  |         Q  V      |         |         |
    0+45       0.7251     27.66  |         |    Q V  |         |         |
    0+50       1.1787     65.85  |         |         |       V |      Q  |
    0+55       1.4893     45.11  |         |         |    Q    |     V   |
    1+ 0       1.5993     15.96  |        Q|         |         |        V|
    1+ 5       1.6264      3.95  | Q       |         |         |        V|
    1+10       1.6301      0.53  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex310.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 10 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             0.79                  29.94

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90             1.85                  70.11
```

```
      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    0.790(In)
      Area Averaged 100-Year Rainfall =    1.850(In)

      Point rain (area averaged) =    1.226(In)
      Areal adjustment factor =   99.98 %
      Adjusted average point rain =    1.226(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00          0.000
          11.400           85.00          0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  77.0      0.279     0.000        0.279       0.699      0.195
      85.0  85.0      0.187     0.000        0.187       0.301      0.056
                                                          Sum (F) =   0.252
      Area averaged mean soil loss (F) (In/Hr) =  0.252
      Minimum soil loss rate ((In/Hr)) =  0.126
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                            Graph %           (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827          55.825           21.323
          2   0.167        583.654          37.583           14.355
          3   0.250        875.481           6.592            2.518
                                   Sum = 100.000   Sum=      38.196
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)         Max    |   Low         (In/Hr)
   1   0.08      1.30      0.191        (  0.252)      0.172        0.019
   2   0.17      1.30      0.191        (  0.252)      0.172        0.019
   3   0.25      1.10      0.162        (  0.252)      0.146        0.016
   4   0.33      1.50      0.221        (  0.252)      0.199        0.022
   5   0.42      1.50      0.221        (  0.252)      0.199        0.022
   6   0.50      1.80      0.265        (  0.252)      0.238        0.026
   7   0.58      1.50      0.221        (  0.252)      0.199        0.022
   8   0.67      1.80      0.265        (  0.252)      0.238        0.026
   9   0.75      1.80      0.265        (  0.252)      0.238        0.026
  10   0.83      1.50      0.221        (  0.252)      0.199        0.022
```

```
11   0.92     1.60      0.235       (  0.252)      0.212        0.024
12   1.00     1.80      0.265       (  0.252)      0.238        0.026
13   1.08     2.20      0.324          0.252    (  0.291)       0.072
14   1.17     2.20      0.324          0.252    (  0.291)       0.072
15   1.25     2.20      0.324          0.252    (  0.291)       0.072
16   1.33     2.00      0.294          0.252    (  0.265)       0.043
17   1.42     2.60      0.382          0.252    (  0.344)       0.131
18   1.50     2.70      0.397          0.252    (  0.357)       0.146
19   1.58     2.40      0.353          0.252    (  0.318)       0.101
20   1.67     2.70      0.397          0.252    (  0.357)       0.146
21   1.75     3.30      0.485          0.252    (  0.437)       0.234
22   1.83     3.10      0.456          0.252    (  0.410)       0.204
23   1.92     2.90      0.427          0.252    (  0.384)       0.175
24   2.00     3.00      0.441          0.252    (  0.397)       0.190
25   2.08     3.10      0.456          0.252    (  0.410)       0.204
26   2.17     4.20      0.618          0.252    (  0.556)       0.366
27   2.25     5.00      0.736          0.252    (  0.662)       0.484
28   2.33     3.50      0.515          0.252    (  0.463)       0.263
29   2.42     6.80      1.000          0.252    (  0.900)       0.749
30   2.50     7.30      1.074          0.252    (  0.966)       0.822
31   2.58     8.20      1.206          0.252    (  1.086)       0.955
32   2.67     5.90      0.868          0.252    (  0.781)       0.616
33   2.75     2.00      0.294          0.252    (  0.265)       0.043
34   2.83     1.80      0.265       (  0.252)      0.238        0.026
35   2.92     1.80      0.265       (  0.252)      0.238        0.026
36   3.00     0.60      0.088       (  0.252)      0.079        0.009
           (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     6.4
    Flood volume = Effective rainfall      0.54(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       1.7(Ac.Ft)
    Total soil loss =      0.69(In)
    Total soil loss =     2.182(Ac.Ft)
    Total rainfall =      1.23(In)
    Flood volume =       73621.3 Cubic Feet
    Total soil loss =       95032.9 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     34.063(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        3 - H O U R   S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0028      0.41  Q          |         |         |         |
  0+10       0.0075      0.68  Q          |         |         |         |
  0+15       0.0121      0.67  Q          |         |         |         |
  0+20       0.0173      0.75  Q          |         |         |         |
  0+25       0.0230      0.83  Q          |         |         |         |
  0+30       0.0294      0.94  Q          |         |         |         |
  0+35       0.0357      0.91  Q          |         |         |         |
  0+40       0.0422      0.95  Q          |         |         |         |
  0+45       0.0491      1.00  |Q         |         |         |         |
  0+50       0.0554      0.92  QV         |         |         |         |
```

```
    0+55       0.0615      0.89  QV        |         |         |         |
    1+ 0       0.0681      0.96  QV        |         |         |         |
    1+ 5       0.0818      1.98  |Q        |         |         |         |
    1+10       0.0999      2.64  | Q       |         |         |         |
    1+15       0.1189      2.75  | Q       |         |         |         |
    1+20       0.1335      2.12  | QV      |         |         |         |
    1+25       0.1582      3.59  |  Q      |         |         |         |
    1+30       0.1933      5.09  |   VQ    |         |         |         |
    1+35       0.2249      4.58  |   QV    |         |         |         |
    1+40       0.2588      4.93  |   Q V   |         |         |         |
    1+45       0.3093      7.34  |      Q  |         |         |         |
    1+50       0.3650      8.09  |       Q |         |         |         |
    1+55       0.4150      7.26  |      Q V|         |         |         |
    2+ 0       0.4637      7.08  |      Q  V         |         |         |
    2+ 5       0.5156      7.53  |      Q  | V       |         |         |
    2+10       0.5929     11.23  |         |Q  V     |         |         |
    2+15       0.7038     16.10  |         |     Q   |         |         |
    2+20       0.7967     13.49  |         |  Q    V |         |         |
    2+25       0.9411     20.97  |         |         Q V       |         |
    2+30       1.1406     28.96  |         |         |     V Q |         |
    2+35       1.3752     34.06  |         |         |         | V Q     |
    2+40       1.5744     28.93  |         |         |       Q |      V  |
    2+45       1.6582     12.17  |         | Q       |         |        V|
    2+50       1.6770      2.73  | Q       |         |         |        V|
    2+55       1.6843      1.05  |Q        |         |         |        V|
    3+ 0       1.6886      0.64  Q         |         |         |        V|
    3+ 5       1.6900      0.19  Q         |         |         |        V|
    3+10       1.6901      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex610.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589
Existing Condition 10 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.10                 41.69

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

```
         37.90              2.50                   94.75

     STORM EVENT (YEAR) =   10.00
     Area Averaged 2-Year Rainfall =    1.100(In)
     Area Averaged 100-Year Rainfall =    2.500(In)

     Point rain (area averaged) =    1.676(In)
     Areal adjustment factor =   99.99 %
     Adjusted average point rain =    1.676(In)

     Sub-Area Data:
     Area(Ac.)         Runoff Index   Impervious %
         26.500           77.00          0.000
         11.400           85.00          0.000
      Total Area Entered =     37.90(Ac.)


     RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
     AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
     77.0  77.0      0.279     0.000        0.279       0.699      0.195
     85.0  85.0      0.187     0.000        0.187       0.301      0.056
                                                         Sum (F) =   0.252
     Area averaged mean soil loss (F) (In/Hr) =  0.252
     Minimum soil loss rate ((In/Hr)) =  0.126
     (for 24 hour storm duration)
     Soil low loss rate (decimal) =   0.900
     ---------------------------------------------------------------------

                 U n i t  H y d r o g r a p h
                       VALLEY S-Curve
     --------------------------------------------------------------------
                 Unit Hydrograph Data
     ---------------------------------------------------------------------
     Unit time period   Time % of lag   Distribution   Unit Hydrograph
         (hrs)                            Graph %            (CFS)
     ---------------------------------------------------------------------
         1   0.083        291.827         55.825             21.323
         2   0.167        583.654         37.583             14.355
         3   0.250        875.481          6.592              2.518
                                   Sum = 100.000   Sum=      38.196
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)          Max    |   Low         (In/Hr)
   1   0.08      0.50      0.101       (  0.252)      0.090        0.010
   2   0.17      0.60      0.121       (  0.252)      0.109        0.012
   3   0.25      0.60      0.121       (  0.252)      0.109        0.012
   4   0.33      0.60      0.121       (  0.252)      0.109        0.012
   5   0.42      0.60      0.121       (  0.252)      0.109        0.012
   6   0.50      0.70      0.141       (  0.252)      0.127        0.014
   7   0.58      0.70      0.141       (  0.252)      0.127        0.014
   8   0.67      0.70      0.141       (  0.252)      0.127        0.014
   9   0.75      0.70      0.141       (  0.252)      0.127        0.014
```

```
10   0.83      0.70      0.141        (  0.252)       0.127         0.014
11   0.92      0.70      0.141        (  0.252)       0.127         0.014
12   1.00      0.80      0.161        (  0.252)       0.145         0.016
13   1.08      0.80      0.161        (  0.252)       0.145         0.016
14   1.17      0.80      0.161        (  0.252)       0.145         0.016
15   1.25      0.80      0.161        (  0.252)       0.145         0.016
16   1.33      0.80      0.161        (  0.252)       0.145         0.016
17   1.42      0.80      0.161        (  0.252)       0.145         0.016
18   1.50      0.80      0.161        (  0.252)       0.145         0.016
19   1.58      0.80      0.161        (  0.252)       0.145         0.016
20   1.67      0.80      0.161        (  0.252)       0.145         0.016
21   1.75      0.80      0.161        (  0.252)       0.145         0.016
22   1.83      0.80      0.161        (  0.252)       0.145         0.016
23   1.92      0.80      0.161        (  0.252)       0.145         0.016
24   2.00      0.90      0.181        (  0.252)       0.163         0.018
25   2.08      0.80      0.161        (  0.252)       0.145         0.016
26   2.17      0.90      0.181        (  0.252)       0.163         0.018
27   2.25      0.90      0.181        (  0.252)       0.163         0.018
28   2.33      0.90      0.181        (  0.252)       0.163         0.018
29   2.42      0.90      0.181        (  0.252)       0.163         0.018
30   2.50      0.90      0.181        (  0.252)       0.163         0.018
31   2.58      0.90      0.181        (  0.252)       0.163         0.018
32   2.67      0.90      0.181        (  0.252)       0.163         0.018
33   2.75      1.00      0.201        (  0.252)       0.181         0.020
34   2.83      1.00      0.201        (  0.252)       0.181         0.020
35   2.92      1.00      0.201        (  0.252)       0.181         0.020
36   3.00      1.00      0.201        (  0.252)       0.181         0.020
37   3.08      1.00      0.201        (  0.252)       0.181         0.020
38   3.17      1.10      0.221        (  0.252)       0.199         0.022
39   3.25      1.10      0.221        (  0.252)       0.199         0.022
40   3.33      1.10      0.221        (  0.252)       0.199         0.022
41   3.42      1.20      0.241        (  0.252)       0.217         0.024
42   3.50      1.30      0.261        (  0.252)       0.235         0.026
43   3.58      1.40      0.282            0.252    (  0.253)         0.030
44   3.67      1.40      0.282            0.252    (  0.253)         0.030
45   3.75      1.50      0.302            0.252    (  0.271)         0.050
46   3.83      1.50      0.302            0.252    (  0.271)         0.050
47   3.92      1.60      0.322            0.252    (  0.290)         0.070
48   4.00      1.60      0.322            0.252    (  0.290)         0.070
49   4.08      1.70      0.342            0.252    (  0.308)         0.090
50   4.17      1.80      0.362            0.252    (  0.326)         0.110
51   4.25      1.90      0.382            0.252    (  0.344)         0.130
52   4.33      2.00      0.402            0.252    (  0.362)         0.151
53   4.42      2.10      0.422            0.252    (  0.380)         0.171
54   4.50      2.10      0.422            0.252    (  0.380)         0.171
55   4.58      2.20      0.442            0.252    (  0.398)         0.191
56   4.67      2.30      0.463            0.252    (  0.416)         0.211
57   4.75      2.40      0.483            0.252    (  0.434)         0.231
58   4.83      2.40      0.483            0.252    (  0.434)         0.231
59   4.92      2.50      0.503            0.252    (  0.452)         0.251
60   5.00      2.60      0.523            0.252    (  0.471)         0.271
61   5.08      3.10      0.623            0.252    (  0.561)         0.372
62   5.17      3.60      0.724            0.252    (  0.652)         0.472
63   5.25      3.90      0.784            0.252    (  0.706)         0.533
64   5.33      4.20      0.845            0.252    (  0.760)         0.593
65   5.42      4.70      0.945            0.252    (  0.851)         0.694
66   5.50      5.60      1.126            0.252    (  1.013)         0.874
```

```
67   5.58     1.90      0.382          0.252    (  0.344)        0.130
68   5.67     0.90      0.181       (  0.252)      0.163        0.018
69   5.75     0.60      0.121       (  0.252)      0.109        0.012
70   5.83     0.50      0.101       (  0.252)      0.090        0.010
71   5.92     0.30      0.060       (  0.252)      0.054        0.006
72   6.00     0.20      0.040       (  0.252)      0.036        0.004
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =     6.9
    Flood volume = Effective rainfall      0.58(In)
     times area      37.9(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
    Total soil loss =      1.10(In)
    Total soil loss =     3.466(Ac.Ft)
    Total rainfall =      1.68(In)
    Flood volume =       79583.4 Cubic Feet
    Total soil loss =      150961.7 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     30.111(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0015      0.21  Q          |         |         |         |
  0+10       0.0042      0.40  Q          |         |         |         |
  0+15       0.0074      0.46  Q          |         |         |         |
  0+20       0.0106      0.46  Q          |         |         |         |
  0+25       0.0137      0.46  Q          |         |         |         |
  0+30       0.0172      0.50  Q          |         |         |         |
  0+35       0.0209      0.53  Q          |         |         |         |
  0+40       0.0246      0.54  Q          |         |         |         |
  0+45       0.0283      0.54  Q          |         |         |         |
  0+50       0.0320      0.54  Q          |         |         |         |
  0+55       0.0357      0.54  Q          |         |         |         |
  1+ 0       0.0397      0.58  Q          |         |         |         |
  1+ 5       0.0439      0.61  Q          |         |         |         |
  1+10       0.0481      0.61  QV         |         |         |         |
  1+15       0.0524      0.61  QV         |         |         |         |
  1+20       0.0566      0.61  QV         |         |         |         |
  1+25       0.0608      0.61  QV         |         |         |         |
  1+30       0.0651      0.61  QV         |         |         |         |
  1+35       0.0693      0.61  QV         |         |         |         |
  1+40       0.0735      0.61  QV         |         |         |         |
  1+45       0.0778      0.61  QV         |         |         |         |
  1+50       0.0820      0.61  QV         |         |         |         |
  1+55       0.0862      0.61  QV         |         |         |         |
  2+ 0       0.0908      0.66  QV         |         |         |         |
  2+ 5       0.0952      0.64  Q V        |         |         |         |
  2+10       0.0998      0.66  Q V        |         |         |         |
  2+15       0.1045      0.69  Q V        |         |         |         |
  2+20       0.1093      0.69  Q V        |         |         |         |
  2+25       0.1140      0.69  Q V        |         |         |         |
  2+30       0.1188      0.69  Q V        |         |         |         |
```

```
    2+35       0.1235       0.69  Q V       |         |         |         |
    2+40       0.1283       0.69  Q V       |         |         |         |
    2+45       0.1334       0.73  Q V       |         |         |         |
    2+50       0.1386       0.76  Q  V      |         |         |         |
    2+55       0.1439       0.77  Q  V      |         |         |         |
    3+ 0       0.1492       0.77  Q  V      |         |         |         |
    3+ 5       0.1545       0.77  Q  V      |         |         |         |
    3+10       0.1601       0.81  Q  V      |         |         |         |
    3+15       0.1659       0.84  Q  V      |         |         |         |
    3+20       0.1717       0.85  Q  V      |         |         |         |
    3+25       0.1778       0.89  Q  V      |         |         |         |
    3+30       0.1844       0.96  Q   V     |         |         |         |
    3+35       0.1918       1.07  |Q  V     |         |         |         |
    3+40       0.1996       1.13  |Q  V     |         |         |         |
    3+45       0.2105       1.57  |Q  V     |         |         |         |
    3+50       0.2233       1.86  |Q  V     |         |         |         |
    3+55       0.2394       2.34  | Q  V    |         |         |         |
    4+ 0       0.2575       2.63  | Q  V    |         |         |         |
    4+ 5       0.2789       3.11  |  Q  V   |         |         |         |
    4+10       0.3053       3.83  |  Q  V   |         |         |         |
    4+15       0.3369       4.60  |   Q  V  |         |         |         |
    4+20       0.3739       5.36  |    Q  V |         |         |         |
    4+25       0.4161       6.13  |     Q  V|         |         |         |
    4+30       0.4607       6.47  |     Q   V         |         |         |
    4+35       0.5086       6.95  |     Q   |V        |         |         |
    4+40       0.5614       7.67  |      Q  | V       |         |         |
    4+45       0.6195       8.44  |       Q |  V      |         |         |
    4+50       0.6800       8.78  |       Q |   V     |         |         |
    4+55       0.7437       9.26  |        Q|     V   |         |         |
    5+ 0       0.8124       9.98  |        Q|      V  |         |         |
    5+ 5       0.8982      12.46  |         | Q      V|         |         |
    5+10       1.0091      16.10  |         |     Q   | V       |         |
    5+15       1.1405      19.08  |         |        Q|   V     |         |
    5+20       1.2885      21.49  |         |         |Q      V |         |
    5+25       1.4583      24.65  |         |         |   Q     |V        |
    5+30       1.6657      30.11  |         |         |         Q     V   |
    5+35       1.7834      17.09  |         |      Q  |         |        V|
    5+40       1.8141       4.46  |   Q     |         |         |        V|
    5+45       1.8200       0.85  Q         |         |         |        V|
    5+50       1.8230       0.43  Q         |         |         |        V|
    5+55       1.8250       0.30  Q         |         |         |        V|
    6+ 0       1.8264       0.20  Q         |         |         |        V|
    6+ 5       1.8269       0.07  Q         |         |         |        V|
    6+10       1.8270       0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  01/18/21 File: tr31589ex2410.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Existing Condition 10 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      37.90(Ac.)  =      0.059 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 37.90(Ac.)  =  0.059 Sq. Mi.
Length along longest watercourse =    1192.00(Ft.)
Length along longest watercourse measured to centroid =     405.00(Ft.)
Length along longest watercourse =      0.226 Mi.
Length along longest watercourse measured to centroid =      0.077 Mi.
Difference in elevation =      42.00(Ft.)
Slope along watercourse =    186.0403 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.029 Hr.
Lag time =     1.71 Min.
25% of lag time =     0.43 Min.
40% of lag time =     0.69 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              1.70                  64.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       37.90              4.30                 162.97
```

```
      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    1.700(In)
      Area Averaged 100-Year Rainfall =    4.300(In)

      Point rain (area averaged) =    2.770(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    2.769(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
          26.500           77.00          0.000
          11.400           85.00          0.000
       Total Area Entered =     37.90(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      77.0  77.0      0.279     0.000        0.279       0.699      0.195
      85.0  85.0      0.187     0.000        0.187       0.301      0.056
                                                           Sum (F) =   0.252
      Area averaged mean soil loss (F) (In/Hr) =  0.252
      Minimum soil loss rate ((In/Hr)) =  0.126
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.900
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                            Graph %           (CFS)
      ---------------------------------------------------------------------
          1   0.083        291.827          55.825            21.323
          2   0.167        583.654          37.583            14.355
          3   0.250        875.481           6.592             2.518
                                    Sum = 100.000   Sum=      38.196
------------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)          Max    |   Low         (In/Hr)
   1   0.08      0.07      0.022        (  0.446)      0.020       0.002
   2   0.17      0.07      0.022        (  0.444)      0.020       0.002
   3   0.25      0.07      0.022        (  0.443)      0.020       0.002
   4   0.33      0.10      0.033        (  0.441)      0.030       0.003
   5   0.42      0.10      0.033        (  0.439)      0.030       0.003
   6   0.50      0.10      0.033        (  0.437)      0.030       0.003
   7   0.58      0.10      0.033        (  0.436)      0.030       0.003
   8   0.67      0.10      0.033        (  0.434)      0.030       0.003
   9   0.75      0.10      0.033        (  0.432)      0.030       0.003
  10   0.83      0.13      0.044        (  0.431)      0.040       0.004
```

```
 11   0.92     0.13      0.044       (   0.429)      0.040       0.004
 12   1.00     0.13      0.044       (   0.427)      0.040       0.004
 13   1.08     0.10      0.033       (   0.426)      0.030       0.003
 14   1.17     0.10      0.033       (   0.424)      0.030       0.003
 15   1.25     0.10      0.033       (   0.422)      0.030       0.003
 16   1.33     0.10      0.033       (   0.421)      0.030       0.003
 17   1.42     0.10      0.033       (   0.419)      0.030       0.003
 18   1.50     0.10      0.033       (   0.417)      0.030       0.003
 19   1.58     0.10      0.033       (   0.415)      0.030       0.003
 20   1.67     0.10      0.033       (   0.414)      0.030       0.003
 21   1.75     0.10      0.033       (   0.412)      0.030       0.003
 22   1.83     0.13      0.044       (   0.411)      0.040       0.004
 23   1.92     0.13      0.044       (   0.409)      0.040       0.004
 24   2.00     0.13      0.044       (   0.407)      0.040       0.004
 25   2.08     0.13      0.044       (   0.406)      0.040       0.004
 26   2.17     0.13      0.044       (   0.404)      0.040       0.004
 27   2.25     0.13      0.044       (   0.402)      0.040       0.004
 28   2.33     0.13      0.044       (   0.401)      0.040       0.004
 29   2.42     0.13      0.044       (   0.399)      0.040       0.004
 30   2.50     0.13      0.044       (   0.397)      0.040       0.004
 31   2.58     0.17      0.055       (   0.396)      0.050       0.006
 32   2.67     0.17      0.055       (   0.394)      0.050       0.006
 33   2.75     0.17      0.055       (   0.393)      0.050       0.006
 34   2.83     0.17      0.055       (   0.391)      0.050       0.006
 35   2.92     0.17      0.055       (   0.389)      0.050       0.006
 36   3.00     0.17      0.055       (   0.388)      0.050       0.006
 37   3.08     0.17      0.055       (   0.386)      0.050       0.006
 38   3.17     0.17      0.055       (   0.384)      0.050       0.006
 39   3.25     0.17      0.055       (   0.383)      0.050       0.006
 40   3.33     0.17      0.055       (   0.381)      0.050       0.006
 41   3.42     0.17      0.055       (   0.380)      0.050       0.006
 42   3.50     0.17      0.055       (   0.378)      0.050       0.006
 43   3.58     0.17      0.055       (   0.376)      0.050       0.006
 44   3.67     0.17      0.055       (   0.375)      0.050       0.006
 45   3.75     0.17      0.055       (   0.373)      0.050       0.006
 46   3.83     0.20      0.066       (   0.372)      0.060       0.007
 47   3.92     0.20      0.066       (   0.370)      0.060       0.007
 48   4.00     0.20      0.066       (   0.369)      0.060       0.007
 49   4.08     0.20      0.066       (   0.367)      0.060       0.007
 50   4.17     0.20      0.066       (   0.366)      0.060       0.007
 51   4.25     0.20      0.066       (   0.364)      0.060       0.007
 52   4.33     0.23      0.078       (   0.362)      0.070       0.008
 53   4.42     0.23      0.078       (   0.361)      0.070       0.008
 54   4.50     0.23      0.078       (   0.359)      0.070       0.008
 55   4.58     0.23      0.078       (   0.358)      0.070       0.008
 56   4.67     0.23      0.078       (   0.356)      0.070       0.008
 57   4.75     0.23      0.078       (   0.355)      0.070       0.008
 58   4.83     0.27      0.089       (   0.353)      0.080       0.009
 59   4.92     0.27      0.089       (   0.352)      0.080       0.009
 60   5.00     0.27      0.089       (   0.350)      0.080       0.009
 61   5.08     0.20      0.066       (   0.349)      0.060       0.007
 62   5.17     0.20      0.066       (   0.347)      0.060       0.007
 63   5.25     0.20      0.066       (   0.346)      0.060       0.007
 64   5.33     0.23      0.078       (   0.344)      0.070       0.008
 65   5.42     0.23      0.078       (   0.343)      0.070       0.008
 66   5.50     0.23      0.078       (   0.341)      0.070       0.008
 67   5.58     0.27      0.089       (   0.340)      0.080       0.009
```

```
   68   5.67       0.27       0.089        (  0.338)       0.080        0.009
   69   5.75       0.27       0.089        (  0.337)       0.080        0.009
   70   5.83       0.27       0.089        (  0.335)       0.080        0.009
   71   5.92       0.27       0.089        (  0.334)       0.080        0.009
   72   6.00       0.27       0.089        (  0.332)       0.080        0.009
   73   6.08       0.30       0.100        (  0.331)       0.090        0.010
   74   6.17       0.30       0.100        (  0.329)       0.090        0.010
   75   6.25       0.30       0.100        (  0.328)       0.090        0.010
   76   6.33       0.30       0.100        (  0.326)       0.090        0.010
   77   6.42       0.30       0.100        (  0.325)       0.090        0.010
   78   6.50       0.30       0.100        (  0.323)       0.090        0.010
   79   6.58       0.33       0.111        (  0.322)       0.100        0.011
   80   6.67       0.33       0.111        (  0.320)       0.100        0.011
   81   6.75       0.33       0.111        (  0.319)       0.100        0.011
   82   6.83       0.33       0.111        (  0.318)       0.100        0.011
   83   6.92       0.33       0.111        (  0.316)       0.100        0.011
   84   7.00       0.33       0.111        (  0.315)       0.100        0.011
   85   7.08       0.33       0.111        (  0.313)       0.100        0.011
   86   7.17       0.33       0.111        (  0.312)       0.100        0.011
   87   7.25       0.33       0.111        (  0.310)       0.100        0.011
   88   7.33       0.37       0.122        (  0.309)       0.110        0.012
   89   7.42       0.37       0.122        (  0.308)       0.110        0.012
   90   7.50       0.37       0.122        (  0.306)       0.110        0.012
   91   7.58       0.40       0.133        (  0.305)       0.120        0.013
   92   7.67       0.40       0.133        (  0.303)       0.120        0.013
   93   7.75       0.40       0.133        (  0.302)       0.120        0.013
   94   7.83       0.43       0.144        (  0.301)       0.130        0.014
   95   7.92       0.43       0.144        (  0.299)       0.130        0.014
   96   8.00       0.43       0.144        (  0.298)       0.130        0.014
   97   8.08       0.50       0.166        (  0.296)       0.150        0.017
   98   8.17       0.50       0.166        (  0.295)       0.150        0.017
   99   8.25       0.50       0.166        (  0.294)       0.150        0.017
  100   8.33       0.50       0.166        (  0.292)       0.150        0.017
  101   8.42       0.50       0.166        (  0.291)       0.150        0.017
  102   8.50       0.50       0.166        (  0.290)       0.150        0.017
  103   8.58       0.53       0.177        (  0.288)       0.160        0.018
  104   8.67       0.53       0.177        (  0.287)       0.160        0.018
  105   8.75       0.53       0.177        (  0.285)       0.160        0.018
  106   8.83       0.57       0.188        (  0.284)       0.169        0.019
  107   8.92       0.57       0.188        (  0.283)       0.169        0.019
  108   9.00       0.57       0.188        (  0.281)       0.169        0.019
  109   9.08       0.63       0.210        (  0.280)       0.189        0.021
  110   9.17       0.63       0.210        (  0.279)       0.189        0.021
  111   9.25       0.63       0.210        (  0.277)       0.189        0.021
  112   9.33       0.67       0.222        (  0.276)       0.199        0.022
  113   9.42       0.67       0.222        (  0.275)       0.199        0.022
  114   9.50       0.67       0.222        (  0.273)       0.199        0.022
  115   9.58       0.70       0.233        (  0.272)       0.209        0.023
  116   9.67       0.70       0.233        (  0.271)       0.209        0.023
  117   9.75       0.70       0.233        (  0.270)       0.209        0.023
  118   9.83       0.73       0.244        (  0.268)       0.219        0.024
  119   9.92       0.73       0.244        (  0.267)       0.219        0.024
  120  10.00       0.73       0.244        (  0.266)       0.219        0.024
  121  10.08       0.50       0.166        (  0.264)       0.150        0.017
  122  10.17       0.50       0.166        (  0.263)       0.150        0.017
  123  10.25       0.50       0.166        (  0.262)       0.150        0.017
  124  10.33       0.50       0.166        (  0.261)       0.150        0.017
```

```
125  10.42     0.50      0.166       (  0.259)       0.150        0.017
126  10.50     0.50      0.166       (  0.258)       0.150        0.017
127  10.58     0.67      0.222       (  0.257)       0.199        0.022
128  10.67     0.67      0.222       (  0.256)       0.199        0.022
129  10.75     0.67      0.222       (  0.254)       0.199        0.022
130  10.83     0.67      0.222       (  0.253)       0.199        0.022
131  10.92     0.67      0.222       (  0.252)       0.199        0.022
132  11.00     0.67      0.222       (  0.251)       0.199        0.022
133  11.08     0.63      0.210       (  0.249)       0.189        0.021
134  11.17     0.63      0.210       (  0.248)       0.189        0.021
135  11.25     0.63      0.210       (  0.247)       0.189        0.021
136  11.33     0.63      0.210       (  0.246)       0.189        0.021
137  11.42     0.63      0.210       (  0.244)       0.189        0.021
138  11.50     0.63      0.210       (  0.243)       0.189        0.021
139  11.58     0.57      0.188       (  0.242)       0.169        0.019
140  11.67     0.57      0.188       (  0.241)       0.169        0.019
141  11.75     0.57      0.188       (  0.240)       0.169        0.019
142  11.83     0.60      0.199       (  0.238)       0.179        0.020
143  11.92     0.60      0.199       (  0.237)       0.179        0.020
144  12.00     0.60      0.199       (  0.236)       0.179        0.020
145  12.08     0.83      0.277          0.235    (  0.249)        0.042
146  12.17     0.83      0.277          0.234    (  0.249)        0.043
147  12.25     0.83      0.277          0.233    (  0.249)        0.044
148  12.33     0.87      0.288          0.231    (  0.259)        0.057
149  12.42     0.87      0.288          0.230    (  0.259)        0.058
150  12.50     0.87      0.288          0.229    (  0.259)        0.059
151  12.58     0.93      0.310          0.228    (  0.279)        0.082
152  12.67     0.93      0.310          0.227    (  0.279)        0.083
153  12.75     0.93      0.310          0.226    (  0.279)        0.085
154  12.83     0.97      0.321          0.224    (  0.289)        0.097
155  12.92     0.97      0.321          0.223    (  0.289)        0.098
156  13.00     0.97      0.321          0.222    (  0.289)        0.099
157  13.08     1.13      0.377          0.221    (  0.339)        0.156
158  13.17     1.13      0.377          0.220    (  0.339)        0.157
159  13.25     1.13      0.377          0.219    (  0.339)        0.158
160  13.33     1.13      0.377          0.218    (  0.339)        0.159
161  13.42     1.13      0.377          0.217    (  0.339)        0.160
162  13.50     1.13      0.377          0.216    (  0.339)        0.161
163  13.58     0.77      0.255          0.214    (  0.229)        0.040
164  13.67     0.77      0.255          0.213    (  0.229)        0.041
165  13.75     0.77      0.255          0.212    (  0.229)        0.043
166  13.83     0.77      0.255          0.211    (  0.229)        0.044
167  13.92     0.77      0.255          0.210    (  0.229)        0.045
168  14.00     0.77      0.255          0.209    (  0.229)        0.046
169  14.08     0.90      0.299          0.208    (  0.269)        0.091
170  14.17     0.90      0.299          0.207    (  0.269)        0.092
171  14.25     0.90      0.299          0.206    (  0.269)        0.093
172  14.33     0.87      0.288          0.205    (  0.259)        0.083
173  14.42     0.87      0.288          0.204    (  0.259)        0.084
174  14.50     0.87      0.288          0.203    (  0.259)        0.085
175  14.58     0.87      0.288          0.202    (  0.259)        0.086
176  14.67     0.87      0.288          0.201    (  0.259)        0.087
177  14.75     0.87      0.288          0.200    (  0.259)        0.088
178  14.83     0.83      0.277          0.199    (  0.249)        0.078
179  14.92     0.83      0.277          0.198    (  0.249)        0.079
180  15.00     0.83      0.277          0.197    (  0.249)        0.080
181  15.08     0.80      0.266          0.196    (  0.239)        0.070
```

```
182  15.17     0.80      0.266          0.195    (  0.239)        0.071
183  15.25     0.80      0.266          0.194    (  0.239)        0.072
184  15.33     0.77      0.255          0.193    (  0.229)        0.062
185  15.42     0.77      0.255          0.192    (  0.229)        0.063
186  15.50     0.77      0.255          0.191    (  0.229)        0.064
187  15.58     0.63      0.210       (  0.190)       0.189        0.021
188  15.67     0.63      0.210          0.189    (  0.189)        0.022
189  15.75     0.63      0.210          0.188    (  0.189)        0.023
190  15.83     0.63      0.210          0.187    (  0.189)        0.024
191  15.92     0.63      0.210          0.186    (  0.189)        0.025
192  16.00     0.63      0.210          0.185    (  0.189)        0.026
193  16.08     0.13      0.044       (  0.184)       0.040        0.004
194  16.17     0.13      0.044       (  0.183)       0.040        0.004
195  16.25     0.13      0.044       (  0.182)       0.040        0.004
196  16.33     0.13      0.044       (  0.181)       0.040        0.004
197  16.42     0.13      0.044       (  0.180)       0.040        0.004
198  16.50     0.13      0.044       (  0.179)       0.040        0.004
199  16.58     0.10      0.033       (  0.178)       0.030        0.003
200  16.67     0.10      0.033       (  0.177)       0.030        0.003
201  16.75     0.10      0.033       (  0.176)       0.030        0.003
202  16.83     0.10      0.033       (  0.176)       0.030        0.003
203  16.92     0.10      0.033       (  0.175)       0.030        0.003
204  17.00     0.10      0.033       (  0.174)       0.030        0.003
205  17.08     0.17      0.055       (  0.173)       0.050        0.006
206  17.17     0.17      0.055       (  0.172)       0.050        0.006
207  17.25     0.17      0.055       (  0.171)       0.050        0.006
208  17.33     0.17      0.055       (  0.170)       0.050        0.006
209  17.42     0.17      0.055       (  0.169)       0.050        0.006
210  17.50     0.17      0.055       (  0.169)       0.050        0.006
211  17.58     0.17      0.055       (  0.168)       0.050        0.006
212  17.67     0.17      0.055       (  0.167)       0.050        0.006
213  17.75     0.17      0.055       (  0.166)       0.050        0.006
214  17.83     0.13      0.044       (  0.165)       0.040        0.004
215  17.92     0.13      0.044       (  0.164)       0.040        0.004
216  18.00     0.13      0.044       (  0.164)       0.040        0.004
217  18.08     0.13      0.044       (  0.163)       0.040        0.004
218  18.17     0.13      0.044       (  0.162)       0.040        0.004
219  18.25     0.13      0.044       (  0.161)       0.040        0.004
220  18.33     0.13      0.044       (  0.160)       0.040        0.004
221  18.42     0.13      0.044       (  0.160)       0.040        0.004
222  18.50     0.13      0.044       (  0.159)       0.040        0.004
223  18.58     0.10      0.033       (  0.158)       0.030        0.003
224  18.67     0.10      0.033       (  0.157)       0.030        0.003
225  18.75     0.10      0.033       (  0.157)       0.030        0.003
226  18.83     0.07      0.022       (  0.156)       0.020        0.002
227  18.92     0.07      0.022       (  0.155)       0.020        0.002
228  19.00     0.07      0.022       (  0.154)       0.020        0.002
229  19.08     0.10      0.033       (  0.154)       0.030        0.003
230  19.17     0.10      0.033       (  0.153)       0.030        0.003
231  19.25     0.10      0.033       (  0.152)       0.030        0.003
232  19.33     0.13      0.044       (  0.152)       0.040        0.004
233  19.42     0.13      0.044       (  0.151)       0.040        0.004
234  19.50     0.13      0.044       (  0.150)       0.040        0.004
235  19.58     0.10      0.033       (  0.149)       0.030        0.003
236  19.67     0.10      0.033       (  0.149)       0.030        0.003
237  19.75     0.10      0.033       (  0.148)       0.030        0.003
238  19.83     0.07      0.022       (  0.147)       0.020        0.002
```

```
239  19.92     0.07      0.022       (  0.147)      0.020        0.002
240  20.00     0.07      0.022       (  0.146)      0.020        0.002
241  20.08     0.10      0.033       (  0.145)      0.030        0.003
242  20.17     0.10      0.033       (  0.145)      0.030        0.003
243  20.25     0.10      0.033       (  0.144)      0.030        0.003
244  20.33     0.10      0.033       (  0.144)      0.030        0.003
245  20.42     0.10      0.033       (  0.143)      0.030        0.003
246  20.50     0.10      0.033       (  0.142)      0.030        0.003
247  20.58     0.10      0.033       (  0.142)      0.030        0.003
248  20.67     0.10      0.033       (  0.141)      0.030        0.003
249  20.75     0.10      0.033       (  0.141)      0.030        0.003
250  20.83     0.07      0.022       (  0.140)      0.020        0.002
251  20.92     0.07      0.022       (  0.139)      0.020        0.002
252  21.00     0.07      0.022       (  0.139)      0.020        0.002
253  21.08     0.10      0.033       (  0.138)      0.030        0.003
254  21.17     0.10      0.033       (  0.138)      0.030        0.003
255  21.25     0.10      0.033       (  0.137)      0.030        0.003
256  21.33     0.07      0.022       (  0.137)      0.020        0.002
257  21.42     0.07      0.022       (  0.136)      0.020        0.002
258  21.50     0.07      0.022       (  0.136)      0.020        0.002
259  21.58     0.10      0.033       (  0.135)      0.030        0.003
260  21.67     0.10      0.033       (  0.135)      0.030        0.003
261  21.75     0.10      0.033       (  0.134)      0.030        0.003
262  21.83     0.07      0.022       (  0.134)      0.020        0.002
263  21.92     0.07      0.022       (  0.133)      0.020        0.002
264  22.00     0.07      0.022       (  0.133)      0.020        0.002
265  22.08     0.10      0.033       (  0.132)      0.030        0.003
266  22.17     0.10      0.033       (  0.132)      0.030        0.003
267  22.25     0.10      0.033       (  0.132)      0.030        0.003
268  22.33     0.07      0.022       (  0.131)      0.020        0.002
269  22.42     0.07      0.022       (  0.131)      0.020        0.002
270  22.50     0.07      0.022       (  0.130)      0.020        0.002
271  22.58     0.07      0.022       (  0.130)      0.020        0.002
272  22.67     0.07      0.022       (  0.130)      0.020        0.002
273  22.75     0.07      0.022       (  0.129)      0.020        0.002
274  22.83     0.07      0.022       (  0.129)      0.020        0.002
275  22.92     0.07      0.022       (  0.129)      0.020        0.002
276  23.00     0.07      0.022       (  0.128)      0.020        0.002
277  23.08     0.07      0.022       (  0.128)      0.020        0.002
278  23.17     0.07      0.022       (  0.128)      0.020        0.002
279  23.25     0.07      0.022       (  0.127)      0.020        0.002
280  23.33     0.07      0.022       (  0.127)      0.020        0.002
281  23.42     0.07      0.022       (  0.127)      0.020        0.002
282  23.50     0.07      0.022       (  0.127)      0.020        0.002
283  23.58     0.07      0.022       (  0.126)      0.020        0.002
284  23.67     0.07      0.022       (  0.126)      0.020        0.002
285  23.75     0.07      0.022       (  0.126)      0.020        0.002
286  23.83     0.07      0.022       (  0.126)      0.020        0.002
287  23.92     0.07      0.022       (  0.126)      0.020        0.002
288  24.00     0.07      0.022       (  0.126)      0.020        0.002
             (Loss Rate Not Used)
    Sum =     100.0                                Sum =     5.6
     Flood volume = Effective rainfall      0.47(In)
      times area      37.9(Ac.)/[(In)/(Ft.)] =       1.5(Ac.Ft)
     Total soil loss =      2.30(In)
     Total soil loss =     7.276(Ac.Ft)
     Total rainfall =      2.77(In)
```

```
    Flood volume =         64061.6 Cubic Feet
    Total soil loss =        316951.8 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =       6.137(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            24 - H O U R    S T O R M
                       R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
------------------------------------------------------------------------
  0+ 5       0.0003      0.05  Q         |         |         |         |
  0+10       0.0009      0.08  Q         |         |         |         |
  0+15       0.0015      0.08  Q         |         |         |         |
  0+20       0.0022      0.11  Q         |         |         |         |
  0+25       0.0031      0.12  Q         |         |         |         |
  0+30       0.0039      0.13  Q         |         |         |         |
  0+35       0.0048      0.13  Q         |         |         |         |
  0+40       0.0057      0.13  Q         |         |         |         |
  0+45       0.0066      0.13  Q         |         |         |         |
  0+50       0.0076      0.15  Q         |         |         |         |
  0+55       0.0087      0.17  Q         |         |         |         |
  1+ 0       0.0099      0.17  Q         |         |         |         |
  1+ 5       0.0109      0.15  Q         |         |         |         |
  1+10       0.0118      0.13  Q         |         |         |         |
  1+15       0.0127      0.13  Q         |         |         |         |
  1+20       0.0136      0.13  Q         |         |         |         |
  1+25       0.0144      0.13  Q         |         |         |         |
  1+30       0.0153      0.13  Q         |         |         |         |
  1+35       0.0162      0.13  Q         |         |         |         |
  1+40       0.0170      0.13  Q         |         |         |         |
  1+45       0.0179      0.13  Q         |         |         |         |
  1+50       0.0190      0.15  Q         |         |         |         |
  1+55       0.0201      0.17  Q         |         |         |         |
  2+ 0       0.0213      0.17  Q         |         |         |         |
  2+ 5       0.0224      0.17  Q         |         |         |         |
  2+10       0.0236      0.17  Q         |         |         |         |
  2+15       0.0248      0.17  Q         |         |         |         |
  2+20       0.0259      0.17  Q         |         |         |         |
  2+25       0.0271      0.17  Q         |         |         |         |
  2+30       0.0283      0.17  Q         |         |         |         |
  2+35       0.0296      0.19  Q         |         |         |         |
  2+40       0.0310      0.21  Q         |         |         |         |
  2+45       0.0325      0.21  Q         |         |         |         |
  2+50       0.0340      0.21  Q         |         |         |         |
  2+55       0.0354      0.21  Q         |         |         |         |
  3+ 0       0.0369      0.21  QV        |         |         |         |
  3+ 5       0.0383      0.21  QV        |         |         |         |
  3+10       0.0398      0.21  QV        |         |         |         |
  3+15       0.0412      0.21  QV        |         |         |         |
  3+20       0.0427      0.21  QV        |         |         |         |
  3+25       0.0442      0.21  QV        |         |         |         |
  3+30       0.0456      0.21  QV        |         |         |         |
  3+35       0.0471      0.21  QV        |         |         |         |
```

```
3+40       0.0485      0.21  QV         |         |         |         |
3+45       0.0500      0.21  QV         |         |         |         |
3+50       0.0516      0.24  QV         |         |         |         |
3+55       0.0533      0.25  |Q         |         |         |         |
4+ 0       0.0551      0.25  |Q         |         |         |         |
4+ 5       0.0568      0.25  |Q         |         |         |         |
4+10       0.0586      0.25  |Q         |         |         |         |
4+15       0.0603      0.25  |Q         |         |         |         |
4+20       0.0623      0.28  |Q         |         |         |         |
4+25       0.0643      0.29  |Q         |         |         |         |
4+30       0.0663      0.30  |Q         |         |         |         |
4+35       0.0684      0.30  |Q         |         |         |         |
4+40       0.0704      0.30  |Q         |         |         |         |
4+45       0.0724      0.30  |Q         |         |         |         |
4+50       0.0746      0.32  |QV        |         |         |         |
4+55       0.0770      0.34  |QV        |         |         |         |
5+ 0       0.0793      0.34  |QV        |         |         |         |
5+ 5       0.0813      0.29  |QV        |         |         |         |
5+10       0.0831      0.26  |QV        |         |         |         |
5+15       0.0848      0.25  |QV        |         |         |         |
5+20       0.0867      0.28  |QV        |         |         |         |
5+25       0.0888      0.29  |QV        |         |         |         |
5+30       0.0908      0.30  |QV        |         |         |         |
5+35       0.0930      0.32  |QV        |         |         |         |
5+40       0.0953      0.34  |QV        |         |         |         |
5+45       0.0977      0.34  |QV        |         |         |         |
5+50       0.1000      0.34  |QV        |         |         |         |
5+55       0.1023      0.34  |QV        |         |         |         |
6+ 0       0.1047      0.34  |QV        |         |         |         |
6+ 5       0.1071      0.36  |QV        |         |         |         |
6+10       0.1098      0.38  |QV        |         |         |         |
6+15       0.1124      0.38  |Q V       |         |         |         |
6+20       0.1150      0.38  |Q V       |         |         |         |
6+25       0.1176      0.38  |Q V       |         |         |         |
6+30       0.1202      0.38  |Q V       |         |         |         |
6+35       0.1230      0.40  |Q V       |         |         |         |
6+40       0.1259      0.42  |Q V       |         |         |         |
6+45       0.1288      0.42  |Q V       |         |         |         |
6+50       0.1318      0.42  |Q V       |         |         |         |
6+55       0.1347      0.42  |Q V       |         |         |         |
7+ 0       0.1376      0.42  |Q V       |         |         |         |
7+ 5       0.1405      0.42  |Q V       |         |         |         |
7+10       0.1434      0.42  |Q V       |         |         |         |
7+15       0.1463      0.42  |Q V       |         |         |         |
7+20       0.1494      0.45  |Q  V      |         |         |         |
7+25       0.1526      0.46  |Q  V      |         |         |         |
7+30       0.1558      0.47  |Q  V      |         |         |         |
7+35       0.1592      0.49  |Q  V      |         |         |         |
7+40       0.1627      0.51  | Q V      |         |         |         |
7+45       0.1662      0.51  | Q V      |         |         |         |
7+50       0.1698      0.53  | Q V      |         |         |         |
7+55       0.1736      0.55  | Q V      |         |         |         |
8+ 0       0.1774      0.55  | Q V      |         |         |         |
8+ 5       0.1815      0.60  | Q V      |         |         |         |
8+10       0.1858      0.63  | Q  V     |         |         |         |
8+15       0.1902      0.64  | Q  V     |         |         |         |
8+20       0.1946      0.64  | Q  V     |         |         |         |
```

```
 8+25       0.1990      0.64  | Q  V    |         |         |         |
 8+30       0.2033      0.64  | Q  V    |         |         |         |
 8+35       0.2079      0.66  | Q  V    |         |         |         |
 8+40       0.2125      0.67  | Q  V    |         |         |         |
 8+45       0.2172      0.68  | Q  V    |         |         |         |
 8+50       0.2220      0.70  | Q   V   |         |         |         |
 8+55       0.2269      0.72  | Q   V   |         |         |         |
 9+ 0       0.2319      0.72  | Q   V   |         |         |         |
 9+ 5       0.2372      0.77  |  Q  V   |         |         |         |
 9+10       0.2427      0.80  |  Q  V   |         |         |         |
 9+15       0.2482      0.80  |  Q  V   |         |         |         |
 9+20       0.2539      0.83  |  Q  V   |         |         |         |
 9+25       0.2597      0.84  |  Q   V  |         |         |         |
 9+30       0.2656      0.85  |  Q   V  |         |         |         |
 9+35       0.2716      0.87  |  Q   V  |         |         |         |
 9+40       0.2777      0.89  |  Q   V  |         |         |         |
 9+45       0.2838      0.89  |  Q   V  |         |         |         |
 9+50       0.2901      0.91  |  Q   V  |         |         |         |
 9+55       0.2965      0.93  |  Q    V |         |         |         |
10+ 0       0.3029      0.93  |  Q    V |         |         |         |
10+ 5       0.3082      0.77  |  Q    V |         |         |         |
10+10       0.3127      0.65  | Q     V |         |         |         |
10+15       0.3170      0.64  | Q     V |         |         |         |
10+20       0.3214      0.64  | Q     V |         |         |         |
10+25       0.3258      0.64  | Q     V |         |         |         |
10+30       0.3302      0.64  | Q     V |         |         |         |
10+35       0.3353      0.75  |  Q     V|         |         |         |
10+40       0.3411      0.83  |  Q     V|         |         |         |
10+45       0.3469      0.85  |  Q     V|         |         |         |
10+50       0.3527      0.85  |  Q     V|         |         |         |
10+55       0.3586      0.85  |  Q     V|         |         |         |
11+ 0       0.3644      0.85  |  Q     V|         |         |         |
11+ 5       0.3701      0.82  |  Q      V         |         |         |
11+10       0.3756      0.81  |  Q      V         |         |         |
11+15       0.3812      0.80  |  Q      V         |         |         |
11+20       0.3867      0.80  |  Q      V         |         |         |
11+25       0.3923      0.80  |  Q      V         |         |         |
11+30       0.3978      0.80  |  Q      V         |         |         |
11+35       0.4030      0.76  |  Q      V         |         |         |
11+40       0.4080      0.73  | Q       |V        |         |         |
11+45       0.4130      0.72  | Q       |V        |         |         |
11+50       0.4181      0.74  | Q       |V        |         |         |
11+55       0.4233      0.76  |  Q      |V        |         |         |
12+ 0       0.4286      0.76  |  Q      |V        |         |         |
12+ 5       0.4371      1.23  |   Q     |V        |         |         |
12+10       0.4479      1.58  |     Q   | V       |         |         |
12+15       0.4595      1.67  |     Q   | V       |         |         |
12+20       0.4729      1.96  |      Q  | V       |         |         |
12+25       0.4878      2.16  |       Q |  V      |         |         |
12+30       0.5032      2.23  |       Q |  V      |         |         |
12+35       0.5221      2.75  |         Q   V     |         |         |
12+40       0.5435      3.11  |         | Q V     |         |         |
12+45       0.5656      3.21  |         | Q  V    |         |         |
12+50       0.5897      3.49  |         |  Q  V   |         |         |
12+55       0.6151      3.69  |         |   Q V   |         |         |
13+ 0       0.6410      3.76  |         |    Q V  |         |         |
13+ 5       0.6754      4.99  |         |       VQ|         |         |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
13+10       0.7155      5.83  |         |        V|  Q      |         |
13+15       0.7569      6.01  |         |         V   Q     |         |
13+20       0.7986      6.05  |         |         |V  Q     |         |
13+25       0.8406      6.09  |         |         | V Q     |         |
13+30       0.8828      6.14  |         |         |   Q     |         |
13+35       0.9075      3.58  |         |   Q     |   V     |         |
13+40       0.9204      1.87  |      Q  |         |    V    |         |
13+45       0.9314      1.61  |     Q   |         |    V    |         |
13+50       0.9428      1.65  |     Q   |         |    V    |         |
13+55       0.9544      1.69  |     Q   |         |    V    |         |
14+ 0       0.9663      1.73  |     Q   |         |     V   |         |
14+ 5       0.9850      2.72  |         Q         |     V   |         |
14+10       1.0084      3.39  |         |  Q      |      V  |         |
14+15       1.0328      3.54  |         |   Q     |       V |         |
14+20       1.0558      3.35  |         |  Q      |       V |         |
14+25       1.0781      3.23  |         | Q       |        V|         |
14+30       1.1004      3.24  |         | Q       |        V|         |
14+35       1.1230      3.28  |         |  Q      |         V         |
14+40       1.1459      3.32  |         |  Q      |         |V        |
14+45       1.1690      3.36  |         |  Q      |         |V        |
14+50       1.1908      3.16  |         | Q       |         | V       |
14+55       1.2118      3.04  |         | Q       |         | V       |
15+ 0       1.2328      3.05  |         | Q       |         |  V      |
15+ 5       1.2525      2.86  |         |Q        |         |   V     |
15+10       1.2713      2.74  |         Q         |         |   V     |
15+15       1.2902      2.75  |         Q         |         |    V    |
15+20       1.3078      2.55  |         Q         |         |    V    |
15+25       1.3245      2.43  |        Q|         |         |     V   |
15+30       1.3413      2.44  |        Q|         |         |     V   |
15+35       1.3518      1.53  |     Q   |         |         |     V   |
15+40       1.3582      0.93  |  Q      |         |         |     V   |
15+45       1.3641      0.85  |  Q      |         |         |      V  |
15+50       1.3702      0.89  |  Q      |         |         |      V  |
15+55       1.3766      0.93  |  Q      |         |         |      V  |
16+ 0       1.3833      0.96  |  Q      |         |         |      V  |
16+ 5       1.3869      0.53  | Q       |         |         |      V  |
16+10       1.3884      0.22  Q         |         |         |      V  |
16+15       1.3896      0.17  Q         |         |         |      V  |
16+20       1.3908      0.17  Q         |         |         |      V  |
16+25       1.3919      0.17  Q         |         |         |      V  |
16+30       1.3931      0.17  Q         |         |         |      V  |
16+35       1.3941      0.15  Q         |         |         |      V  |
16+40       1.3950      0.13  Q         |         |         |      V  |
16+45       1.3959      0.13  Q         |         |         |      V  |
16+50       1.3967      0.13  Q         |         |         |      V  |
16+55       1.3976      0.13  Q         |         |         |       V |
17+ 0       1.3985      0.13  Q         |         |         |       V |
17+ 5       1.3997      0.17  Q         |         |         |       V |
17+10       1.4011      0.21  Q         |         |         |       V |
17+15       1.4026      0.21  Q         |         |         |       V |
17+20       1.4040      0.21  Q         |         |         |       V |
17+25       1.4055      0.21  Q         |         |         |       V |
17+30       1.4069      0.21  Q         |         |         |       V |
17+35       1.4084      0.21  Q         |         |         |       V |
17+40       1.4099      0.21  Q         |         |         |       V |
17+45       1.4113      0.21  Q         |         |         |       V |
17+50       1.4126      0.19  Q         |         |         |       V |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17+55       1.4138      0.17  Q         |         |         |       V |
18+ 0       1.4150      0.17  Q         |         |         |       V |
18+ 5       1.4161      0.17  Q         |         |         |       V |
18+10       1.4173      0.17  Q         |         |         |       V |
18+15       1.4185      0.17  Q         |         |         |       V |
18+20       1.4196      0.17  Q         |         |         |       V |
18+25       1.4208      0.17  Q         |         |         |       V |
18+30       1.4220      0.17  Q         |         |         |       V |
18+35       1.4230      0.15  Q         |         |         |       V |
18+40       1.4238      0.13  Q         |         |         |       V |
18+45       1.4247      0.13  Q         |         |         |       V |
18+50       1.4254      0.10  Q         |         |         |       V |
18+55       1.4260      0.09  Q         |         |         |       V |
19+ 0       1.4266      0.08  Q         |         |         |       V |
19+ 5       1.4274      0.11  Q         |         |         |       V |
19+10       1.4282      0.12  Q         |         |         |       V |
19+15       1.4291      0.13  Q         |         |         |       V |
19+20       1.4301      0.15  Q         |         |         |       V |
19+25       1.4313      0.17  Q         |         |         |       V |
19+30       1.4324      0.17  Q         |         |         |       V |
19+35       1.4335      0.15  Q         |         |         |       V |
19+40       1.4343      0.13  Q         |         |         |        V|
19+45       1.4352      0.13  Q         |         |         |        V|
19+50       1.4359      0.10  Q         |         |         |        V|
19+55       1.4365      0.09  Q         |         |         |        V|
20+ 0       1.4371      0.08  Q         |         |         |        V|
20+ 5       1.4379      0.11  Q         |         |         |        V|
20+10       1.4387      0.12  Q         |         |         |        V|
20+15       1.4396      0.13  Q         |         |         |        V|
20+20       1.4405      0.13  Q         |         |         |        V|
20+25       1.4413      0.13  Q         |         |         |        V|
20+30       1.4422      0.13  Q         |         |         |        V|
20+35       1.4431      0.13  Q         |         |         |        V|
20+40       1.4440      0.13  Q         |         |         |        V|
20+45       1.4448      0.13  Q         |         |         |        V|
20+50       1.4456      0.10  Q         |         |         |        V|
20+55       1.4462      0.09  Q         |         |         |        V|
21+ 0       1.4467      0.08  Q         |         |         |        V|
21+ 5       1.4475      0.11  Q         |         |         |        V|
21+10       1.4483      0.12  Q         |         |         |        V|
21+15       1.4492      0.13  Q         |         |         |        V|
21+20       1.4499      0.10  Q         |         |         |        V|
21+25       1.4505      0.09  Q         |         |         |        V|
21+30       1.4511      0.08  Q         |         |         |        V|
21+35       1.4519      0.11  Q         |         |         |        V|
21+40       1.4527      0.12  Q         |         |         |        V|
21+45       1.4536      0.13  Q         |         |         |        V|
21+50       1.4543      0.10  Q         |         |         |        V|
21+55       1.4549      0.09  Q         |         |         |        V|
22+ 0       1.4555      0.08  Q         |         |         |        V|
22+ 5       1.4562      0.11  Q         |         |         |        V|
22+10       1.4571      0.12  Q         |         |         |        V|
22+15       1.4580      0.13  Q         |         |         |        V|
22+20       1.4587      0.10  Q         |         |         |        V|
22+25       1.4593      0.09  Q         |         |         |        V|
22+30       1.4599      0.08  Q         |         |         |        V|
22+35       1.4604      0.08  Q         |         |         |        V|
```

```
   22+40        1.4610       0.08  Q         |         |         |       V|
   22+45        1.4616       0.08  Q         |         |         |       V|
   22+50        1.4622       0.08  Q         |         |         |       V|
   22+55        1.4628       0.08  Q         |         |         |       V|
   23+ 0        1.4634       0.08  Q         |         |         |       V|
   23+ 5        1.4639       0.08  Q         |         |         |       V|
   23+10        1.4645       0.08  Q         |         |         |       V|
   23+15        1.4651       0.08  Q         |         |         |       V|
   23+20        1.4657       0.08  Q         |         |         |       V|
   23+25        1.4663       0.08  Q         |         |         |       V|
   23+30        1.4669       0.08  Q         |         |         |       V|
   23+35        1.4674       0.08  Q         |         |         |       V|
   23+40        1.4680       0.08  Q         |         |         |       V|
   23+45        1.4686       0.08  Q         |         |         |       V|
   23+50        1.4692       0.08  Q         |         |         |       V|
   23+55        1.4698       0.08  Q         |         |         |       V|
   24+ 0        1.4704       0.08  Q         |         |         |       V|
   24+ 5        1.4706       0.04  Q         |         |         |       V|
   24+10        1.4707       0.01  Q         |         |         |       V|
----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop12.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 2 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        0.00              0.48                  0.00
       31.30              0.48                 15.02

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
```

```
          31.30              1.18                   36.93

   STORM EVENT (YEAR) =    2.00
   Area Averaged 2-Year Rainfall =    0.480(In)
   Area Averaged 100-Year Rainfall =    1.180(In)

   Point rain (area averaged) =    0.480(In)
   Areal adjustment factor =   99.97 %
   Adjusted average point rain =    0.480(In)

   Sub-Area Data:
   Area(Ac.)         Runoff Index   Impervious %
        4.900           69.00         0.500
       26.400           56.00         0.500
    Total Area Entered =     31.30(Ac.)


   RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
   AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
   69.0  69.0      0.373     0.500        0.205       0.157      0.032
   56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                     Sum (F) =   0.269
   Area averaged mean soil loss (F) (In/Hr) =  0.269
   Minimum soil loss rate ((In/Hr)) =  0.135
   (for 24 hour storm duration)
   Soil low loss rate (decimal) =   0.500
   ---------------------------------------------------------------------
   Slope of intensity-duration curve for a 1 hour storm =0.5000
   ----------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                     VALLEY S-Curve
   --------------------------------------------------------------------
               Unit Hydrograph Data
   ---------------------------------------------------------------------
   Unit time period   Time % of lag   Distribution   Unit Hydrograph
       (hrs)                           Graph %          (CFS)
   ---------------------------------------------------------------------
       1   0.083         99.785        19.134             6.036
       2   0.167        199.570        48.386            15.263
       3   0.250        299.355        15.668             4.942
       4   0.333        399.141         7.074             2.231
       5   0.417        498.926         3.984             1.257
       6   0.500        598.711         2.581             0.814
       7   0.583        698.496         1.607             0.507
       8   0.667        798.281         1.051             0.331
       9   0.750        898.066         0.516             0.163
                                 Sum = 100.000   Sum=      31.545
---------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern    Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent    (In/Hr)          Max   |   Low         (In/Hr)
   1   0.08     4.20       0.242        (  0.269)       0.121        0.121
```

```
 2   0.17     4.30      0.248       (  0.269)       0.124        0.124
 3   0.25     5.00      0.288       (  0.269)       0.144        0.144
 4   0.33     5.00      0.288       (  0.269)       0.144        0.144
 5   0.42     5.80      0.334       (  0.269)       0.167        0.167
 6   0.50     6.50      0.374       (  0.269)       0.187        0.187
 7   0.58     7.40      0.426       (  0.269)       0.213        0.213
 8   0.67     8.60      0.495       (  0.269)       0.248        0.248
 9   0.75    12.30      0.708          0.269    (  0.354)        0.439
10   0.83    29.10      1.676          0.269    (  0.838)        1.407
11   0.92     6.80      0.392       (  0.269)       0.196        0.196
12   1.00     5.00      0.288       (  0.269)       0.144        0.144
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =     3.5
    Flood volume = Effective rainfall      0.29(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       0.8(Ac.Ft)
    Total soil loss =      0.19(In)
    Total soil loss =     0.484(Ac.Ft)
    Total rainfall =      0.48(In)
    Flood volume =       33451.8 Cubic Feet
    Total soil loss =       21069.9 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     25.964(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        1 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0050      0.73  Q         |         |         |         |
  0+10       0.0229      2.59  |V Q      |         |         |         |
  0+15       0.0460      3.36  | V Q     |         |         |         |
  0+20       0.0732      3.95  |  V Q    |         |         |         |
  0+25       0.1032      4.35  |    Q    |         |         |         |
  0+30       0.1374      4.97  |     QV  |         |         |         |
  0+35       0.1762      5.63  |      Q V|         |         |         |
  0+40       0.2206      6.45  |       Q |V        |         |         |
  0+45       0.2782      8.37  |         |Q  V     |         |         |
  0+50       0.3981     17.41  |         |         V  Q      |         |
  0+55       0.5770     25.96  |         |         |         V   Q     |
  1+ 0       0.6627     12.45  |         |     Q   |         |   V     |
  1+ 5       0.7127      7.26  |        Q|         |         |      V  |
  1+10       0.7368      3.50  |   Q     |         |         |       V |
  1+15       0.7510      2.05  | Q       |         |         |        V|
  1+20       0.7595      1.24  |Q        |         |         |        V|
  1+25       0.7647      0.75  |Q        |         |         |        V|
  1+30       0.7672      0.37  Q         |         |         |        V|
  1+35       0.7678      0.08  Q         |         |         |        V|
  1+40       0.7679      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop32.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 2 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  = 0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              0.79                   24.73

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.85                   57.91
```

```
STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    0.790(In)
Area Averaged 100-Year Rainfall =    1.850(In)

Point rain (area averaged) =    0.790(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    0.790(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     4.900           69.00          0.500
    26.400           56.00          0.500
 Total Area Entered =     31.30(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  69.0      0.373     0.500        0.205       0.157      0.032
56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                    Sum (F) =   0.269
Area averaged mean soil loss (F) (In/Hr) =  0.269
Minimum soil loss rate ((In/Hr)) =  0.135
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
---------------------------------------------------------------------

            U n i t  H y d r o g r a p h
                  VALLEY S-Curve
--------------------------------------------------------------------
            Unit Hydrograph Data
---------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %           (CFS)
---------------------------------------------------------------------
    1   0.083         99.785         19.134             6.036
    2   0.167        199.570         48.386            15.263
    3   0.250        299.355         15.668             4.942
    4   0.333        399.141          7.074             2.231
    5   0.417        498.926          3.984             1.257
    6   0.500        598.711          2.581             0.814
    7   0.583        698.496          1.607             0.507
    8   0.667        798.281          1.051             0.331
    9   0.750        898.066          0.516             0.163
                              Sum = 100.000   Sum=      31.545
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)         Max    |   Low         (In/Hr)
   1   0.08      1.30     0.123       (  0.269)       0.062        0.062
   2   0.17      1.30     0.123       (  0.269)       0.062        0.062
   3   0.25      1.10     0.104       (  0.269)       0.052        0.052
   4   0.33      1.50     0.142       (  0.269)       0.071        0.071
```

```
 5   0.42     1.50      0.142       (  0.269)      0.071        0.071
 6   0.50     1.80      0.171       (  0.269)      0.085        0.085
 7   0.58     1.50      0.142       (  0.269)      0.071        0.071
 8   0.67     1.80      0.171       (  0.269)      0.085        0.085
 9   0.75     1.80      0.171       (  0.269)      0.085        0.085
10   0.83     1.50      0.142       (  0.269)      0.071        0.071
11   0.92     1.60      0.152       (  0.269)      0.076        0.076
12   1.00     1.80      0.171       (  0.269)      0.085        0.085
13   1.08     2.20      0.209       (  0.269)      0.104        0.104
14   1.17     2.20      0.209       (  0.269)      0.104        0.104
15   1.25     2.20      0.209       (  0.269)      0.104        0.104
16   1.33     2.00      0.190       (  0.269)      0.095        0.095
17   1.42     2.60      0.246       (  0.269)      0.123        0.123
18   1.50     2.70      0.256       (  0.269)      0.128        0.128
19   1.58     2.40      0.227       (  0.269)      0.114        0.114
20   1.67     2.70      0.256       (  0.269)      0.128        0.128
21   1.75     3.30      0.313       (  0.269)      0.156        0.156
22   1.83     3.10      0.294       (  0.269)      0.147        0.147
23   1.92     2.90      0.275       (  0.269)      0.137        0.137
24   2.00     3.00      0.284       (  0.269)      0.142        0.142
25   2.08     3.10      0.294       (  0.269)      0.147        0.147
26   2.17     4.20      0.398       (  0.269)      0.199        0.199
27   2.25     5.00      0.474       (  0.269)      0.237        0.237
28   2.33     3.50      0.332       (  0.269)      0.166        0.166
29   2.42     6.80      0.645          0.269     (  0.322)      0.375
30   2.50     7.30      0.692          0.269     (  0.346)      0.423
31   2.58     8.20      0.777          0.269     (  0.389)      0.508
32   2.67     5.90      0.559          0.269     (  0.280)      0.290
33   2.75     2.00      0.190       (  0.269)      0.095        0.095
34   2.83     1.80      0.171       (  0.269)      0.085        0.085
35   2.92     1.80      0.171       (  0.269)      0.085        0.085
36   3.00     0.60      0.057       (  0.269)      0.028        0.028
           (Loss Rate Not Used)
   Sum =     100.0                                     Sum =     5.0
    Flood volume = Effective rainfall      0.42(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
    Total soil loss =      0.37(In)
    Total soil loss =     0.974(Ac.Ft)
    Total rainfall =      0.79(In)
    Flood volume =       47337.6 Cubic Feet
    Total soil loss =       42409.1 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     13.017(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        3 - H O U R   S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0026      0.37  Q         |         |         |         |
  0+10       0.0116      1.31  V Q       |         |         |         |
  0+15       0.0224      1.56  V  Q      |         |         |         |
  0+20       0.0338      1.67  |V Q      |         |         |         |
```

```
    0+25       0.0475       1.99 |V Q      |         |         |         |
    0+30       0.0627       2.20 | V Q     |         |         |         |
    0+35       0.0791       2.39 | V Q     |         |         |         |
    0+40       0.0954       2.36 |  VQ     |         |         |         |
    0+45       0.1131       2.56 |   VQ    |         |         |         |
    0+50       0.1306       2.54 |   VQ    |         |         |         |
    0+55       0.1470       2.38 |   QV    |         |         |         |
    1+ 0       0.1639       2.46 |   Q V   |         |         |         |
    1+ 5       0.1826       2.72 |    QV   |         |         |         |
    1+10       0.2036       3.05 |     QV  |         |         |         |
    1+15       0.2254       3.16 |     Q V |         |         |         |
    1+20       0.2472       3.16 |     Q  V|         |         |         |
    1+25       0.2694       3.22 |     Q  V|         |         |         |
    1+30       0.2945       3.65 |      Q  V         |         |         |
    1+35       0.3205       3.77 |      Q  |V        |         |         |
    1+40       0.3461       3.72 |      Q  | V       |         |         |
    1+45       0.3742       4.08 |       Q |  V      |         |         |
    1+50       0.4054       4.52 |        Q|   V     |         |         |
    1+55       0.4363       4.49 |       Q |     V   |         |         |
    2+ 0       0.4667       4.41 |       Q |      V  |         |         |
    2+ 5       0.4976       4.49 |       Q |       V |         |         |
    2+10       0.5313       4.89 |        Q|        V|         |         |
    2+15       0.5722       5.95 |         |Q        |V        |         |
    2+20       0.6161       6.37 |         | Q       | V       |         |
    2+25       0.6634       6.86 |         |  Q      |   V     |         |
    2+30       0.7333      10.15 |         |         Q     V   |         |
    2+35       0.8184      12.36 |         |         |   Q     V         |
    2+40       0.9080      13.02 |         |         |     Q   |  V      |
    2+45       0.9719       9.28 |         |       Q |         |    V    |
    2+50       1.0102       5.56 |         |Q        |         |      V  |
    2+55       1.0392       4.20 |       Q |         |         |       V |
    3+ 0       1.0616       3.25 |     Q   |         |         |        V|
    3+ 5       1.0744       1.86 |  Q      |         |         |        V|
    3+10       1.0806       0.90 |Q        |         |         |        V|
    3+15       1.0838       0.47 Q         |         |         |        V|
    3+20       1.0854       0.23 Q         |         |         |        V|
    3+25       1.0861       0.11 Q         |         |         |        V|
    3+30       1.0865       0.06 Q         |         |         |        V|
    3+35       1.0867       0.02 Q         |         |         |        V|
    3+40       1.0867       0.00 Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop62.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 2 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =31.30(Ac.)  = 0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.10                  34.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              2.50                  78.25
```

```
      STORM EVENT (YEAR) =    2.00
      Area Averaged 2-Year Rainfall =    1.100(In)
      Area Averaged 100-Year Rainfall =    2.500(In)

      Point rain (area averaged) =    1.100(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.100(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00         0.500
          26.400           56.00         0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134              6.036
          2   0.167        199.570         48.386             15.263
          3   0.250        299.355         15.668              4.942
          4   0.333        399.141          7.074              2.231
          5   0.417        498.926          3.984              1.257
          6   0.500        598.711          2.581              0.814
          7   0.583        698.496          1.607              0.507
          8   0.667        798.281          1.051              0.331
          9   0.750        898.066          0.516              0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max    |   Low          (In/Hr)
   1   0.08     0.50     0.066       (  0.269)      0.033        0.033
   2   0.17     0.60     0.079       (  0.269)      0.040        0.040
   3   0.25     0.60     0.079       (  0.269)      0.040        0.040
   4   0.33     0.60     0.079       (  0.269)      0.040        0.040
```

```
  5   0.42      0.60      0.079       (  0.269)      0.040      0.040
  6   0.50      0.70      0.092       (  0.269)      0.046      0.046
  7   0.58      0.70      0.092       (  0.269)      0.046      0.046
  8   0.67      0.70      0.092       (  0.269)      0.046      0.046
  9   0.75      0.70      0.092       (  0.269)      0.046      0.046
 10   0.83      0.70      0.092       (  0.269)      0.046      0.046
 11   0.92      0.70      0.092       (  0.269)      0.046      0.046
 12   1.00      0.80      0.106       (  0.269)      0.053      0.053
 13   1.08      0.80      0.106       (  0.269)      0.053      0.053
 14   1.17      0.80      0.106       (  0.269)      0.053      0.053
 15   1.25      0.80      0.106       (  0.269)      0.053      0.053
 16   1.33      0.80      0.106       (  0.269)      0.053      0.053
 17   1.42      0.80      0.106       (  0.269)      0.053      0.053
 18   1.50      0.80      0.106       (  0.269)      0.053      0.053
 19   1.58      0.80      0.106       (  0.269)      0.053      0.053
 20   1.67      0.80      0.106       (  0.269)      0.053      0.053
 21   1.75      0.80      0.106       (  0.269)      0.053      0.053
 22   1.83      0.80      0.106       (  0.269)      0.053      0.053
 23   1.92      0.80      0.106       (  0.269)      0.053      0.053
 24   2.00      0.90      0.119       (  0.269)      0.059      0.059
 25   2.08      0.80      0.106       (  0.269)      0.053      0.053
 26   2.17      0.90      0.119       (  0.269)      0.059      0.059
 27   2.25      0.90      0.119       (  0.269)      0.059      0.059
 28   2.33      0.90      0.119       (  0.269)      0.059      0.059
 29   2.42      0.90      0.119       (  0.269)      0.059      0.059
 30   2.50      0.90      0.119       (  0.269)      0.059      0.059
 31   2.58      0.90      0.119       (  0.269)      0.059      0.059
 32   2.67      0.90      0.119       (  0.269)      0.059      0.059
 33   2.75      1.00      0.132       (  0.269)      0.066      0.066
 34   2.83      1.00      0.132       (  0.269)      0.066      0.066
 35   2.92      1.00      0.132       (  0.269)      0.066      0.066
 36   3.00      1.00      0.132       (  0.269)      0.066      0.066
 37   3.08      1.00      0.132       (  0.269)      0.066      0.066
 38   3.17      1.10      0.145       (  0.269)      0.073      0.073
 39   3.25      1.10      0.145       (  0.269)      0.073      0.073
 40   3.33      1.10      0.145       (  0.269)      0.073      0.073
 41   3.42      1.20      0.158       (  0.269)      0.079      0.079
 42   3.50      1.30      0.172       (  0.269)      0.086      0.086
 43   3.58      1.40      0.185       (  0.269)      0.092      0.092
 44   3.67      1.40      0.185       (  0.269)      0.092      0.092
 45   3.75      1.50      0.198       (  0.269)      0.099      0.099
 46   3.83      1.50      0.198       (  0.269)      0.099      0.099
 47   3.92      1.60      0.211       (  0.269)      0.106      0.106
 48   4.00      1.60      0.211       (  0.269)      0.106      0.106
 49   4.08      1.70      0.224       (  0.269)      0.112      0.112
 50   4.17      1.80      0.238       (  0.269)      0.119      0.119
 51   4.25      1.90      0.251       (  0.269)      0.125      0.125
 52   4.33      2.00      0.264       (  0.269)      0.132      0.132
 53   4.42      2.10      0.277       (  0.269)      0.139      0.139
 54   4.50      2.10      0.277       (  0.269)      0.139      0.139
 55   4.58      2.20      0.290       (  0.269)      0.145      0.145
 56   4.67      2.30      0.304       (  0.269)      0.152      0.152
 57   4.75      2.40      0.317       (  0.269)      0.158      0.158
 58   4.83      2.40      0.317       (  0.269)      0.158      0.158
 59   4.92      2.50      0.330       (  0.269)      0.165      0.165
 60   5.00      2.60      0.343       (  0.269)      0.172      0.172
 61   5.08      3.10      0.409       (  0.269)      0.205      0.205
```

```
62   5.17     3.60      0.475       (  0.269)      0.238        0.238
63   5.25     3.90      0.515       (  0.269)      0.257        0.257
64   5.33     4.20      0.554          0.269    (  0.277)       0.285
65   5.42     4.70      0.620          0.269    (  0.310)       0.351
66   5.50     5.60      0.739          0.269    (  0.370)       0.470
67   5.58     1.90      0.251       (  0.269)      0.125        0.125
68   5.67     0.90      0.119       (  0.269)      0.059        0.059
69   5.75     0.60      0.079       (  0.269)      0.040        0.040
70   5.83     0.50      0.066       (  0.269)      0.033        0.033
71   5.92     0.30      0.040       (  0.269)      0.020        0.020
72   6.00     0.20      0.026       (  0.269)      0.013        0.013
           (Loss Rate Not Used)
   Sum =     100.0                                      Sum =     6.7
    Flood volume = Effective rainfall      0.56(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       1.5(Ac.Ft)
    Total soil loss =      0.54(In)
    Total soil loss =     1.402(Ac.Ft)
    Total rainfall =      1.10(In)
    Flood volume =       63901.3 Cubic Feet
    Total soil loss =       61066.1 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     11.014(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0014      0.20  Q          |         |         |         |
  0+10       0.0065      0.74  VQ         |         |         |         |
  0+15       0.0134      1.01  V Q        |         |         |         |
  0+20       0.0211      1.11  V Q        |         |         |         |
  0+25       0.0291      1.17  V Q        |         |         |         |
  0+30       0.0377      1.24  |VQ        |         |         |         |
  0+35       0.0471      1.37  |VQ        |         |         |         |
  0+40       0.0569      1.41  |VQ        |         |         |         |
  0+45       0.0668      1.44  |VQ        |         |         |         |
  0+50       0.0767      1.45  | Q        |         |         |         |
  0+55       0.0867      1.45  | Q        |         |         |         |
  1+ 0       0.0970      1.49  | Q        |         |         |         |
  1+ 5       0.1080      1.60  | VQ       |         |         |         |
  1+10       0.1193      1.63  |  Q       |         |         |         |
  1+15       0.1306      1.65  |  Q       |         |         |         |
  1+20       0.1420      1.65  |  Q       |         |         |         |
  1+25       0.1534      1.66  |  QV      |         |         |         |
  1+30       0.1649      1.66  |  QV      |         |         |         |
  1+35       0.1763      1.67  |  QV      |         |         |         |
  1+40       0.1878      1.67  |  Q V     |         |         |         |
  1+45       0.1993      1.67  |  Q V     |         |         |         |
  1+50       0.2108      1.67  |  Q V     |         |         |         |
  1+55       0.2222      1.67  |  Q  V    |         |         |         |
  2+ 0       0.2340      1.71  |  Q  V    |         |         |         |
  2+ 5       0.2462      1.77  |  Q  V    |         |         |         |
```

```
    2+10       0.2581      1.74  |  Q   V  |         |         |         |
    2+15       0.2707      1.82  |  Q   V  |         |         |         |
    2+20       0.2834      1.85  |  Q   V  |         |         |         |
    2+25       0.2962      1.86  |  Q    V |         |         |         |
    2+30       0.3091      1.87  |  Q    V |         |         |         |
    2+35       0.3219      1.87  |  Q    V |         |         |         |
    2+40       0.3348      1.87  |  Q     V|         |         |         |
    2+45       0.3480      1.91  |  Q     V|         |         |         |
    2+50       0.3619      2.02  |   Q    V|         |         |         |
    2+55       0.3760      2.05  |   Q     V         |         |         |
    3+ 0       0.3902      2.06  |   Q     V         |         |         |
    3+ 5       0.4045      2.07  |   Q     |V        |         |         |
    3+10       0.4190      2.12  |   Q     |V        |         |         |
    3+15       0.4343      2.22  |   Q     |V        |         |         |
    3+20       0.4498      2.25  |   Q     | V       |         |         |
    3+25       0.4658      2.31  |   Q     | V       |         |         |
    3+30       0.4827      2.46  |   Q     |  V      |         |         |
    3+35       0.5009      2.64  |    Q    |  V      |         |         |
    3+40       0.5201      2.79  |    Q    |   V     |         |         |
    3+45       0.5400      2.89  |    Q    |   V     |         |         |
    3+50       0.5608      3.02  |     Q   |    V    |         |         |
    3+55       0.5822      3.11  |     Q   |    V    |         |         |
    4+ 0       0.6044      3.23  |     Q   |     V   |         |         |
    4+ 5       0.6273      3.32  |     Q   |      V  |         |         |
    4+10       0.6513      3.48  |     Q   |      V  |         |         |
    4+15       0.6766      3.67  |      Q  |       V |         |         |
    4+20       0.7032      3.87  |      Q  |        V|         |         |
    4+25       0.7312      4.07  |       Q |        V|         |         |
    4+30       0.7604      4.23  |       Q |         V         |         |
    4+35       0.7902      4.34  |       Q |         |V        |         |
    4+40       0.8213      4.51  |        Q|         | V       |         |
    4+45       0.8537      4.70  |        Q|         |  V      |         |
    4+50       0.8872      4.86  |        Q|         |   V     |         |
    4+55       0.9214      4.97  |        Q|         |    V    |         |
    5+ 0       0.9568      5.14  |         Q         |     V   |         |
    5+ 5       0.9946      5.49  |         Q         |      V  |         |
    5+10       1.0377      6.25  |         | Q       |       V |         |
    5+15       1.0863      7.07  |         |   Q     |        V|         |
    5+20       1.1400      7.79  |         |    Q    |         |V        |
    5+25       1.2009      8.84  |         |      Q  |         | V       |
    5+30       1.2754     10.82  |         |         |Q        |   V     |
    5+35       1.3513     11.01  |         |         | Q       |     V   |
    5+40       1.3937      6.17  |         | Q       |         |       V |
    5+45       1.4194      3.73  |      Q  |         |         |       V |
    5+50       1.4368      2.52  |    Q    |         |         |        V|
    5+55       1.4493      1.81  |  Q      |         |         |        V|
    6+ 0       1.4576      1.21  | Q       |         |         |        V|
    6+ 5       1.4628      0.75  |Q        |         |         |        V|
    6+10       1.4650      0.33  Q         |         |         |        V|
    6+15       1.4660      0.14  Q         |         |         |        V|
    6+20       1.4665      0.07  Q         |         |         |        V|
    6+25       1.4668      0.04  Q         |         |         |        V|
    6+30       1.4669      0.02  Q         |         |         |        V|
    6+35       1.4670      0.01  Q         |         |         |        V|
    6+40       1.4670      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 2 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.70                  53.21

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              4.30                 134.59
```

```
      STORM EVENT (YEAR) =    2.00
      Area Averaged 2-Year Rainfall =    1.700(In)
      Area Averaged 100-Year Rainfall =    4.300(In)

      Point rain (area averaged) =    1.700(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.700(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00          0.500
          26.400           56.00          0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                           Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                            Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134             6.036
          2   0.167        199.570         48.386            15.263
          3   0.250        299.355         15.668             4.942
          4   0.333        399.141          7.074             2.231
          5   0.417        498.926          3.984             1.257
          6   0.500        598.711          2.581             0.814
          7   0.583        698.496          1.607             0.507
          8   0.667        798.281          1.051             0.331
          9   0.750        898.066          0.516             0.163
                                     Sum = 100.000   Sum=      31.545
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)   Percent   (In/Hr)          Max    |   Low         (In/Hr)
   1   0.08      0.07      0.014        (  0.477)       0.007        0.007
   2   0.17      0.07      0.014        (  0.475)       0.007        0.007
   3   0.25      0.07      0.014        (  0.473)       0.007        0.007
   4   0.33      0.10      0.020        (  0.471)       0.010        0.010
```

```
  5   0.42      0.10      0.020      (  0.470)      0.010       0.010
  6   0.50      0.10      0.020      (  0.468)      0.010       0.010
  7   0.58      0.10      0.020      (  0.466)      0.010       0.010
  8   0.67      0.10      0.020      (  0.464)      0.010       0.010
  9   0.75      0.10      0.020      (  0.462)      0.010       0.010
 10   0.83      0.13      0.027      (  0.460)      0.014       0.014
 11   0.92      0.13      0.027      (  0.459)      0.014       0.014
 12   1.00      0.13      0.027      (  0.457)      0.014       0.014
 13   1.08      0.10      0.020      (  0.455)      0.010       0.010
 14   1.17      0.10      0.020      (  0.453)      0.010       0.010
 15   1.25      0.10      0.020      (  0.451)      0.010       0.010
 16   1.33      0.10      0.020      (  0.450)      0.010       0.010
 17   1.42      0.10      0.020      (  0.448)      0.010       0.010
 18   1.50      0.10      0.020      (  0.446)      0.010       0.010
 19   1.58      0.10      0.020      (  0.444)      0.010       0.010
 20   1.67      0.10      0.020      (  0.443)      0.010       0.010
 21   1.75      0.10      0.020      (  0.441)      0.010       0.010
 22   1.83      0.13      0.027      (  0.439)      0.014       0.014
 23   1.92      0.13      0.027      (  0.437)      0.014       0.014
 24   2.00      0.13      0.027      (  0.435)      0.014       0.014
 25   2.08      0.13      0.027      (  0.434)      0.014       0.014
 26   2.17      0.13      0.027      (  0.432)      0.014       0.014
 27   2.25      0.13      0.027      (  0.430)      0.014       0.014
 28   2.33      0.13      0.027      (  0.428)      0.014       0.014
 29   2.42      0.13      0.027      (  0.427)      0.014       0.014
 30   2.50      0.13      0.027      (  0.425)      0.014       0.014
 31   2.58      0.17      0.034      (  0.423)      0.017       0.017
 32   2.67      0.17      0.034      (  0.421)      0.017       0.017
 33   2.75      0.17      0.034      (  0.420)      0.017       0.017
 34   2.83      0.17      0.034      (  0.418)      0.017       0.017
 35   2.92      0.17      0.034      (  0.416)      0.017       0.017
 36   3.00      0.17      0.034      (  0.415)      0.017       0.017
 37   3.08      0.17      0.034      (  0.413)      0.017       0.017
 38   3.17      0.17      0.034      (  0.411)      0.017       0.017
 39   3.25      0.17      0.034      (  0.409)      0.017       0.017
 40   3.33      0.17      0.034      (  0.408)      0.017       0.017
 41   3.42      0.17      0.034      (  0.406)      0.017       0.017
 42   3.50      0.17      0.034      (  0.404)      0.017       0.017
 43   3.58      0.17      0.034      (  0.403)      0.017       0.017
 44   3.67      0.17      0.034      (  0.401)      0.017       0.017
 45   3.75      0.17      0.034      (  0.399)      0.017       0.017
 46   3.83      0.20      0.041      (  0.398)      0.020       0.020
 47   3.92      0.20      0.041      (  0.396)      0.020       0.020
 48   4.00      0.20      0.041      (  0.394)      0.020       0.020
 49   4.08      0.20      0.041      (  0.393)      0.020       0.020
 50   4.17      0.20      0.041      (  0.391)      0.020       0.020
 51   4.25      0.20      0.041      (  0.389)      0.020       0.020
 52   4.33      0.23      0.048      (  0.388)      0.024       0.024
 53   4.42      0.23      0.048      (  0.386)      0.024       0.024
 54   4.50      0.23      0.048      (  0.384)      0.024       0.024
 55   4.58      0.23      0.048      (  0.383)      0.024       0.024
 56   4.67      0.23      0.048      (  0.381)      0.024       0.024
 57   4.75      0.23      0.048      (  0.379)      0.024       0.024
 58   4.83      0.27      0.054      (  0.378)      0.027       0.027
 59   4.92      0.27      0.054      (  0.376)      0.027       0.027
 60   5.00      0.27      0.054      (  0.374)      0.027       0.027
 61   5.08      0.20      0.041      (  0.373)      0.020       0.020
```

```
  62   5.17      0.20      0.041        (  0.371)      0.020       0.020
  63   5.25      0.20      0.041        (  0.370)      0.020       0.020
  64   5.33      0.23      0.048        (  0.368)      0.024       0.024
  65   5.42      0.23      0.048        (  0.366)      0.024       0.024
  66   5.50      0.23      0.048        (  0.365)      0.024       0.024
  67   5.58      0.27      0.054        (  0.363)      0.027       0.027
  68   5.67      0.27      0.054        (  0.362)      0.027       0.027
  69   5.75      0.27      0.054        (  0.360)      0.027       0.027
  70   5.83      0.27      0.054        (  0.358)      0.027       0.027
  71   5.92      0.27      0.054        (  0.357)      0.027       0.027
  72   6.00      0.27      0.054        (  0.355)      0.027       0.027
  73   6.08      0.30      0.061        (  0.354)      0.031       0.031
  74   6.17      0.30      0.061        (  0.352)      0.031       0.031
  75   6.25      0.30      0.061        (  0.350)      0.031       0.031
  76   6.33      0.30      0.061        (  0.349)      0.031       0.031
  77   6.42      0.30      0.061        (  0.347)      0.031       0.031
  78   6.50      0.30      0.061        (  0.346)      0.031       0.031
  79   6.58      0.33      0.068        (  0.344)      0.034       0.034
  80   6.67      0.33      0.068        (  0.343)      0.034       0.034
  81   6.75      0.33      0.068        (  0.341)      0.034       0.034
  82   6.83      0.33      0.068        (  0.340)      0.034       0.034
  83   6.92      0.33      0.068        (  0.338)      0.034       0.034
  84   7.00      0.33      0.068        (  0.336)      0.034       0.034
  85   7.08      0.33      0.068        (  0.335)      0.034       0.034
  86   7.17      0.33      0.068        (  0.333)      0.034       0.034
  87   7.25      0.33      0.068        (  0.332)      0.034       0.034
  88   7.33      0.37      0.075        (  0.330)      0.037       0.037
  89   7.42      0.37      0.075        (  0.329)      0.037       0.037
  90   7.50      0.37      0.075        (  0.327)      0.037       0.037
  91   7.58      0.40      0.082        (  0.326)      0.041       0.041
  92   7.67      0.40      0.082        (  0.324)      0.041       0.041
  93   7.75      0.40      0.082        (  0.323)      0.041       0.041
  94   7.83      0.43      0.088        (  0.321)      0.044       0.044
  95   7.92      0.43      0.088        (  0.320)      0.044       0.044
  96   8.00      0.43      0.088        (  0.318)      0.044       0.044
  97   8.08      0.50      0.102        (  0.317)      0.051       0.051
  98   8.17      0.50      0.102        (  0.315)      0.051       0.051
  99   8.25      0.50      0.102        (  0.314)      0.051       0.051
 100   8.33      0.50      0.102        (  0.313)      0.051       0.051
 101   8.42      0.50      0.102        (  0.311)      0.051       0.051
 102   8.50      0.50      0.102        (  0.310)      0.051       0.051
 103   8.58      0.53      0.109        (  0.308)      0.054       0.054
 104   8.67      0.53      0.109        (  0.307)      0.054       0.054
 105   8.75      0.53      0.109        (  0.305)      0.054       0.054
 106   8.83      0.57      0.116        (  0.304)      0.058       0.058
 107   8.92      0.57      0.116        (  0.302)      0.058       0.058
 108   9.00      0.57      0.116        (  0.301)      0.058       0.058
 109   9.08      0.63      0.129        (  0.300)      0.065       0.065
 110   9.17      0.63      0.129        (  0.298)      0.065       0.065
 111   9.25      0.63      0.129        (  0.297)      0.065       0.065
 112   9.33      0.67      0.136        (  0.295)      0.068       0.068
 113   9.42      0.67      0.136        (  0.294)      0.068       0.068
 114   9.50      0.67      0.136        (  0.292)      0.068       0.068
 115   9.58      0.70      0.143        (  0.291)      0.071       0.071
 116   9.67      0.70      0.143        (  0.290)      0.071       0.071
 117   9.75      0.70      0.143        (  0.288)      0.071       0.071
 118   9.83      0.73      0.150        (  0.287)      0.075       0.075
```

```
 119   9.92       0.73      0.150        (  0.286)       0.075       0.075
 120  10.00       0.73      0.150        (  0.284)       0.075       0.075
 121  10.08       0.50      0.102        (  0.283)       0.051       0.051
 122  10.17       0.50      0.102        (  0.281)       0.051       0.051
 123  10.25       0.50      0.102        (  0.280)       0.051       0.051
 124  10.33       0.50      0.102        (  0.279)       0.051       0.051
 125  10.42       0.50      0.102        (  0.277)       0.051       0.051
 126  10.50       0.50      0.102        (  0.276)       0.051       0.051
 127  10.58       0.67      0.136        (  0.275)       0.068       0.068
 128  10.67       0.67      0.136        (  0.273)       0.068       0.068
 129  10.75       0.67      0.136        (  0.272)       0.068       0.068
 130  10.83       0.67      0.136        (  0.271)       0.068       0.068
 131  10.92       0.67      0.136        (  0.269)       0.068       0.068
 132  11.00       0.67      0.136        (  0.268)       0.068       0.068
 133  11.08       0.63      0.129        (  0.267)       0.065       0.065
 134  11.17       0.63      0.129        (  0.265)       0.065       0.065
 135  11.25       0.63      0.129        (  0.264)       0.065       0.065
 136  11.33       0.63      0.129        (  0.263)       0.065       0.065
 137  11.42       0.63      0.129        (  0.261)       0.065       0.065
 138  11.50       0.63      0.129        (  0.260)       0.065       0.065
 139  11.58       0.57      0.116        (  0.259)       0.058       0.058
 140  11.67       0.57      0.116        (  0.258)       0.058       0.058
 141  11.75       0.57      0.116        (  0.256)       0.058       0.058
 142  11.83       0.60      0.122        (  0.255)       0.061       0.061
 143  11.92       0.60      0.122        (  0.254)       0.061       0.061
 144  12.00       0.60      0.122        (  0.252)       0.061       0.061
 145  12.08       0.83      0.170        (  0.251)       0.085       0.085
 146  12.17       0.83      0.170        (  0.250)       0.085       0.085
 147  12.25       0.83      0.170        (  0.249)       0.085       0.085
 148  12.33       0.87      0.177        (  0.247)       0.088       0.088
 149  12.42       0.87      0.177        (  0.246)       0.088       0.088
 150  12.50       0.87      0.177        (  0.245)       0.088       0.088
 151  12.58       0.93      0.190        (  0.244)       0.095       0.095
 152  12.67       0.93      0.190        (  0.242)       0.095       0.095
 153  12.75       0.93      0.190        (  0.241)       0.095       0.095
 154  12.83       0.97      0.197        (  0.240)       0.099       0.099
 155  12.92       0.97      0.197        (  0.239)       0.099       0.099
 156  13.00       0.97      0.197        (  0.238)       0.099       0.099
 157  13.08       1.13      0.231        (  0.236)       0.116       0.116
 158  13.17       1.13      0.231        (  0.235)       0.116       0.116
 159  13.25       1.13      0.231        (  0.234)       0.116       0.116
 160  13.33       1.13      0.231        (  0.233)       0.116       0.116
 161  13.42       1.13      0.231        (  0.232)       0.116       0.116
 162  13.50       1.13      0.231        (  0.230)       0.116       0.116
 163  13.58       0.77      0.156        (  0.229)       0.078       0.078
 164  13.67       0.77      0.156        (  0.228)       0.078       0.078
 165  13.75       0.77      0.156        (  0.227)       0.078       0.078
 166  13.83       0.77      0.156        (  0.226)       0.078       0.078
 167  13.92       0.77      0.156        (  0.225)       0.078       0.078
 168  14.00       0.77      0.156        (  0.223)       0.078       0.078
 169  14.08       0.90      0.184        (  0.222)       0.092       0.092
 170  14.17       0.90      0.184        (  0.221)       0.092       0.092
 171  14.25       0.90      0.184        (  0.220)       0.092       0.092
 172  14.33       0.87      0.177        (  0.219)       0.088       0.088
 173  14.42       0.87      0.177        (  0.218)       0.088       0.088
 174  14.50       0.87      0.177        (  0.217)       0.088       0.088
 175  14.58       0.87      0.177        (  0.216)       0.088       0.088
```

```
 176  14.67     0.87      0.177       (  0.215)      0.088      0.088
 177  14.75     0.87      0.177       (  0.213)      0.088      0.088
 178  14.83     0.83      0.170       (  0.212)      0.085      0.085
 179  14.92     0.83      0.170       (  0.211)      0.085      0.085
 180  15.00     0.83      0.170       (  0.210)      0.085      0.085
 181  15.08     0.80      0.163       (  0.209)      0.082      0.082
 182  15.17     0.80      0.163       (  0.208)      0.082      0.082
 183  15.25     0.80      0.163       (  0.207)      0.082      0.082
 184  15.33     0.77      0.156       (  0.206)      0.078      0.078
 185  15.42     0.77      0.156       (  0.205)      0.078      0.078
 186  15.50     0.77      0.156       (  0.204)      0.078      0.078
 187  15.58     0.63      0.129       (  0.203)      0.065      0.065
 188  15.67     0.63      0.129       (  0.202)      0.065      0.065
 189  15.75     0.63      0.129       (  0.201)      0.065      0.065
 190  15.83     0.63      0.129       (  0.200)      0.065      0.065
 191  15.92     0.63      0.129       (  0.199)      0.065      0.065
 192  16.00     0.63      0.129       (  0.198)      0.065      0.065
 193  16.08     0.13      0.027       (  0.197)      0.014      0.014
 194  16.17     0.13      0.027       (  0.196)      0.014      0.014
 195  16.25     0.13      0.027       (  0.195)      0.014      0.014
 196  16.33     0.13      0.027       (  0.194)      0.014      0.014
 197  16.42     0.13      0.027       (  0.193)      0.014      0.014
 198  16.50     0.13      0.027       (  0.192)      0.014      0.014
 199  16.58     0.10      0.020       (  0.191)      0.010      0.010
 200  16.67     0.10      0.020       (  0.190)      0.010      0.010
 201  16.75     0.10      0.020       (  0.189)      0.010      0.010
 202  16.83     0.10      0.020       (  0.188)      0.010      0.010
 203  16.92     0.10      0.020       (  0.187)      0.010      0.010
 204  17.00     0.10      0.020       (  0.186)      0.010      0.010
 205  17.08     0.17      0.034       (  0.185)      0.017      0.017
 206  17.17     0.17      0.034       (  0.184)      0.017      0.017
 207  17.25     0.17      0.034       (  0.183)      0.017      0.017
 208  17.33     0.17      0.034       (  0.182)      0.017      0.017
 209  17.42     0.17      0.034       (  0.181)      0.017      0.017
 210  17.50     0.17      0.034       (  0.180)      0.017      0.017
 211  17.58     0.17      0.034       (  0.179)      0.017      0.017
 212  17.67     0.17      0.034       (  0.179)      0.017      0.017
 213  17.75     0.17      0.034       (  0.178)      0.017      0.017
 214  17.83     0.13      0.027       (  0.177)      0.014      0.014
 215  17.92     0.13      0.027       (  0.176)      0.014      0.014
 216  18.00     0.13      0.027       (  0.175)      0.014      0.014
 217  18.08     0.13      0.027       (  0.174)      0.014      0.014
 218  18.17     0.13      0.027       (  0.173)      0.014      0.014
 219  18.25     0.13      0.027       (  0.172)      0.014      0.014
 220  18.33     0.13      0.027       (  0.172)      0.014      0.014
 221  18.42     0.13      0.027       (  0.171)      0.014      0.014
 222  18.50     0.13      0.027       (  0.170)      0.014      0.014
 223  18.58     0.10      0.020       (  0.169)      0.010      0.010
 224  18.67     0.10      0.020       (  0.168)      0.010      0.010
 225  18.75     0.10      0.020       (  0.167)      0.010      0.010
 226  18.83     0.07      0.014       (  0.167)      0.007      0.007
 227  18.92     0.07      0.014       (  0.166)      0.007      0.007
 228  19.00     0.07      0.014       (  0.165)      0.007      0.007
 229  19.08     0.10      0.020       (  0.164)      0.010      0.010
 230  19.17     0.10      0.020       (  0.164)      0.010      0.010
 231  19.25     0.10      0.020       (  0.163)      0.010      0.010
 232  19.33     0.13      0.027       (  0.162)      0.014      0.014
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
233  19.42     0.13      0.027       (  0.161)       0.014        0.014
234  19.50     0.13      0.027       (  0.161)       0.014        0.014
235  19.58     0.10      0.020       (  0.160)       0.010        0.010
236  19.67     0.10      0.020       (  0.159)       0.010        0.010
237  19.75     0.10      0.020       (  0.158)       0.010        0.010
238  19.83     0.07      0.014       (  0.158)       0.007        0.007
239  19.92     0.07      0.014       (  0.157)       0.007        0.007
240  20.00     0.07      0.014       (  0.156)       0.007        0.007
241  20.08     0.10      0.020       (  0.156)       0.010        0.010
242  20.17     0.10      0.020       (  0.155)       0.010        0.010
243  20.25     0.10      0.020       (  0.154)       0.010        0.010
244  20.33     0.10      0.020       (  0.154)       0.010        0.010
245  20.42     0.10      0.020       (  0.153)       0.010        0.010
246  20.50     0.10      0.020       (  0.152)       0.010        0.010
247  20.58     0.10      0.020       (  0.152)       0.010        0.010
248  20.67     0.10      0.020       (  0.151)       0.010        0.010
249  20.75     0.10      0.020       (  0.150)       0.010        0.010
250  20.83     0.07      0.014       (  0.150)       0.007        0.007
251  20.92     0.07      0.014       (  0.149)       0.007        0.007
252  21.00     0.07      0.014       (  0.149)       0.007        0.007
253  21.08     0.10      0.020       (  0.148)       0.010        0.010
254  21.17     0.10      0.020       (  0.147)       0.010        0.010
255  21.25     0.10      0.020       (  0.147)       0.010        0.010
256  21.33     0.07      0.014       (  0.146)       0.007        0.007
257  21.42     0.07      0.014       (  0.146)       0.007        0.007
258  21.50     0.07      0.014       (  0.145)       0.007        0.007
259  21.58     0.10      0.020       (  0.145)       0.010        0.010
260  21.67     0.10      0.020       (  0.144)       0.010        0.010
261  21.75     0.10      0.020       (  0.144)       0.010        0.010
262  21.83     0.07      0.014       (  0.143)       0.007        0.007
263  21.92     0.07      0.014       (  0.143)       0.007        0.007
264  22.00     0.07      0.014       (  0.142)       0.007        0.007
265  22.08     0.10      0.020       (  0.142)       0.010        0.010
266  22.17     0.10      0.020       (  0.141)       0.010        0.010
267  22.25     0.10      0.020       (  0.141)       0.010        0.010
268  22.33     0.07      0.014       (  0.140)       0.007        0.007
269  22.42     0.07      0.014       (  0.140)       0.007        0.007
270  22.50     0.07      0.014       (  0.139)       0.007        0.007
271  22.58     0.07      0.014       (  0.139)       0.007        0.007
272  22.67     0.07      0.014       (  0.139)       0.007        0.007
273  22.75     0.07      0.014       (  0.138)       0.007        0.007
274  22.83     0.07      0.014       (  0.138)       0.007        0.007
275  22.92     0.07      0.014       (  0.138)       0.007        0.007
276  23.00     0.07      0.014       (  0.137)       0.007        0.007
277  23.08     0.07      0.014       (  0.137)       0.007        0.007
278  23.17     0.07      0.014       (  0.137)       0.007        0.007
279  23.25     0.07      0.014       (  0.136)       0.007        0.007
280  23.33     0.07      0.014       (  0.136)       0.007        0.007
281  23.42     0.07      0.014       (  0.136)       0.007        0.007
282  23.50     0.07      0.014       (  0.135)       0.007        0.007
283  23.58     0.07      0.014       (  0.135)       0.007        0.007
284  23.67     0.07      0.014       (  0.135)       0.007        0.007
285  23.75     0.07      0.014       (  0.135)       0.007        0.007
286  23.83     0.07      0.014       (  0.135)       0.007        0.007
287  23.92     0.07      0.014       (  0.135)       0.007        0.007
288  24.00     0.07      0.014       (  0.135)       0.007        0.007
            (Loss Rate Not Used)
```

```
 Sum =     100.0                                     Sum =    10.2
  Flood volume = Effective rainfall      0.85(In)
   times area      31.3(Ac.)/[(In)/(Ft.)] =       2.2(Ac.Ft)
  Total soil loss =      0.85(In)
  Total soil loss =     2.217(Ac.Ft)
  Total rainfall =      1.70(In)
  Flood volume =       96570.2 Cubic Feet
  Total soil loss =       96570.2 Cubic Feet
  --------------------------------------------------------------------
   Peak flow rate of this hydrograph =      3.631(CFS)
  --------------------------------------------------------------------
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
                 R u n o f f      H y d r o g r a p h
  --------------------------------------------------------------------
              Hydrograph in   5   Minute intervals ((CFS))

  --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft    Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0003      0.04  Q         |         |         |         |
  0+10       0.0013      0.14  Q         |         |         |         |
  0+15       0.0025      0.18  Q         |         |         |         |
  0+20       0.0040      0.21  Q         |         |         |         |
  0+25       0.0059      0.27  VQ        |         |         |         |
  0+30       0.0079      0.30  VQ        |         |         |         |
  0+35       0.0100      0.31  VQ        |         |         |         |
  0+40       0.0122      0.31  VQ        |         |         |         |
  0+45       0.0144      0.32  VQ        |         |         |         |
  0+50       0.0168      0.34  VQ        |         |         |         |
  0+55       0.0195      0.39  VQ        |         |         |         |
  1+ 0       0.0223      0.41  VQ        |         |         |         |
  1+ 5       0.0250      0.40  VQ        |         |         |         |
  1+10       0.0275      0.35  VQ        |         |         |         |
  1+15       0.0298      0.34  VQ        |         |         |         |
  1+20       0.0320      0.33  VQ        |         |         |         |
  1+25       0.0343      0.33  VQ        |         |         |         |
  1+30       0.0365      0.33  VQ        |         |         |         |
  1+35       0.0388      0.32  VQ        |         |         |         |
  1+40       0.0410      0.32  VQ        |         |         |         |
  1+45       0.0432      0.32  VQ        |         |         |         |
  1+50       0.0456      0.34  VQ        |         |         |         |
  1+55       0.0483      0.39  VQ        |         |         |         |
  2+ 0       0.0511      0.41  VQ        |         |         |         |
  2+ 5       0.0540      0.42  VQ        |         |         |         |
  2+10       0.0569      0.42   |Q       |         |         |         |
  2+15       0.0598      0.43   |Q       |         |         |         |
  2+20       0.0628      0.43   |Q       |         |         |         |
  2+25       0.0657      0.43   |Q       |         |         |         |
  2+30       0.0687      0.43   |Q       |         |         |         |
  2+35       0.0718      0.45   |Q       |         |         |         |
  2+40       0.0753      0.50   |VQ      |         |         |         |
  2+45       0.0788      0.52   |VQ      |         |         |         |
  2+50       0.0824      0.53   |VQ      |         |         |         |
  2+55       0.0861      0.53   |VQ      |         |         |         |
  3+ 0       0.0898      0.53   |VQ      |         |         |         |
  3+ 5       0.0935      0.53   |VQ      |         |         |         |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
3+10       0.0971      0.54  |VQ       |         |         |         |
3+15       0.1008      0.54  |VQ       |         |         |         |
3+20       0.1045      0.54  |VQ       |         |         |         |
3+25       0.1082      0.54  |VQ       |         |         |         |
3+30       0.1119      0.54  | Q       |         |         |         |
3+35       0.1156      0.54  | Q       |         |         |         |
3+40       0.1193      0.54  | Q       |         |         |         |
3+45       0.1230      0.54  | Q       |         |         |         |
3+50       0.1268      0.56  | Q       |         |         |         |
3+55       0.1310      0.61  | Q       |         |         |         |
4+ 0       0.1353      0.63  | Q       |         |         |         |
4+ 5       0.1397      0.63  | Q       |         |         |         |
4+10       0.1441      0.64  | Q       |         |         |         |
4+15       0.1485      0.64  | Q       |         |         |         |
4+20       0.1531      0.66  | Q       |         |         |         |
4+25       0.1580      0.72  | Q       |         |         |         |
4+30       0.1631      0.73  | Q       |         |         |         |
4+35       0.1682      0.74  | QV      |         |         |         |
4+40       0.1733      0.74  | QV      |         |         |         |
4+45       0.1784      0.75  | QV      |         |         |         |
4+50       0.1837      0.77  |  Q      |         |         |         |
4+55       0.1894      0.82  |  Q      |         |         |         |
5+ 0       0.1952      0.84  |  Q      |         |         |         |
5+ 5       0.2007      0.81  |  Q      |         |         |         |
5+10       0.2056      0.71  | QV      |         |         |         |
5+15       0.2103      0.68  | QV      |         |         |         |
5+20       0.2150      0.68  | QV      |         |         |         |
5+25       0.2200      0.73  | QV      |         |         |         |
5+30       0.2251      0.74  | Q V     |         |         |         |
5+35       0.2304      0.76  |  QV     |         |         |         |
5+40       0.2360      0.82  |  QV     |         |         |         |
5+45       0.2418      0.84  |  QV     |         |         |         |
5+50       0.2476      0.85  |  QV     |         |         |         |
5+55       0.2535      0.85  |  QV     |         |         |         |
6+ 0       0.2593      0.85  |  QV     |         |         |         |
6+ 5       0.2654      0.88  |  QV     |         |         |         |
6+10       0.2718      0.93  |  QV     |         |         |         |
6+15       0.2783      0.95  |  Q V    |         |         |         |
6+20       0.2849      0.96  |  Q V    |         |         |         |
6+25       0.2915      0.96  |  Q V    |         |         |         |
6+30       0.2981      0.96  |  Q V    |         |         |         |
6+35       0.3049      0.98  |  Q V    |         |         |         |
6+40       0.3121      1.04  |   QV    |         |         |         |
6+45       0.3193      1.05  |   QV    |         |         |         |
6+50       0.3266      1.06  |   QV    |         |         |         |
6+55       0.3340      1.07  |   Q V   |         |         |         |
7+ 0       0.3414      1.07  |   Q V   |         |         |         |
7+ 5       0.3487      1.07  |   Q V   |         |         |         |
7+10       0.3561      1.07  |   Q V   |         |         |         |
7+15       0.3635      1.07  |   Q V   |         |         |         |
7+20       0.3710      1.09  |   Q V   |         |         |         |
7+25       0.3789      1.15  |   Q V   |         |         |         |
7+30       0.3869      1.16  |   Q V   |         |         |         |
7+35       0.3951      1.19  |   Q  V  |         |         |         |
7+40       0.4037      1.25  |   Q  V  |         |         |         |
7+45       0.4124      1.27  |    Q V  |         |         |         |
7+50       0.4214      1.30  |    Q V  |         |         |         |
```

```
 7+55       0.4307      1.35  |    Q V  |         |         |         |
 8+ 0       0.4401      1.37  |    Q V  |         |         |         |
 8+ 5       0.4500      1.42  |    Q  V |         |         |         |
 8+10       0.4605      1.53  |     Q V |         |         |         |
 8+15       0.4713      1.57  |     Q V |         |         |         |
 8+20       0.4823      1.59  |     Q V |         |         |         |
 8+25       0.4932      1.60  |     Q V |         |         |         |
 8+30       0.5043      1.60  |     Q  V|         |         |         |
 8+35       0.5155      1.63  |     Q  V|         |         |         |
 8+40       0.5271      1.68  |     Q  V|         |         |         |
 8+45       0.5388      1.70  |     Q  V|         |         |         |
 8+50       0.5507      1.73  |     Q  V|         |         |         |
 8+55       0.5629      1.78  |      Q  V         |         |         |
 9+ 0       0.5754      1.80  |      Q  V         |         |         |
 9+ 5       0.5881      1.85  |      Q  V         |         |         |
 9+10       0.6016      1.96  |      Q  V         |         |         |
 9+15       0.6154      2.00  |      Q  |V        |         |         |
 9+20       0.6294      2.04  |       Q |V        |         |         |
 9+25       0.6439      2.10  |       Q |V        |         |         |
 9+30       0.6585      2.12  |       Q |V        |         |         |
 9+35       0.6733      2.15  |       Q | V       |         |         |
 9+40       0.6885      2.21  |       Q | V       |         |         |
 9+45       0.7039      2.23  |       Q | V       |         |         |
 9+50       0.7195      2.26  |        Q| V       |         |         |
 9+55       0.7355      2.32  |        Q|  V      |         |         |
10+ 0       0.7516      2.34  |        Q|  V      |         |         |
10+ 5       0.7668      2.20  |       Q |  V      |         |         |
10+10       0.7795      1.85  |      Q  |   V     |         |         |
10+15       0.7914      1.73  |     Q   |   V     |         |         |
10+20       0.8030      1.68  |     Q   |   V     |         |         |
10+25       0.8144      1.65  |     Q   |   V     |         |         |
10+30       0.8256      1.63  |     Q   |   V     |         |         |
10+35       0.8375      1.72  |     Q   |    V    |         |         |
10+40       0.8511      1.98  |      Q  |    V    |         |         |
10+45       0.8652      2.06  |       Q |    V    |         |         |
10+50       0.8797      2.09  |       Q |    V    |         |         |
10+55       0.8942      2.12  |       Q |     V   |         |         |
11+ 0       0.9089      2.13  |       Q |     V   |         |         |
11+ 5       0.9235      2.12  |       Q |     V   |         |         |
11+10       0.9377      2.07  |       Q |     V   |         |         |
11+15       0.9519      2.06  |       Q |      V  |         |         |
11+20       0.9660      2.05  |       Q |      V  |         |         |
11+25       0.9801      2.04  |       Q |      V  |         |         |
11+30       0.9942      2.04  |       Q |      V  |         |         |
11+35       1.0079      2.00  |      Q  |       V |         |         |
11+40       1.0210      1.89  |      Q  |       V |         |         |
11+45       1.0338      1.86  |      Q  |       V |         |         |
11+50       1.0466      1.87  |      Q  |       V |         |         |
11+55       1.0598      1.91  |      Q  |        V|         |         |
12+ 0       1.0730      1.92  |      Q  |        V|         |         |
12+ 5       1.0872      2.07  |       Q |        V|         |         |
12+10       1.1040      2.43  |        Q|        V|         |         |
12+15       1.1216      2.55  |         Q         V         |         |
12+20       1.1397      2.63  |         Q         V         |         |
12+25       1.1584      2.71  |         Q         V         |         |
12+30       1.1773      2.75  |         Q         |V        |         |
12+35       1.1966      2.81  |         |Q        |V        |         |
```

```
12+40       1.2168      2.92  |         |Q        |V        |         |
12+45       1.2372      2.96  |         |Q        | V       |         |
12+50       1.2579      3.00  |         | Q       | V       |         |
12+55       1.2790      3.06  |         | Q       |  V      |         |
13+ 0       1.3002      3.09  |         | Q       |  V      |         |
13+ 5       1.3223      3.20  |         | Q       |  V      |         |
13+10       1.3461      3.47  |         |  Q      |   V     |         |
13+15       1.3706      3.55  |         |   Q     |   V     |         |
13+20       1.3954      3.59  |         |   Q     |    V    |         |
13+25       1.4203      3.62  |         |   Q     |    V    |         |
13+30       1.4453      3.63  |         |   Q     |     V   |         |
13+35       1.4688      3.41  |         |  Q      |     V   |         |
13+40       1.4884      2.85  |         |Q        |     V   |         |
13+45       1.5068      2.67  |         Q         |      V  |         |
13+50       1.5246      2.58  |         Q         |      V  |         |
13+55       1.5420      2.54  |         Q         |      V  |         |
14+ 0       1.5593      2.51  |         Q         |       V |         |
14+ 5       1.5770      2.57  |         Q         |       V |         |
14+10       1.5960      2.76  |         |Q        |       V |         |
14+15       1.6155      2.82  |         |Q        |        V|         |
14+20       1.6350      2.83  |         |Q        |        V|         |
14+25       1.6543      2.80  |         |Q        |        V|         |
14+30       1.6735      2.79  |         |Q        |         V         |
14+35       1.6928      2.79  |         |Q        |         V         |
14+40       1.7120      2.79  |         |Q        |         V         |
14+45       1.7312      2.79  |         |Q        |         |V        |
14+50       1.7503      2.77  |         |Q        |         |V        |
14+55       1.7690      2.72  |         Q         |         |V        |
15+ 0       1.7876      2.70  |         Q         |         | V       |
15+ 5       1.8061      2.67  |         Q         |         | V       |
15+10       1.8241      2.62  |         Q         |         | V       |
15+15       1.8420      2.60  |         Q         |         |  V      |
15+20       1.8596      2.57  |         Q         |         |  V      |
15+25       1.8769      2.51  |         Q         |         |  V      |
15+30       1.8941      2.49  |        Q|         |         |   V     |
15+35       1.9106      2.40  |        Q|         |         |   V     |
15+40       1.9256      2.18  |       Q |         |         |   V     |
15+45       1.9402      2.11  |       Q |         |         |    V    |
15+50       1.9545      2.08  |       Q |         |         |    V    |
15+55       1.9687      2.06  |       Q |         |         |    V    |
16+ 0       1.9829      2.05  |       Q |         |         |    V    |
16+ 5       1.9948      1.74  |     Q   |         |         |    V    |
16+10       2.0014      0.95  |  Q      |         |         |     V   |
16+15       2.0062      0.70  | Q       |         |         |     V   |
16+20       2.0103      0.59  | Q       |         |         |     V   |
16+25       2.0139      0.52  | Q       |         |         |     V   |
16+30       2.0172      0.48  |Q        |         |         |     V   |
16+35       2.0202      0.43  |Q        |         |         |     V   |
16+40       2.0227      0.37  |Q        |         |         |     V   |
16+45       2.0250      0.34  |Q        |         |         |     V   |
16+50       2.0273      0.33  |Q        |         |         |     V   |
16+55       2.0296      0.33  |Q        |         |         |     V   |
17+ 0       2.0318      0.33  |Q        |         |         |     V   |
17+ 5       2.0343      0.36  |Q        |         |         |     V   |
17+10       2.0375      0.47  |Q        |         |         |     V   |
17+15       2.0410      0.50  | Q       |         |         |     V   |
17+20       2.0445      0.52  | Q       |         |         |     V   |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17+25       2.0481      0.52  | Q       |         |         |     V   |
17+30       2.0518      0.53  | Q       |         |         |      V  |
17+35       2.0555      0.53  | Q       |         |         |      V  |
17+40       2.0591      0.54  | Q       |         |         |      V  |
17+45       2.0628      0.54  | Q       |         |         |      V  |
17+50       2.0664      0.52  | Q       |         |         |      V  |
17+55       2.0696      0.46  |Q        |         |         |      V  |
18+ 0       2.0727      0.45  |Q        |         |         |      V  |
18+ 5       2.0757      0.44  |Q        |         |         |      V  |
18+10       2.0787      0.44  |Q        |         |         |      V  |
18+15       2.0817      0.43  |Q        |         |         |      V  |
18+20       2.0846      0.43  |Q        |         |         |      V  |
18+25       2.0876      0.43  |Q        |         |         |      V  |
18+30       2.0906      0.43  |Q        |         |         |      V  |
18+35       2.0934      0.41  |Q        |         |         |      V  |
18+40       2.0958      0.36  |Q        |         |         |      V  |
18+45       2.0982      0.34  |Q        |         |         |      V  |
18+50       2.1003      0.31  |Q        |         |         |      V  |
18+55       2.1021      0.26  |Q        |         |         |      V  |
19+ 0       2.1037      0.24  Q         |         |         |      V  |
19+ 5       2.1054      0.25  Q         |         |         |      V  |
19+10       2.1074      0.29  |Q        |         |         |       V |
19+15       2.1095      0.31  |Q        |         |         |       V |
19+20       2.1118      0.33  |Q        |         |         |       V |
19+25       2.1145      0.39  |Q        |         |         |       V |
19+30       2.1173      0.41  |Q        |         |         |       V |
19+35       2.1201      0.40  |Q        |         |         |       V |
19+40       2.1225      0.35  |Q        |         |         |       V |
19+45       2.1248      0.34  |Q        |         |         |       V |
19+50       2.1269      0.31  |Q        |         |         |       V |
19+55       2.1287      0.26  |Q        |         |         |       V |
20+ 0       2.1303      0.24  Q         |         |         |       V |
20+ 5       2.1320      0.25  Q         |         |         |       V |
20+10       2.1340      0.29  |Q        |         |         |       V |
20+15       2.1361      0.31  |Q        |         |         |       V |
20+20       2.1383      0.31  |Q        |         |         |       V |
20+25       2.1405      0.32  |Q        |         |         |       V |
20+30       2.1427      0.32  |Q        |         |         |       V |
20+35       2.1449      0.32  |Q        |         |         |       V |
20+40       2.1471      0.32  |Q        |         |         |       V |
20+45       2.1493      0.32  |Q        |         |         |       V |
20+50       2.1514      0.30  |Q        |         |         |       V |
20+55       2.1531      0.25  Q         |         |         |       V |
21+ 0       2.1547      0.23  Q         |         |         |       V |
21+ 5       2.1564      0.25  Q         |         |         |       V |
21+10       2.1584      0.29  |Q        |         |         |       V |
21+15       2.1605      0.31  |Q        |         |         |       V |
21+20       2.1625      0.29  |Q        |         |         |        V|
21+25       2.1642      0.24  Q         |         |         |        V|
21+30       2.1658      0.23  Q         |         |         |        V|
21+35       2.1675      0.24  Q         |         |         |        V|
21+40       2.1695      0.29  |Q        |         |         |        V|
21+45       2.1716      0.31  |Q        |         |         |        V|
21+50       2.1736      0.29  |Q        |         |         |        V|
21+55       2.1753      0.24  Q         |         |         |        V|
22+ 0       2.1769      0.23  Q         |         |         |        V|
22+ 5       2.1786      0.24  Q         |         |         |        V|
```

```
   22+10        2.1806       0.29   |Q         |         |         |        V|
   22+15        2.1827       0.31   |Q         |         |         |        V|
   22+20        2.1847       0.29   |Q         |         |         |        V|
   22+25        2.1864       0.24   Q          |         |         |        V|
   22+30        2.1880       0.23   Q          |         |         |        V|
   22+35        2.1895       0.22   Q          |         |         |        V|
   22+40        2.1910       0.22   Q          |         |         |        V|
   22+45        2.1925       0.22   Q          |         |         |        V|
   22+50        2.1940       0.22   Q          |         |         |        V|
   22+55        2.1955       0.22   Q          |         |         |        V|
   23+ 0        2.1970       0.21   Q          |         |         |        V|
   23+ 5        2.1985       0.21   Q          |         |         |        V|
   23+10        2.1999       0.21   Q          |         |         |        V|
   23+15        2.2014       0.21   Q          |         |         |        V|
   23+20        2.2029       0.21   Q          |         |         |        V|
   23+25        2.2044       0.21   Q          |         |         |        V|
   23+30        2.2058       0.21   Q          |         |         |        V|
   23+35        2.2073       0.21   Q          |         |         |        V|
   23+40        2.2088       0.21   Q          |         |         |        V|
   23+45        2.2103       0.21   Q          |         |         |        V|
   23+50        2.2118       0.21   Q          |         |         |        V|
   23+55        2.2132       0.21   Q          |         |         |        V|
   24+ 0        2.2147       0.21   Q          |         |         |        V|
   24+ 5        2.2159       0.17   Q          |         |         |        V|
   24+10        2.2164       0.07   Q          |         |         |        V|
   24+15        2.2166       0.04   Q          |         |         |        V|
   24+20        2.2168       0.02   Q          |         |         |        V|
   24+25        2.2169       0.01   Q          |         |         |        V|
   24+30        2.2169       0.01   Q          |         |         |        V|
   24+35        2.2169       0.00   Q          |         |         |        V|
   24+40        2.2169       0.00   Q          |         |         |         V
----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop15.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 5 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              0.48                   15.02

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.18                   36.93
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    0.480(In)
      Area Averaged 100-Year Rainfall =    1.180(In)

      Point rain (area averaged) =    0.644(In)
      Areal adjustment factor =   99.97 %
      Adjusted average point rain =    0.644(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00         0.500
          26.400           56.00         0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ----------------------------------------------------------------------

                  U n i t   H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134             6.036
          2   0.167        199.570         48.386            15.263
          3   0.250        299.355         15.668             4.942
          4   0.333        399.141          7.074             2.231
          5   0.417        498.926          3.984             1.257
          6   0.500        598.711          2.581             0.814
          7   0.583        698.496          1.607             0.507
          8   0.667        798.281          1.051             0.331
          9   0.750        898.066          0.516             0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     4.20      0.324       (  0.269)       0.162        0.162
   2   0.17     4.30      0.332       (  0.269)       0.166        0.166
```

```
   3   0.25     5.00      0.386       (  0.269)       0.193        0.193
   4   0.33     5.00      0.386       (  0.269)       0.193        0.193
   5   0.42     5.80      0.448       (  0.269)       0.224        0.224
   6   0.50     6.50      0.502       (  0.269)       0.251        0.251
   7   0.58     7.40      0.572          0.269    (  0.286)       0.303
   8   0.67     8.60      0.664          0.269    (  0.332)       0.395
   9   0.75    12.30      0.950          0.269    (  0.475)       0.681
  10   0.83    29.10      2.248          0.269    (  1.124)       1.979
  11   0.92     6.80      0.525       (  0.269)       0.263        0.263
  12   1.00     5.00      0.386       (  0.269)       0.193        0.193
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     5.0
      Flood volume = Effective rainfall      0.42(In)
       times area      31.3(Ac.)/[(In)/(Ft.)] =       1.1(Ac.Ft)
      Total soil loss =      0.23(In)
      Total soil loss =     0.592(Ac.Ft)
      Total rainfall =      0.64(In)
      Flood volume =       47375.1 Cubic Feet
      Total soil loss =       25769.9 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     36.852(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0      10.0      20.0      30.0      40.0
  -----------------------------------------------------------------------
    0+ 5      0.0067      0.98  Q         |         |         |         |
    0+10      0.0307      3.48  |V Q      |         |         |         |
    0+15      0.0617      4.50  | V Q     |         |         |         |
    0+20      0.0982      5.30  |  V Q    |         |         |         |
    0+25      0.1384      5.83  |    Q    |         |         |         |
    0+30      0.1843      6.66  |     Q   |         |         |         |
    0+35      0.2371      7.66  |      QV |         |         |         |
    0+40      0.3010      9.29  |        Q|V        |         |         |
    0+45      0.3894     12.83  |         | Q V     |         |         |
    0+50      0.5662     25.67  |         |         V    Q    |         |
    0+55      0.8200     36.85  |         |         |         V     Q   |
    1+ 0      0.9402     17.46  |         |      Q  |         |   V     |
    1+ 5      1.0099     10.12  |         Q         |         |      V  |
    1+10      1.0438      4.93  |   Q     |         |         |       V |
    1+15      1.0638      2.90  | Q       |         |         |        V|
    1+20      1.0759      1.75  |Q        |         |         |        V|
    1+25      1.0831      1.06  |Q        |         |         |        V|
    1+30      1.0866      0.51  Q         |         |         |        V|
    1+35      1.0874      0.11  Q         |         |         |        V|
    1+40      1.0876      0.03  Q         |         |         |         V
-----------------------------------------------------------------------
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop35.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 5 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              0.79                  24.73

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.85                  57.91
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    0.790(In)
      Area Averaged 100-Year Rainfall =    1.850(In)

      Point rain (area averaged) =    1.038(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.038(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00          0.500
          26.400           56.00          0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134              6.036
          2   0.167        199.570         48.386             15.263
          3   0.250        299.355         15.668              4.942
          4   0.333        399.141          7.074              2.231
          5   0.417        498.926          3.984              1.257
          6   0.500        598.711          2.581              0.814
          7   0.583        698.496          1.607              0.507
          8   0.667        798.281          1.051              0.331
          9   0.750        898.066          0.516              0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low          (In/Hr)
   1   0.08     1.30     0.162       (  0.269)      0.081        0.081
   2   0.17     1.30     0.162       (  0.269)      0.081        0.081
   3   0.25     1.10     0.137       (  0.269)      0.069        0.069
   4   0.33     1.50     0.187       (  0.269)      0.093        0.093
```

```
  5   0.42     1.50      0.187       (  0.269)       0.093         0.093
  6   0.50     1.80      0.224       (  0.269)       0.112         0.112
  7   0.58     1.50      0.187       (  0.269)       0.093         0.093
  8   0.67     1.80      0.224       (  0.269)       0.112         0.112
  9   0.75     1.80      0.224       (  0.269)       0.112         0.112
 10   0.83     1.50      0.187       (  0.269)       0.093         0.093
 11   0.92     1.60      0.199       (  0.269)       0.100         0.100
 12   1.00     1.80      0.224       (  0.269)       0.112         0.112
 13   1.08     2.20      0.274       (  0.269)       0.137         0.137
 14   1.17     2.20      0.274       (  0.269)       0.137         0.137
 15   1.25     2.20      0.274       (  0.269)       0.137         0.137
 16   1.33     2.00      0.249       (  0.269)       0.125         0.125
 17   1.42     2.60      0.324       (  0.269)       0.162         0.162
 18   1.50     2.70      0.336       (  0.269)       0.168         0.168
 19   1.58     2.40      0.299       (  0.269)       0.149         0.149
 20   1.67     2.70      0.336       (  0.269)       0.168         0.168
 21   1.75     3.30      0.411       (  0.269)       0.206         0.206
 22   1.83     3.10      0.386       (  0.269)       0.193         0.193
 23   1.92     2.90      0.361       (  0.269)       0.181         0.181
 24   2.00     3.00      0.374       (  0.269)       0.187         0.187
 25   2.08     3.10      0.386       (  0.269)       0.193         0.193
 26   2.17     4.20      0.523       (  0.269)       0.262         0.262
 27   2.25     5.00      0.623          0.269    (  0.311)         0.354
 28   2.33     3.50      0.436       (  0.269)       0.218         0.218
 29   2.42     6.80      0.847          0.269    (  0.424)         0.578
 30   2.50     7.30      0.909          0.269    (  0.455)         0.640
 31   2.58     8.20      1.022          0.269    (  0.511)         0.752
 32   2.67     5.90      0.735          0.269    (  0.367)         0.466
 33   2.75     2.00      0.249       (  0.269)       0.125         0.125
 34   2.83     1.80      0.224       (  0.269)       0.112         0.112
 35   2.92     1.80      0.224       (  0.269)       0.112         0.112
 36   3.00     0.60      0.075       (  0.269)       0.037         0.037
              (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     7.0
     Flood volume = Effective rainfall      0.58(In)
      times area      31.3(Ac.)/[(In)/(Ft.)] =       1.5(Ac.Ft)
     Total soil loss =      0.46(In)
     Total soil loss =     1.197(Ac.Ft)
     Total rainfall =     1.04(In)
     Flood volume =       65818.4 Cubic Feet
     Total soil loss =       52133.5 Cubic Feet
     --------------------------------------------------------------------
      Peak flow rate of this hydrograph =     19.551(CFS)
     --------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         3 - H O U R    S T O R M
                    R u n o f f      H y d r o g r a p h
     --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft    Q(CFS)  0        5.0      10.0      15.0      20.0
 -----------------------------------------------------------------------
   0+ 5       0.0034      0.49  Q          |         |         |         |
   0+10       0.0153      1.73  V  Q       |         |         |         |
   0+15       0.0294      2.05  V   Q      |         |         |         |
   0+20       0.0445      2.19  |V  Q      |         |         |         |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
    0+25       0.0625      2.61  |V   Q    |         |         |         |
    0+30       0.0823      2.89  | V  Q    |         |         |         |
    0+35       0.1040      3.14  | V   Q   |         |         |         |
    0+40       0.1254      3.11  |  V  Q   |         |         |         |
    0+45       0.1486      3.37  |  V  Q   |         |         |         |
    0+50       0.1716      3.34  |   V Q   |         |         |         |
    0+55       0.1932      3.13  |    VQ   |         |         |         |
    1+ 0       0.2154      3.23  |    VQ   |         |         |         |
    1+ 5       0.2400      3.57  |     VQ  |         |         |         |
    1+10       0.2676      4.01  |      VQ |         |         |         |
    1+15       0.2963      4.16  |      VQ |         |         |         |
    1+20       0.3249      4.15  |       Q |         |         |         |
    1+25       0.3540      4.23  |       QV|         |         |         |
    1+30       0.3871      4.80  |        QV         |         |         |
    1+35       0.4212      4.96  |        Q|V        |         |         |
    1+40       0.4549      4.89  |        Q| V       |         |         |
    1+45       0.4919      5.37  |         Q  V      |         |         |
    1+50       0.5328      5.94  |         |Q  V     |         |         |
    1+55       0.5735      5.90  |         |Q   V    |         |         |
    2+ 0       0.6133      5.79  |         |Q    V   |         |         |
    2+ 5       0.6540      5.90  |         |Q     V  |         |         |
    2+10       0.6982      6.43  |         | Q     V |         |         |
    2+15       0.7538      8.07  |         |     Q  V|         |         |
    2+20       0.8160      9.02  |         |       Q |V        |         |
    2+25       0.8830      9.74  |         |        Q|  V      |         |
    2+30       0.9879     15.23  |         |         |     V   Q         |
    2+35       1.1155     18.52  |         |         |        V|      Q  |
    2+40       1.2501     19.55  |         |         |         |  V     Q|
    2+45       1.3480     14.22  |         |         |       Q |    V    |
    2+50       1.4039      8.11  |         |     Q   |         |      V  |
    2+55       1.4448      5.94  |         |Q        |         |       V |
    3+ 0       1.4759      4.52  |        Q|         |         |        V|
    3+ 5       1.4938      2.60  |    Q    |         |         |        V|
    3+10       1.5026      1.27  | Q       |         |         |        V|
    3+15       1.5071      0.66  |Q        |         |         |        V|
    3+20       1.5092      0.31  Q         |         |         |        V|
    3+25       1.5102      0.14  Q         |         |         |        V|
    3+30       1.5107      0.07  Q         |         |         |        V|
    3+35       1.5109      0.03  Q         |         |         |        V|
    3+40       1.5110      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop65.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 5 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             1.10                  34.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             2.50                  78.25
```

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    1.100(In)
      Area Averaged 100-Year Rainfall =    2.500(In)

      Point rain (area averaged) =    1.428(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.428(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00         0.500
          26.400           56.00         0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134              6.036
          2   0.167        199.570         48.386             15.263
          3   0.250        299.355         15.668              4.942
          4   0.333        399.141          7.074              2.231
          5   0.417        498.926          3.984              1.257
          6   0.500        598.711          2.581              0.814
          7   0.583        698.496          1.607              0.507
          8   0.667        798.281          1.051              0.331
          9   0.750        898.066          0.516              0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     0.50      0.086       (  0.269)      0.043        0.043
   2   0.17     0.60      0.103       (  0.269)      0.051        0.051
   3   0.25     0.60      0.103       (  0.269)      0.051        0.051
   4   0.33     0.60      0.103       (  0.269)      0.051        0.051
```

```
  5   0.42     0.60     0.103      (  0.269)      0.051       0.051
  6   0.50     0.70     0.120      (  0.269)      0.060       0.060
  7   0.58     0.70     0.120      (  0.269)      0.060       0.060
  8   0.67     0.70     0.120      (  0.269)      0.060       0.060
  9   0.75     0.70     0.120      (  0.269)      0.060       0.060
 10   0.83     0.70     0.120      (  0.269)      0.060       0.060
 11   0.92     0.70     0.120      (  0.269)      0.060       0.060
 12   1.00     0.80     0.137      (  0.269)      0.069       0.069
 13   1.08     0.80     0.137      (  0.269)      0.069       0.069
 14   1.17     0.80     0.137      (  0.269)      0.069       0.069
 15   1.25     0.80     0.137      (  0.269)      0.069       0.069
 16   1.33     0.80     0.137      (  0.269)      0.069       0.069
 17   1.42     0.80     0.137      (  0.269)      0.069       0.069
 18   1.50     0.80     0.137      (  0.269)      0.069       0.069
 19   1.58     0.80     0.137      (  0.269)      0.069       0.069
 20   1.67     0.80     0.137      (  0.269)      0.069       0.069
 21   1.75     0.80     0.137      (  0.269)      0.069       0.069
 22   1.83     0.80     0.137      (  0.269)      0.069       0.069
 23   1.92     0.80     0.137      (  0.269)      0.069       0.069
 24   2.00     0.90     0.154      (  0.269)      0.077       0.077
 25   2.08     0.80     0.137      (  0.269)      0.069       0.069
 26   2.17     0.90     0.154      (  0.269)      0.077       0.077
 27   2.25     0.90     0.154      (  0.269)      0.077       0.077
 28   2.33     0.90     0.154      (  0.269)      0.077       0.077
 29   2.42     0.90     0.154      (  0.269)      0.077       0.077
 30   2.50     0.90     0.154      (  0.269)      0.077       0.077
 31   2.58     0.90     0.154      (  0.269)      0.077       0.077
 32   2.67     0.90     0.154      (  0.269)      0.077       0.077
 33   2.75     1.00     0.171      (  0.269)      0.086       0.086
 34   2.83     1.00     0.171      (  0.269)      0.086       0.086
 35   2.92     1.00     0.171      (  0.269)      0.086       0.086
 36   3.00     1.00     0.171      (  0.269)      0.086       0.086
 37   3.08     1.00     0.171      (  0.269)      0.086       0.086
 38   3.17     1.10     0.188      (  0.269)      0.094       0.094
 39   3.25     1.10     0.188      (  0.269)      0.094       0.094
 40   3.33     1.10     0.188      (  0.269)      0.094       0.094
 41   3.42     1.20     0.206      (  0.269)      0.103       0.103
 42   3.50     1.30     0.223      (  0.269)      0.111       0.111
 43   3.58     1.40     0.240      (  0.269)      0.120       0.120
 44   3.67     1.40     0.240      (  0.269)      0.120       0.120
 45   3.75     1.50     0.257      (  0.269)      0.128       0.128
 46   3.83     1.50     0.257      (  0.269)      0.128       0.128
 47   3.92     1.60     0.274      (  0.269)      0.137       0.137
 48   4.00     1.60     0.274      (  0.269)      0.137       0.137
 49   4.08     1.70     0.291      (  0.269)      0.146       0.146
 50   4.17     1.80     0.308      (  0.269)      0.154       0.154
 51   4.25     1.90     0.326      (  0.269)      0.163       0.163
 52   4.33     2.00     0.343      (  0.269)      0.171       0.171
 53   4.42     2.10     0.360      (  0.269)      0.180       0.180
 54   4.50     2.10     0.360      (  0.269)      0.180       0.180
 55   4.58     2.20     0.377      (  0.269)      0.188       0.188
 56   4.67     2.30     0.394      (  0.269)      0.197       0.197
 57   4.75     2.40     0.411      (  0.269)      0.206       0.206
 58   4.83     2.40     0.411      (  0.269)      0.206       0.206
 59   4.92     2.50     0.428      (  0.269)      0.214       0.214
 60   5.00     2.60     0.445      (  0.269)      0.223       0.223
 61   5.08     3.10     0.531      (  0.269)      0.266       0.266
```

```
62   5.17     3.60     0.617          0.269    (  0.308)       0.348
63   5.25     3.90     0.668          0.269    (  0.334)       0.399
64   5.33     4.20     0.720          0.269    (  0.360)       0.451
65   5.42     4.70     0.805          0.269    (  0.403)       0.536
66   5.50     5.60     0.959          0.269    (  0.480)       0.690
67   5.58     1.90     0.326       (  0.269)      0.163        0.163
68   5.67     0.90     0.154       (  0.269)      0.077        0.077
69   5.75     0.60     0.103       (  0.269)      0.051        0.051
70   5.83     0.50     0.086       (  0.269)      0.043        0.043
71   5.92     0.30     0.051       (  0.269)      0.026        0.026
72   6.00     0.20     0.034       (  0.269)      0.017        0.017
           (Loss Rate Not Used)
   Sum =     100.0                                     Sum =     9.1
    Flood volume = Effective rainfall      0.76(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       2.0(Ac.Ft)
    Total soil loss =      0.67(In)
    Total soil loss =     1.745(Ac.Ft)
    Total rainfall =      1.43(In)
    Flood volume =       86217.1 Cubic Feet
    Total soil loss =       76003.6 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     16.347(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0018      0.26  Q         |         |         |         |
  0+10       0.0084      0.96  VQ        |         |         |         |
  0+15       0.0174      1.31  V Q       |         |         |         |
  0+20       0.0274      1.45  V Q       |         |         |         |
  0+25       0.0378      1.52  V  Q      |         |         |         |
  0+30       0.0490      1.62  V  Q      |         |         |         |
  0+35       0.0612      1.77  |V Q      |         |         |         |
  0+40       0.0738      1.84  |V Q      |         |         |         |
  0+45       0.0867      1.86  |V Q      |         |         |         |
  0+50       0.0996      1.88  | VQ      |         |         |         |
  0+55       0.1126      1.88  | VQ      |         |         |         |
  1+ 0       0.1259      1.94  | VQ      |         |         |         |
  1+ 5       0.1402      2.07  | V Q     |         |         |         |
  1+10       0.1548      2.12  |  VQ     |         |         |         |
  1+15       0.1695      2.14  |  VQ     |         |         |         |
  1+20       0.1843      2.15  |  VQ     |         |         |         |
  1+25       0.1991      2.15  |   Q     |         |         |         |
  1+30       0.2140      2.16  |   Q     |         |         |         |
  1+35       0.2289      2.16  |   Q     |         |         |         |
  1+40       0.2438      2.16  |   Q     |         |         |         |
  1+45       0.2587      2.16  |   QV    |         |         |         |
  1+50       0.2736      2.16  |   QV    |         |         |         |
  1+55       0.2885      2.16  |   QV    |         |         |         |
  2+ 0       0.3037      2.21  |   Q V   |         |         |         |
  2+ 5       0.3195      2.29  |   Q V   |         |         |         |
```

```
    2+10       0.3351      2.26  |   Q V   |         |         |         |
    2+15       0.3514      2.36  |   Q  V  |         |         |         |
    2+20       0.3679      2.40  |   Q  V  |         |         |         |
    2+25       0.3845      2.41  |   Q  V  |         |         |         |
    2+30       0.4012      2.42  |   Q   V |         |         |         |
    2+35       0.4179      2.43  |   Q   V |         |         |         |
    2+40       0.4346      2.43  |   Q   V |         |         |         |
    2+45       0.4517      2.48  |   Q    V|         |         |         |
    2+50       0.4698      2.62  |    Q   V|         |         |         |
    2+55       0.4881      2.66  |    Q   V|         |         |         |
    3+ 0       0.5065      2.68  |    Q    V         |         |         |
    3+ 5       0.5250      2.69  |    Q    V         |         |         |
    3+10       0.5439      2.75  |    Q    V         |         |         |
    3+15       0.5638      2.88  |    Q    |V        |         |         |
    3+20       0.5839      2.93  |    Q    |V        |         |         |
    3+25       0.6046      3.00  |    Q    | V       |         |         |
    3+30       0.6266      3.19  |     Q   | V       |         |         |
    3+35       0.6502      3.42  |     Q   |  V      |         |         |
    3+40       0.6751      3.62  |      Q  |  V      |         |         |
    3+45       0.7009      3.75  |      Q  |   V     |         |         |
    3+50       0.7279      3.92  |      Q  |   V     |         |         |
    3+55       0.7557      4.03  |       Q |    V    |         |         |
    4+ 0       0.7846      4.20  |       Q |    V    |         |         |
    4+ 5       0.8143      4.31  |       Q |     V   |         |         |
    4+10       0.8454      4.52  |        Q|      V  |         |         |
    4+15       0.8783      4.77  |        Q|      V  |         |         |
    4+20       0.9128      5.02  |         Q       V |         |         |
    4+25       0.9492      5.28  |         Q        V|         |         |
    4+30       0.9870      5.49  |         Q        V|         |         |
    4+35       1.0258      5.63  |         |Q        V         |         |
    4+40       1.0661      5.86  |         |Q        |V        |         |
    4+45       1.1082      6.11  |         | Q       | V       |         |
    4+50       1.1517      6.32  |         | Q       |  V      |         |
    4+55       1.1961      6.45  |         | Q       |   V     |         |
    5+ 0       1.2420      6.67  |         |  Q      |    V    |         |
    5+ 5       1.2911      7.13  |         |   Q     |     V   |         |
    5+10       1.3486      8.35  |         |     Q   |      V  |         |
    5+15       1.4187     10.17  |         |         Q       V |         |
    5+20       1.4998     11.79  |         |         |  Q      V         |
    5+25       1.5935     13.59  |         |         |      Q  | V       |
    5+30       1.7060     16.35  |         |         |         | Q V     |
    5+35       1.8177     16.21  |         |         |         | Q   V   |
    5+40       1.8780      8.75  |         |      Q  |         |      V  |
    5+45       1.9140      5.24  |         Q         |         |       V |
    5+50       1.9382      3.51  |      Q  |         |         |        V|
    5+55       1.9554      2.49  |   Q     |         |         |        V|
    6+ 0       1.9668      1.65  |  Q      |         |         |        V|
    6+ 5       1.9737      1.01  | Q       |         |         |        V|
    6+10       1.9768      0.44  Q         |         |         |        V|
    6+15       1.9780      0.18  Q         |         |         |        V|
    6+20       1.9787      0.09  Q         |         |         |        V|
    6+25       1.9790      0.05  Q         |         |         |        V|
    6+30       1.9792      0.02  Q         |         |         |        V|
    6+35       1.9793      0.01  Q         |         |         |        V|
    6+40       1.9793      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop245.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 5 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  = 0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.70                 53.21

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              4.30                134.59
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
      STORM EVENT (YEAR) =    5.00
      Area Averaged 2-Year Rainfall =    1.700(In)
      Area Averaged 100-Year Rainfall =    4.300(In)

      Point rain (area averaged) =    2.309(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    2.309(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00         0.500
          26.400           56.00         0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %           (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134             6.036
          2   0.167        199.570         48.386            15.263
          3   0.250        299.355         15.668             4.942
          4   0.333        399.141          7.074             2.231
          5   0.417        498.926          3.984             1.257
          6   0.500        598.711          2.581             0.814
          7   0.583        698.496          1.607             0.507
          8   0.667        798.281          1.051             0.331
          9   0.750        898.066          0.516             0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max    |   Low        (In/Hr)
   1   0.08     0.07      0.018       (  0.477)       0.009         0.009
   2   0.17     0.07      0.018       (  0.475)       0.009         0.009
   3   0.25     0.07      0.018       (  0.473)       0.009         0.009
   4   0.33     0.10      0.028       (  0.471)       0.014         0.014
```

```
  5   0.42     0.10      0.028       (   0.470)       0.014       0.014
  6   0.50     0.10      0.028       (   0.468)       0.014       0.014
  7   0.58     0.10      0.028       (   0.466)       0.014       0.014
  8   0.67     0.10      0.028       (   0.464)       0.014       0.014
  9   0.75     0.10      0.028       (   0.462)       0.014       0.014
 10   0.83     0.13      0.037       (   0.460)       0.018       0.018
 11   0.92     0.13      0.037       (   0.459)       0.018       0.018
 12   1.00     0.13      0.037       (   0.457)       0.018       0.018
 13   1.08     0.10      0.028       (   0.455)       0.014       0.014
 14   1.17     0.10      0.028       (   0.453)       0.014       0.014
 15   1.25     0.10      0.028       (   0.451)       0.014       0.014
 16   1.33     0.10      0.028       (   0.450)       0.014       0.014
 17   1.42     0.10      0.028       (   0.448)       0.014       0.014
 18   1.50     0.10      0.028       (   0.446)       0.014       0.014
 19   1.58     0.10      0.028       (   0.444)       0.014       0.014
 20   1.67     0.10      0.028       (   0.443)       0.014       0.014
 21   1.75     0.10      0.028       (   0.441)       0.014       0.014
 22   1.83     0.13      0.037       (   0.439)       0.018       0.018
 23   1.92     0.13      0.037       (   0.437)       0.018       0.018
 24   2.00     0.13      0.037       (   0.435)       0.018       0.018
 25   2.08     0.13      0.037       (   0.434)       0.018       0.018
 26   2.17     0.13      0.037       (   0.432)       0.018       0.018
 27   2.25     0.13      0.037       (   0.430)       0.018       0.018
 28   2.33     0.13      0.037       (   0.428)       0.018       0.018
 29   2.42     0.13      0.037       (   0.427)       0.018       0.018
 30   2.50     0.13      0.037       (   0.425)       0.018       0.018
 31   2.58     0.17      0.046       (   0.423)       0.023       0.023
 32   2.67     0.17      0.046       (   0.421)       0.023       0.023
 33   2.75     0.17      0.046       (   0.420)       0.023       0.023
 34   2.83     0.17      0.046       (   0.418)       0.023       0.023
 35   2.92     0.17      0.046       (   0.416)       0.023       0.023
 36   3.00     0.17      0.046       (   0.415)       0.023       0.023
 37   3.08     0.17      0.046       (   0.413)       0.023       0.023
 38   3.17     0.17      0.046       (   0.411)       0.023       0.023
 39   3.25     0.17      0.046       (   0.409)       0.023       0.023
 40   3.33     0.17      0.046       (   0.408)       0.023       0.023
 41   3.42     0.17      0.046       (   0.406)       0.023       0.023
 42   3.50     0.17      0.046       (   0.404)       0.023       0.023
 43   3.58     0.17      0.046       (   0.403)       0.023       0.023
 44   3.67     0.17      0.046       (   0.401)       0.023       0.023
 45   3.75     0.17      0.046       (   0.399)       0.023       0.023
 46   3.83     0.20      0.055       (   0.398)       0.028       0.028
 47   3.92     0.20      0.055       (   0.396)       0.028       0.028
 48   4.00     0.20      0.055       (   0.394)       0.028       0.028
 49   4.08     0.20      0.055       (   0.393)       0.028       0.028
 50   4.17     0.20      0.055       (   0.391)       0.028       0.028
 51   4.25     0.20      0.055       (   0.389)       0.028       0.028
 52   4.33     0.23      0.065       (   0.388)       0.032       0.032
 53   4.42     0.23      0.065       (   0.386)       0.032       0.032
 54   4.50     0.23      0.065       (   0.384)       0.032       0.032
 55   4.58     0.23      0.065       (   0.383)       0.032       0.032
 56   4.67     0.23      0.065       (   0.381)       0.032       0.032
 57   4.75     0.23      0.065       (   0.379)       0.032       0.032
 58   4.83     0.27      0.074       (   0.378)       0.037       0.037
 59   4.92     0.27      0.074       (   0.376)       0.037       0.037
 60   5.00     0.27      0.074       (   0.374)       0.037       0.037
 61   5.08     0.20      0.055       (   0.373)       0.028       0.028
```

```
  62   5.17      0.20      0.055       (   0.371)      0.028       0.028
  63   5.25      0.20      0.055       (   0.370)      0.028       0.028
  64   5.33      0.23      0.065       (   0.368)      0.032       0.032
  65   5.42      0.23      0.065       (   0.366)      0.032       0.032
  66   5.50      0.23      0.065       (   0.365)      0.032       0.032
  67   5.58      0.27      0.074       (   0.363)      0.037       0.037
  68   5.67      0.27      0.074       (   0.362)      0.037       0.037
  69   5.75      0.27      0.074       (   0.360)      0.037       0.037
  70   5.83      0.27      0.074       (   0.358)      0.037       0.037
  71   5.92      0.27      0.074       (   0.357)      0.037       0.037
  72   6.00      0.27      0.074       (   0.355)      0.037       0.037
  73   6.08      0.30      0.083       (   0.354)      0.042       0.042
  74   6.17      0.30      0.083       (   0.352)      0.042       0.042
  75   6.25      0.30      0.083       (   0.350)      0.042       0.042
  76   6.33      0.30      0.083       (   0.349)      0.042       0.042
  77   6.42      0.30      0.083       (   0.347)      0.042       0.042
  78   6.50      0.30      0.083       (   0.346)      0.042       0.042
  79   6.58      0.33      0.092       (   0.344)      0.046       0.046
  80   6.67      0.33      0.092       (   0.343)      0.046       0.046
  81   6.75      0.33      0.092       (   0.341)      0.046       0.046
  82   6.83      0.33      0.092       (   0.340)      0.046       0.046
  83   6.92      0.33      0.092       (   0.338)      0.046       0.046
  84   7.00      0.33      0.092       (   0.336)      0.046       0.046
  85   7.08      0.33      0.092       (   0.335)      0.046       0.046
  86   7.17      0.33      0.092       (   0.333)      0.046       0.046
  87   7.25      0.33      0.092       (   0.332)      0.046       0.046
  88   7.33      0.37      0.102       (   0.330)      0.051       0.051
  89   7.42      0.37      0.102       (   0.329)      0.051       0.051
  90   7.50      0.37      0.102       (   0.327)      0.051       0.051
  91   7.58      0.40      0.111       (   0.326)      0.055       0.055
  92   7.67      0.40      0.111       (   0.324)      0.055       0.055
  93   7.75      0.40      0.111       (   0.323)      0.055       0.055
  94   7.83      0.43      0.120       (   0.321)      0.060       0.060
  95   7.92      0.43      0.120       (   0.320)      0.060       0.060
  96   8.00      0.43      0.120       (   0.318)      0.060       0.060
  97   8.08      0.50      0.139       (   0.317)      0.069       0.069
  98   8.17      0.50      0.139       (   0.315)      0.069       0.069
  99   8.25      0.50      0.139       (   0.314)      0.069       0.069
 100   8.33      0.50      0.139       (   0.313)      0.069       0.069
 101   8.42      0.50      0.139       (   0.311)      0.069       0.069
 102   8.50      0.50      0.139       (   0.310)      0.069       0.069
 103   8.58      0.53      0.148       (   0.308)      0.074       0.074
 104   8.67      0.53      0.148       (   0.307)      0.074       0.074
 105   8.75      0.53      0.148       (   0.305)      0.074       0.074
 106   8.83      0.57      0.157       (   0.304)      0.079       0.079
 107   8.92      0.57      0.157       (   0.302)      0.079       0.079
 108   9.00      0.57      0.157       (   0.301)      0.079       0.079
 109   9.08      0.63      0.175       (   0.300)      0.088       0.088
 110   9.17      0.63      0.175       (   0.298)      0.088       0.088
 111   9.25      0.63      0.175       (   0.297)      0.088       0.088
 112   9.33      0.67      0.185       (   0.295)      0.092       0.092
 113   9.42      0.67      0.185       (   0.294)      0.092       0.092
 114   9.50      0.67      0.185       (   0.292)      0.092       0.092
 115   9.58      0.70      0.194       (   0.291)      0.097       0.097
 116   9.67      0.70      0.194       (   0.290)      0.097       0.097
 117   9.75      0.70      0.194       (   0.288)      0.097       0.097
 118   9.83      0.73      0.203       (   0.287)      0.102       0.102
```

```
119   9.92      0.73      0.203       (   0.286)      0.102      0.102
120  10.00      0.73      0.203       (   0.284)      0.102      0.102
121  10.08      0.50      0.139       (   0.283)      0.069      0.069
122  10.17      0.50      0.139       (   0.281)      0.069      0.069
123  10.25      0.50      0.139       (   0.280)      0.069      0.069
124  10.33      0.50      0.139       (   0.279)      0.069      0.069
125  10.42      0.50      0.139       (   0.277)      0.069      0.069
126  10.50      0.50      0.139       (   0.276)      0.069      0.069
127  10.58      0.67      0.185       (   0.275)      0.092      0.092
128  10.67      0.67      0.185       (   0.273)      0.092      0.092
129  10.75      0.67      0.185       (   0.272)      0.092      0.092
130  10.83      0.67      0.185       (   0.271)      0.092      0.092
131  10.92      0.67      0.185       (   0.269)      0.092      0.092
132  11.00      0.67      0.185       (   0.268)      0.092      0.092
133  11.08      0.63      0.175       (   0.267)      0.088      0.088
134  11.17      0.63      0.175       (   0.265)      0.088      0.088
135  11.25      0.63      0.175       (   0.264)      0.088      0.088
136  11.33      0.63      0.175       (   0.263)      0.088      0.088
137  11.42      0.63      0.175       (   0.261)      0.088      0.088
138  11.50      0.63      0.175       (   0.260)      0.088      0.088
139  11.58      0.57      0.157       (   0.259)      0.079      0.079
140  11.67      0.57      0.157       (   0.258)      0.079      0.079
141  11.75      0.57      0.157       (   0.256)      0.079      0.079
142  11.83      0.60      0.166       (   0.255)      0.083      0.083
143  11.92      0.60      0.166       (   0.254)      0.083      0.083
144  12.00      0.60      0.166       (   0.252)      0.083      0.083
145  12.08      0.83      0.231       (   0.251)      0.115      0.115
146  12.17      0.83      0.231       (   0.250)      0.115      0.115
147  12.25      0.83      0.231       (   0.249)      0.115      0.115
148  12.33      0.87      0.240       (   0.247)      0.120      0.120
149  12.42      0.87      0.240       (   0.246)      0.120      0.120
150  12.50      0.87      0.240       (   0.245)      0.120      0.120
151  12.58      0.93      0.259       (   0.244)      0.129      0.129
152  12.67      0.93      0.259       (   0.242)      0.129      0.129
153  12.75      0.93      0.259       (   0.241)      0.129      0.129
154  12.83      0.97      0.268       (   0.240)      0.134      0.134
155  12.92      0.97      0.268       (   0.239)      0.134      0.134
156  13.00      0.97      0.268       (   0.238)      0.134      0.134
157  13.08      1.13      0.314       (   0.236)      0.157      0.157
158  13.17      1.13      0.314       (   0.235)      0.157      0.157
159  13.25      1.13      0.314       (   0.234)      0.157      0.157
160  13.33      1.13      0.314       (   0.233)      0.157      0.157
161  13.42      1.13      0.314       (   0.232)      0.157      0.157
162  13.50      1.13      0.314       (   0.230)      0.157      0.157
163  13.58      0.77      0.212       (   0.229)      0.106      0.106
164  13.67      0.77      0.212       (   0.228)      0.106      0.106
165  13.75      0.77      0.212       (   0.227)      0.106      0.106
166  13.83      0.77      0.212       (   0.226)      0.106      0.106
167  13.92      0.77      0.212       (   0.225)      0.106      0.106
168  14.00      0.77      0.212       (   0.223)      0.106      0.106
169  14.08      0.90      0.249       (   0.222)      0.125      0.125
170  14.17      0.90      0.249       (   0.221)      0.125      0.125
171  14.25      0.90      0.249       (   0.220)      0.125      0.125
172  14.33      0.87      0.240       (   0.219)      0.120      0.120
173  14.42      0.87      0.240       (   0.218)      0.120      0.120
174  14.50      0.87      0.240       (   0.217)      0.120      0.120
175  14.58      0.87      0.240       (   0.216)      0.120      0.120
```

```
 176  14.67      0.87      0.240       (   0.215)      0.120      0.120
 177  14.75      0.87      0.240       (   0.213)      0.120      0.120
 178  14.83      0.83      0.231       (   0.212)      0.115      0.115
 179  14.92      0.83      0.231       (   0.211)      0.115      0.115
 180  15.00      0.83      0.231       (   0.210)      0.115      0.115
 181  15.08      0.80      0.222       (   0.209)      0.111      0.111
 182  15.17      0.80      0.222       (   0.208)      0.111      0.111
 183  15.25      0.80      0.222       (   0.207)      0.111      0.111
 184  15.33      0.77      0.212       (   0.206)      0.106      0.106
 185  15.42      0.77      0.212       (   0.205)      0.106      0.106
 186  15.50      0.77      0.212       (   0.204)      0.106      0.106
 187  15.58      0.63      0.175       (   0.203)      0.088      0.088
 188  15.67      0.63      0.175       (   0.202)      0.088      0.088
 189  15.75      0.63      0.175       (   0.201)      0.088      0.088
 190  15.83      0.63      0.175       (   0.200)      0.088      0.088
 191  15.92      0.63      0.175       (   0.199)      0.088      0.088
 192  16.00      0.63      0.175       (   0.198)      0.088      0.088
 193  16.08      0.13      0.037       (   0.197)      0.018      0.018
 194  16.17      0.13      0.037       (   0.196)      0.018      0.018
 195  16.25      0.13      0.037       (   0.195)      0.018      0.018
 196  16.33      0.13      0.037       (   0.194)      0.018      0.018
 197  16.42      0.13      0.037       (   0.193)      0.018      0.018
 198  16.50      0.13      0.037       (   0.192)      0.018      0.018
 199  16.58      0.10      0.028       (   0.191)      0.014      0.014
 200  16.67      0.10      0.028       (   0.190)      0.014      0.014
 201  16.75      0.10      0.028       (   0.189)      0.014      0.014
 202  16.83      0.10      0.028       (   0.188)      0.014      0.014
 203  16.92      0.10      0.028       (   0.187)      0.014      0.014
 204  17.00      0.10      0.028       (   0.186)      0.014      0.014
 205  17.08      0.17      0.046       (   0.185)      0.023      0.023
 206  17.17      0.17      0.046       (   0.184)      0.023      0.023
 207  17.25      0.17      0.046       (   0.183)      0.023      0.023
 208  17.33      0.17      0.046       (   0.182)      0.023      0.023
 209  17.42      0.17      0.046       (   0.181)      0.023      0.023
 210  17.50      0.17      0.046       (   0.180)      0.023      0.023
 211  17.58      0.17      0.046       (   0.179)      0.023      0.023
 212  17.67      0.17      0.046       (   0.179)      0.023      0.023
 213  17.75      0.17      0.046       (   0.178)      0.023      0.023
 214  17.83      0.13      0.037       (   0.177)      0.018      0.018
 215  17.92      0.13      0.037       (   0.176)      0.018      0.018
 216  18.00      0.13      0.037       (   0.175)      0.018      0.018
 217  18.08      0.13      0.037       (   0.174)      0.018      0.018
 218  18.17      0.13      0.037       (   0.173)      0.018      0.018
 219  18.25      0.13      0.037       (   0.172)      0.018      0.018
 220  18.33      0.13      0.037       (   0.172)      0.018      0.018
 221  18.42      0.13      0.037       (   0.171)      0.018      0.018
 222  18.50      0.13      0.037       (   0.170)      0.018      0.018
 223  18.58      0.10      0.028       (   0.169)      0.014      0.014
 224  18.67      0.10      0.028       (   0.168)      0.014      0.014
 225  18.75      0.10      0.028       (   0.167)      0.014      0.014
 226  18.83      0.07      0.018       (   0.167)      0.009      0.009
 227  18.92      0.07      0.018       (   0.166)      0.009      0.009
 228  19.00      0.07      0.018       (   0.165)      0.009      0.009
 229  19.08      0.10      0.028       (   0.164)      0.014      0.014
 230  19.17      0.10      0.028       (   0.164)      0.014      0.014
 231  19.25      0.10      0.028       (   0.163)      0.014      0.014
 232  19.33      0.13      0.037       (   0.162)      0.018      0.018
```

```
233  19.42     0.13      0.037       (  0.161)      0.018        0.018
234  19.50     0.13      0.037       (  0.161)      0.018        0.018
235  19.58     0.10      0.028       (  0.160)      0.014        0.014
236  19.67     0.10      0.028       (  0.159)      0.014        0.014
237  19.75     0.10      0.028       (  0.158)      0.014        0.014
238  19.83     0.07      0.018       (  0.158)      0.009        0.009
239  19.92     0.07      0.018       (  0.157)      0.009        0.009
240  20.00     0.07      0.018       (  0.156)      0.009        0.009
241  20.08     0.10      0.028       (  0.156)      0.014        0.014
242  20.17     0.10      0.028       (  0.155)      0.014        0.014
243  20.25     0.10      0.028       (  0.154)      0.014        0.014
244  20.33     0.10      0.028       (  0.154)      0.014        0.014
245  20.42     0.10      0.028       (  0.153)      0.014        0.014
246  20.50     0.10      0.028       (  0.152)      0.014        0.014
247  20.58     0.10      0.028       (  0.152)      0.014        0.014
248  20.67     0.10      0.028       (  0.151)      0.014        0.014
249  20.75     0.10      0.028       (  0.150)      0.014        0.014
250  20.83     0.07      0.018       (  0.150)      0.009        0.009
251  20.92     0.07      0.018       (  0.149)      0.009        0.009
252  21.00     0.07      0.018       (  0.149)      0.009        0.009
253  21.08     0.10      0.028       (  0.148)      0.014        0.014
254  21.17     0.10      0.028       (  0.147)      0.014        0.014
255  21.25     0.10      0.028       (  0.147)      0.014        0.014
256  21.33     0.07      0.018       (  0.146)      0.009        0.009
257  21.42     0.07      0.018       (  0.146)      0.009        0.009
258  21.50     0.07      0.018       (  0.145)      0.009        0.009
259  21.58     0.10      0.028       (  0.145)      0.014        0.014
260  21.67     0.10      0.028       (  0.144)      0.014        0.014
261  21.75     0.10      0.028       (  0.144)      0.014        0.014
262  21.83     0.07      0.018       (  0.143)      0.009        0.009
263  21.92     0.07      0.018       (  0.143)      0.009        0.009
264  22.00     0.07      0.018       (  0.142)      0.009        0.009
265  22.08     0.10      0.028       (  0.142)      0.014        0.014
266  22.17     0.10      0.028       (  0.141)      0.014        0.014
267  22.25     0.10      0.028       (  0.141)      0.014        0.014
268  22.33     0.07      0.018       (  0.140)      0.009        0.009
269  22.42     0.07      0.018       (  0.140)      0.009        0.009
270  22.50     0.07      0.018       (  0.139)      0.009        0.009
271  22.58     0.07      0.018       (  0.139)      0.009        0.009
272  22.67     0.07      0.018       (  0.139)      0.009        0.009
273  22.75     0.07      0.018       (  0.138)      0.009        0.009
274  22.83     0.07      0.018       (  0.138)      0.009        0.009
275  22.92     0.07      0.018       (  0.138)      0.009        0.009
276  23.00     0.07      0.018       (  0.137)      0.009        0.009
277  23.08     0.07      0.018       (  0.137)      0.009        0.009
278  23.17     0.07      0.018       (  0.137)      0.009        0.009
279  23.25     0.07      0.018       (  0.136)      0.009        0.009
280  23.33     0.07      0.018       (  0.136)      0.009        0.009
281  23.42     0.07      0.018       (  0.136)      0.009        0.009
282  23.50     0.07      0.018       (  0.135)      0.009        0.009
283  23.58     0.07      0.018       (  0.135)      0.009        0.009
284  23.67     0.07      0.018       (  0.135)      0.009        0.009
285  23.75     0.07      0.018       (  0.135)      0.009        0.009
286  23.83     0.07      0.018       (  0.135)      0.009        0.009
287  23.92     0.07      0.018       (  0.135)      0.009        0.009
288  24.00     0.07      0.018       (  0.135)      0.009        0.009
            (Loss Rate Not Used)
```

```
   Sum =     100.0                                   Sum =    13.9
    Flood volume = Effective rainfall      1.15(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       3.0(Ac.Ft)
    Total soil loss =      1.15(In)
    Total soil loss =     3.011(Ac.Ft)
    Total rainfall =      2.31(In)
    Flood volume =      131164.2 Cubic Feet
    Total soil loss =      131164.2 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      4.932(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0004      0.06  Q         |         |         |         |
  0+10       0.0017      0.20  Q         |         |         |         |
  0+15       0.0034      0.24  Q         |         |         |         |
  0+20       0.0054      0.29  VQ        |         |         |         |
  0+25       0.0080      0.37  VQ        |         |         |         |
  0+30       0.0108      0.40  VQ        |         |         |         |
  0+35       0.0136      0.42  VQ        |         |         |         |
  0+40       0.0166      0.43  VQ        |         |         |         |
  0+45       0.0196      0.43  VQ        |         |         |         |
  0+50       0.0228      0.46  VQ        |         |         |         |
  0+55       0.0264      0.53  V Q       |         |         |         |
  1+ 0       0.0303      0.56  V Q       |         |         |         |
  1+ 5       0.0340      0.54  V Q       |         |         |         |
  1+10       0.0373      0.48  VQ        |         |         |         |
  1+15       0.0404      0.46  VQ        |         |         |         |
  1+20       0.0435      0.45  VQ        |         |         |         |
  1+25       0.0466      0.44  VQ        |         |         |         |
  1+30       0.0496      0.44  VQ        |         |         |         |
  1+35       0.0527      0.44  VQ        |         |         |         |
  1+40       0.0557      0.44  VQ        |         |         |         |
  1+45       0.0587      0.44  VQ        |         |         |         |
  1+50       0.0619      0.47  VQ        |         |         |         |
  1+55       0.0656      0.54  V Q       |         |         |         |
  2+ 0       0.0694      0.56  V Q       |         |         |         |
  2+ 5       0.0733      0.57  V Q       |         |         |         |
  2+10       0.0773      0.57  |VQ       |         |         |         |
  2+15       0.0813      0.58  |VQ       |         |         |         |
  2+20       0.0853      0.58  |VQ       |         |         |         |
  2+25       0.0893      0.58  |VQ       |         |         |         |
  2+30       0.0933      0.58  |VQ       |         |         |         |
  2+35       0.0975      0.61  |VQ       |         |         |         |
  2+40       0.1022      0.68  |VQ       |         |         |         |
  2+45       0.1071      0.70  |VQ       |         |         |         |
  2+50       0.1120      0.71  |VQ       |         |         |         |
  2+55       0.1169      0.72  |VQ       |         |         |         |
  3+ 0       0.1219      0.72  |VQ       |         |         |         |
  3+ 5       0.1269      0.73  |VQ       |         |         |         |
```

```
3+10       0.1319      0.73  |VQ       |         |         |         |
3+15       0.1370      0.73  |VQ       |         |         |         |
3+20       0.1420      0.73  |VQ       |         |         |         |
3+25       0.1470      0.73  |VQ       |         |         |         |
3+30       0.1520      0.73  | Q       |         |         |         |
3+35       0.1570      0.73  | Q       |         |         |         |
3+40       0.1621      0.73  | Q       |         |         |         |
3+45       0.1671      0.73  | Q       |         |         |         |
3+50       0.1723      0.76  | VQ      |         |         |         |
3+55       0.1780      0.83  | VQ      |         |         |         |
4+ 0       0.1838      0.85  | VQ      |         |         |         |
4+ 5       0.1898      0.86  | VQ      |         |         |         |
4+10       0.1957      0.87  | VQ      |         |         |         |
4+15       0.2017      0.87  | VQ      |         |         |         |
4+20       0.2079      0.90  | VQ      |         |         |         |
4+25       0.2146      0.97  | VQ      |         |         |         |
4+30       0.2215      1.00  | VQ      |         |         |         |
4+35       0.2284      1.01  |  VQ     |         |         |         |
4+40       0.2354      1.01  |  VQ     |         |         |         |
4+45       0.2424      1.02  |  VQ     |         |         |         |
4+50       0.2496      1.05  |  VQ     |         |         |         |
4+55       0.2573      1.12  |  VQ     |         |         |         |
5+ 0       0.2651      1.14  |  VQ     |         |         |         |
5+ 5       0.2727      1.10  |  VQ     |         |         |         |
5+10       0.2793      0.96  |  Q      |         |         |         |
5+15       0.2856      0.92  |  Q      |         |         |         |
5+20       0.2920      0.93  |  Q      |         |         |         |
5+25       0.2988      0.99  |  Q      |         |         |         |
5+30       0.3057      1.00  |   Q     |         |         |         |
5+35       0.3129      1.04  |   Q     |         |         |         |
5+40       0.3205      1.11  |   Q     |         |         |         |
5+45       0.3284      1.14  |   Q     |         |         |         |
5+50       0.3363      1.15  |   Q     |         |         |         |
5+55       0.3443      1.16  |   Q     |         |         |         |
6+ 0       0.3522      1.16  |   Q     |         |         |         |
6+ 5       0.3605      1.19  |   Q     |         |         |         |
6+10       0.3692      1.26  |   VQ    |         |         |         |
6+15       0.3780      1.29  |    Q    |         |         |         |
6+20       0.3870      1.30  |    Q    |         |         |         |
6+25       0.3959      1.30  |    Q    |         |         |         |
6+30       0.4049      1.31  |    Q    |         |         |         |
6+35       0.4141      1.34  |    Q    |         |         |         |
6+40       0.4238      1.41  |    Q    |         |         |         |
6+45       0.4337      1.43  |    Q    |         |         |         |
6+50       0.4437      1.44  |    Q    |         |         |         |
6+55       0.4536      1.45  |    QV   |         |         |         |
7+ 0       0.4636      1.45  |    QV   |         |         |         |
7+ 5       0.4737      1.46  |    QV   |         |         |         |
7+10       0.4837      1.46  |    QV   |         |         |         |
7+15       0.4937      1.46  |    QV   |         |         |         |
7+20       0.5040      1.49  |    QV   |         |         |         |
7+25       0.5147      1.56  |     Q   |         |         |         |
7+30       0.5255      1.58  |     Q   |         |         |         |
7+35       0.5367      1.62  |     QV  |         |         |         |
7+40       0.5483      1.69  |     QV  |         |         |         |
7+45       0.5602      1.72  |     QV  |         |         |         |
7+50       0.5723      1.76  |      Q  |         |         |         |
```

```
 7+55       0.5850      1.84  |      Q  |         |         |         |
 8+ 0       0.5978      1.87  |      Q  |         |         |         |
 8+ 5       0.6111      1.93  |      QV |         |         |         |
 8+10       0.6255      2.08  |       Q |         |         |         |
 8+15       0.6402      2.13  |       Q |         |         |         |
 8+20       0.6550      2.16  |       Q |         |         |         |
 8+25       0.6699      2.17  |       Q |         |         |         |
 8+30       0.6849      2.18  |       QV|         |         |         |
 8+35       0.7001      2.21  |       QV|         |         |         |
 8+40       0.7159      2.28  |        Q|         |         |         |
 8+45       0.7318      2.31  |        Q|         |         |         |
 8+50       0.7479      2.35  |        Q|         |         |         |
 8+55       0.7646      2.42  |        QV         |         |         |
 9+ 0       0.7815      2.45  |        QV         |         |         |
 9+ 5       0.7988      2.52  |         Q         |         |         |
 9+10       0.8171      2.67  |         Q         |         |         |
 9+15       0.8358      2.72  |         QV        |         |         |
 9+20       0.8549      2.77  |         |Q        |         |         |
 9+25       0.8745      2.85  |         |Q        |         |         |
 9+30       0.8944      2.88  |         |Q        |         |         |
 9+35       0.9145      2.92  |         |QV       |         |         |
 9+40       0.9352      3.00  |         | Q       |         |         |
 9+45       0.9561      3.03  |         | Q       |         |         |
 9+50       0.9772      3.07  |         | Q       |         |         |
 9+55       0.9989      3.15  |         | QV      |         |         |
10+ 0       1.0208      3.18  |         | QV      |         |         |
10+ 5       1.0414      2.99  |         |Q V      |         |         |
10+10       1.0587      2.51  |         Q   V     |         |         |
10+15       1.0749      2.35  |        Q|   V     |         |         |
10+20       1.0906      2.28  |        Q|   V     |         |         |
10+25       1.1061      2.24  |       Q |   V     |         |         |
10+30       1.1214      2.22  |       Q |   V     |         |         |
10+35       1.1375      2.34  |        Q|    V    |         |         |
10+40       1.1560      2.68  |         Q    V    |         |         |
10+45       1.1752      2.79  |         |Q   V    |         |         |
10+50       1.1948      2.84  |         |Q   V    |         |         |
10+55       1.2146      2.87  |         |Q    V   |         |         |
11+ 0       1.2345      2.89  |         |Q    V   |         |         |
11+ 5       1.2543      2.88  |         |Q    V   |         |         |
11+10       1.2737      2.81  |         |Q    V   |         |         |
11+15       1.2929      2.79  |         |Q     V  |         |         |
11+20       1.3121      2.78  |         |Q     V  |         |         |
11+25       1.3312      2.78  |         |Q     V  |         |         |
11+30       1.3503      2.77  |         |Q     V  |         |         |
11+35       1.3690      2.72  |         Q       V |         |         |
11+40       1.3867      2.57  |         Q       V |         |         |
11+45       1.4041      2.53  |         Q       V |         |         |
11+50       1.4216      2.53  |         Q       V |         |         |
11+55       1.4394      2.59  |         Q        V|         |         |
12+ 0       1.4574      2.61  |         Q        V|         |         |
12+ 5       1.4767      2.81  |         |Q       V|         |         |
12+10       1.4995      3.31  |         |  Q     V|         |         |
12+15       1.5234      3.47  |         |  Q      V         |         |
12+20       1.5480      3.57  |         |   Q     V         |         |
12+25       1.5733      3.68  |         |   Q     V         |         |
12+30       1.5990      3.73  |         |   Q     |V        |         |
12+35       1.6253      3.81  |         |    Q    |V        |         |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
12+40       1.6526      3.97  |         |    Q    |V        |         |
12+45       1.6804      4.03  |         |     Q   | V       |         |
12+50       1.7085      4.08  |         |     Q   | V       |         |
12+55       1.7371      4.16  |         |     Q   |  V      |         |
13+ 0       1.7660      4.19  |         |     Q   |  V      |         |
13+ 5       1.7959      4.35  |         |      Q  |  V      |         |
13+10       1.8284      4.71  |         |       Q |   V     |         |
13+15       1.8616      4.83  |         |        Q|   V     |         |
13+20       1.8952      4.88  |         |        Q|    V    |         |
13+25       1.9291      4.91  |         |        Q|    V    |         |
13+30       1.9630      4.93  |         |        Q|     V   |         |
13+35       1.9950      4.64  |         |       Q |     V   |         |
13+40       2.0216      3.87  |         |    Q    |     V   |         |
13+45       2.0466      3.62  |         |   Q     |      V  |         |
13+50       2.0707      3.51  |         |   Q     |      V  |         |
13+55       2.0944      3.44  |         |  Q      |      V  |         |
14+ 0       2.1179      3.40  |         |  Q      |       V |         |
14+ 5       2.1419      3.49  |         |  Q      |       V |         |
14+10       2.1678      3.75  |         |    Q    |       V |         |
14+15       2.1942      3.84  |         |    Q    |        V|         |
14+20       2.2207      3.85  |         |    Q    |        V|         |
14+25       2.2469      3.80  |         |    Q    |        V|         |
14+30       2.2730      3.80  |         |    Q    |         V         |
14+35       2.2992      3.79  |         |    Q    |         V         |
14+40       2.3253      3.79  |         |    Q    |         V         |
14+45       2.3514      3.79  |         |    Q    |         |V        |
14+50       2.3773      3.76  |         |    Q    |         |V        |
14+55       2.4028      3.69  |         |   Q     |         |V        |
15+ 0       2.4280      3.67  |         |   Q     |         | V       |
15+ 5       2.4530      3.63  |         |   Q     |         | V       |
15+10       2.4775      3.55  |         |   Q     |         | V       |
15+15       2.5018      3.53  |         |   Q     |         |  V      |
15+20       2.5258      3.49  |         |  Q      |         |  V      |
15+25       2.5493      3.41  |         |  Q      |         |  V      |
15+30       2.5726      3.38  |         |  Q      |         |   V     |
15+35       2.5950      3.26  |         |  Q      |         |   V     |
15+40       2.6154      2.97  |         |Q        |         |   V     |
15+45       2.6352      2.87  |         |Q        |         |    V    |
15+50       2.6547      2.83  |         |Q        |         |    V    |
15+55       2.6740      2.80  |         |Q        |         |    V    |
16+ 0       2.6932      2.79  |         |Q        |         |    V    |
16+ 5       2.7094      2.36  |        Q|         |         |    V    |
16+10       2.7184      1.30  |    Q    |         |         |     V   |
16+15       2.7249      0.95  |  Q      |         |         |     V   |
16+20       2.7304      0.80  |  Q      |         |         |     V   |
16+25       2.7353      0.71  | Q       |         |         |     V   |
16+30       2.7398      0.65  | Q       |         |         |     V   |
16+35       2.7438      0.59  | Q       |         |         |     V   |
16+40       2.7472      0.50  |Q        |         |         |     V   |
16+45       2.7504      0.46  |Q        |         |         |     V   |
16+50       2.7535      0.45  |Q        |         |         |     V   |
16+55       2.7566      0.45  |Q        |         |         |     V   |
17+ 0       2.7596      0.44  |Q        |         |         |     V   |
17+ 5       2.7630      0.50  |Q        |         |         |     V   |
17+10       2.7674      0.63  | Q       |         |         |     V   |
17+15       2.7721      0.68  | Q       |         |         |     V   |
17+20       2.7769      0.70  | Q       |         |         |     V   |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17+25       2.7818      0.71  | Q       |         |         |     V   |
17+30       2.7868      0.72  | Q       |         |         |      V  |
17+35       2.7918      0.72  | Q       |         |         |      V  |
17+40       2.7968      0.73  | Q       |         |         |      V  |
17+45       2.8018      0.73  | Q       |         |         |      V  |
17+50       2.8066      0.70  | Q       |         |         |      V  |
17+55       2.8110      0.63  | Q       |         |         |      V  |
18+ 0       2.8151      0.61  | Q       |         |         |      V  |
18+ 5       2.8193      0.60  | Q       |         |         |      V  |
18+10       2.8233      0.59  | Q       |         |         |      V  |
18+15       2.8274      0.59  | Q       |         |         |      V  |
18+20       2.8314      0.59  | Q       |         |         |      V  |
18+25       2.8354      0.58  | Q       |         |         |      V  |
18+30       2.8394      0.58  | Q       |         |         |      V  |
18+35       2.8433      0.56  | Q       |         |         |      V  |
18+40       2.8466      0.48  |Q        |         |         |      V  |
18+45       2.8498      0.46  |Q        |         |         |      V  |
18+50       2.8527      0.42  |Q        |         |         |      V  |
18+55       2.8551      0.35  |Q        |         |         |      V  |
19+ 0       2.8573      0.32  |Q        |         |         |      V  |
19+ 5       2.8596      0.34  |Q        |         |         |      V  |
19+10       2.8624      0.40  |Q        |         |         |       V |
19+15       2.8652      0.42  |Q        |         |         |       V |
19+20       2.8684      0.45  |Q        |         |         |       V |
19+25       2.8720      0.53  | Q       |         |         |       V |
19+30       2.8758      0.55  | Q       |         |         |       V |
19+35       2.8795      0.54  | Q       |         |         |       V |
19+40       2.8828      0.48  |Q        |         |         |       V |
19+45       2.8859      0.46  |Q        |         |         |       V |
19+50       2.8888      0.42  |Q        |         |         |       V |
19+55       2.8912      0.35  |Q        |         |         |       V |
20+ 0       2.8934      0.32  |Q        |         |         |       V |
20+ 5       2.8957      0.34  |Q        |         |         |       V |
20+10       2.8985      0.40  |Q        |         |         |       V |
20+15       2.9014      0.42  |Q        |         |         |       V |
20+20       2.9043      0.43  |Q        |         |         |       V |
20+25       2.9073      0.43  |Q        |         |         |       V |
20+30       2.9102      0.43  |Q        |         |         |       V |
20+35       2.9132      0.43  |Q        |         |         |       V |
20+40       2.9162      0.44  |Q        |         |         |       V |
20+45       2.9192      0.44  |Q        |         |         |       V |
20+50       2.9221      0.41  |Q        |         |         |       V |
20+55       2.9244      0.34  |Q        |         |         |       V |
21+ 0       2.9266      0.32  |Q        |         |         |       V |
21+ 5       2.9289      0.33  |Q        |         |         |       V |
21+10       2.9316      0.40  |Q        |         |         |       V |
21+15       2.9345      0.42  |Q        |         |         |       V |
21+20       2.9372      0.40  |Q        |         |         |        V|
21+25       2.9395      0.33  |Q        |         |         |        V|
21+30       2.9417      0.31  |Q        |         |         |        V|
21+35       2.9439      0.33  |Q        |         |         |        V|
21+40       2.9467      0.40  |Q        |         |         |        V|
21+45       2.9495      0.42  |Q        |         |         |        V|
21+50       2.9523      0.40  |Q        |         |         |        V|
21+55       2.9546      0.33  |Q        |         |         |        V|
22+ 0       2.9567      0.31  |Q        |         |         |        V|
22+ 5       2.9590      0.33  |Q        |         |         |        V|
```

```
   22+10          2.9617      0.40  |Q         |         |         |        V|
   22+15          2.9646      0.42  |Q         |         |         |        V|
   22+20          2.9673      0.40  |Q         |         |         |        V|
   22+25          2.9696      0.33  |Q         |         |         |        V|
   22+30          2.9718      0.31  |Q         |         |         |        V|
   22+35          2.9739      0.30  |Q         |         |         |        V|
   22+40          2.9759      0.30  |Q         |         |         |        V|
   22+45          2.9780      0.30  |Q         |         |         |        V|
   22+50          2.9800      0.29  |Q         |         |         |        V|
   22+55          2.9820      0.29  |Q         |         |         |        V|
   23+ 0          2.9840      0.29  |Q         |         |         |        V|
   23+ 5          2.9860      0.29  |Q         |         |         |        V|
   23+10          2.9880      0.29  |Q         |         |         |        V|
   23+15          2.9900      0.29  |Q         |         |         |        V|
   23+20          2.9920      0.29  |Q         |         |         |        V|
   23+25          2.9940      0.29  |Q         |         |         |        V|
   23+30          2.9960      0.29  |Q         |         |         |        V|
   23+35          2.9980      0.29  |Q         |         |         |        V|
   23+40          3.0001      0.29  |Q         |         |         |        V|
   23+45          3.0021      0.29  |Q         |         |         |        V|
   23+50          3.0041      0.29  |Q         |         |         |        V|
   23+55          3.0061      0.29  |Q         |         |         |        V|
   24+ 0          3.0081      0.29  |Q         |         |         |        V|
   24+ 5          3.0097      0.24  Q          |         |         |        V|
   24+10          3.0104      0.09  Q          |         |         |        V|
   24+15          3.0107      0.05  Q          |         |         |        V|
   24+20          3.0109      0.03  Q          |         |         |        V|
   24+25          3.0110      0.02  Q          |         |         |        V|
   24+30          3.0111      0.01  Q          |         |         |        V|
   24+35          3.0111      0.00  Q          |         |         |        V|
   24+40          3.0111      0.00  Q          |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop110.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589
Proposed Condition 10 Year 1 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  = 0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             0.48                  15.02

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             1.18                  36.93
```

```
      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    0.480(In)
      Area Averaged 100-Year Rainfall =    1.180(In)

      Point rain (area averaged) =    0.768(In)
      Areal adjustment factor =   99.97 %
      Adjusted average point rain =    0.768(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00          0.500
          26.400           56.00          0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------
      Slope of intensity-duration curve for a 1 hour storm =0.5000
      ----------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134             6.036
          2   0.167        199.570         48.386            15.263
          3   0.250        299.355         15.668             4.942
          4   0.333        399.141          7.074             2.231
          5   0.417        498.926          3.984             1.257
          6   0.500        598.711          2.581             0.814
          7   0.583        698.496          1.607             0.507
          8   0.667        798.281          1.051             0.331
          9   0.750        898.066          0.516             0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low        (In/Hr)
   1   0.08     4.20      0.387        (  0.269)      0.193        0.193
   2   0.17     4.30      0.396        (  0.269)      0.198        0.198
```

```
   3   0.25     5.00      0.461       (  0.269)       0.230        0.230
   4   0.33     5.00      0.461       (  0.269)       0.230        0.230
   5   0.42     5.80      0.534       (  0.269)       0.267        0.267
   6   0.50     6.50      0.599          0.269    (  0.299)        0.330
   7   0.58     7.40      0.682          0.269    (  0.341)        0.413
   8   0.67     8.60      0.792          0.269    (  0.396)        0.523
   9   0.75    12.30      1.133          0.269    (  0.567)        0.864
  10   0.83    29.10      2.681          0.269    (  1.341)        2.412
  11   0.92     6.80      0.626          0.269    (  0.313)        0.357
  12   1.00     5.00      0.461       (  0.269)       0.230        0.230
             (Loss Rate Not Used)
     Sum =     100.0                                   Sum =     6.2
      Flood volume = Effective rainfall      0.52(In)
       times area      31.3(Ac.)/[(In)/(Ft.)] =       1.4(Ac.Ft)
      Total soil loss =      0.25(In)
      Total soil loss =     0.644(Ac.Ft)
      Total rainfall =      0.77(In)
      Flood volume =       59168.3 Cubic Feet
      Total soil loss =       28064.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     45.470(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
  -----------------------------------------------------------------------
    0+ 5       0.0080      1.17  Q         |         |         |         |
    0+10       0.0366      4.15  |V Q      |         |         |         |
    0+15       0.0736      5.37  | V Q     |         |         |         |
    0+20       0.1172      6.32  |  V Q    |         |         |         |
    0+25       0.1651      6.96  |   VQ    |         |         |         |
    0+30       0.2211      8.13  |     Q   |         |         |         |
    0+35       0.2893      9.91  |      QV |         |         |         |
    0+40       0.3743     12.33  |        Q|V        |         |         |
    0+45       0.4894     16.72  |         |  QV     |         |         |
    0+50       0.7107     32.13  |         |         V    Q    |         |
    0+55       1.0239     45.47  |         |         |         V     Q   |
    1+ 0       1.1753     21.99  |         |      Q  |         |   V     |
    1+ 5       1.2617     12.54  |         Q         |         |      V  |
    1+10       1.3040      6.13  |   Q     |         |         |       V |
    1+15       1.3288      3.61  | Q       |         |         |        V|
    1+20       1.3438      2.18  |Q        |         |         |        V|
    1+25       1.3528      1.31  |Q        |         |         |        V|
    1+30       1.3571      0.63  Q         |         |         |        V|
    1+35       1.3581      0.13  Q         |         |         |        V|
    1+40       1.3583      0.04  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop310.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 10 Year 3 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  = 0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             0.79                 24.73

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             1.85                 57.91
```

```
      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    0.790(In)
      Area Averaged 100-Year Rainfall =    1.850(In)

      Point rain (area averaged) =    1.226(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    1.226(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00          0.500
          26.400           56.00          0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      --------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                              Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134             6.036
          2   0.167        199.570         48.386            15.263
          3   0.250        299.355         15.668             4.942
          4   0.333        399.141          7.074             2.231
          5   0.417        498.926          3.984             1.257
          6   0.500        598.711          2.581             0.814
          7   0.583        698.496          1.607             0.507
          8   0.667        798.281          1.051             0.331
          9   0.750        898.066          0.516             0.163
                                      Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low          (In/Hr)
   1   0.08      1.30      0.191       (  0.269)       0.096        0.096
   2   0.17      1.30      0.191       (  0.269)       0.096        0.096
   3   0.25      1.10      0.162       (  0.269)       0.081        0.081
   4   0.33      1.50      0.221       (  0.269)       0.110        0.110
```

```
 5   0.42     1.50      0.221       (  0.269)      0.110        0.110
 6   0.50     1.80      0.265       (  0.269)      0.132        0.132
 7   0.58     1.50      0.221       (  0.269)      0.110        0.110
 8   0.67     1.80      0.265       (  0.269)      0.132        0.132
 9   0.75     1.80      0.265       (  0.269)      0.132        0.132
10   0.83     1.50      0.221       (  0.269)      0.110        0.110
11   0.92     1.60      0.235       (  0.269)      0.118        0.118
12   1.00     1.80      0.265       (  0.269)      0.132        0.132
13   1.08     2.20      0.324       (  0.269)      0.162        0.162
14   1.17     2.20      0.324       (  0.269)      0.162        0.162
15   1.25     2.20      0.324       (  0.269)      0.162        0.162
16   1.33     2.00      0.294       (  0.269)      0.147        0.147
17   1.42     2.60      0.382       (  0.269)      0.191        0.191
18   1.50     2.70      0.397       (  0.269)      0.199        0.199
19   1.58     2.40      0.353       (  0.269)      0.177        0.177
20   1.67     2.70      0.397       (  0.269)      0.199        0.199
21   1.75     3.30      0.485       (  0.269)      0.243        0.243
22   1.83     3.10      0.456       (  0.269)      0.228        0.228
23   1.92     2.90      0.427       (  0.269)      0.213        0.213
24   2.00     3.00      0.441       (  0.269)      0.221        0.221
25   2.08     3.10      0.456       (  0.269)      0.228        0.228
26   2.17     4.20      0.618          0.269    (  0.309)        0.349
27   2.25     5.00      0.736          0.269    (  0.368)        0.466
28   2.33     3.50      0.515       (  0.269)      0.257        0.257
29   2.42     6.80      1.000          0.269    (  0.500)        0.731
30   2.50     7.30      1.074          0.269    (  0.537)        0.805
31   2.58     8.20      1.206          0.269    (  0.603)        0.937
32   2.67     5.90      0.868          0.269    (  0.434)        0.599
33   2.75     2.00      0.294       (  0.269)      0.147        0.147
34   2.83     1.80      0.265       (  0.269)      0.132        0.132
35   2.92     1.80      0.265       (  0.269)      0.132        0.132
36   3.00     0.60      0.088       (  0.269)      0.044        0.044
           (Loss Rate Not Used)
   Sum =     100.0                                    Sum =     8.5
    Flood volume = Effective rainfall      0.71(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =      1.8(Ac.Ft)
    Total soil loss =      0.52(In)
    Total soil loss =     1.352(Ac.Ft)
    Total rainfall =      1.23(In)
    Flood volume =       80406.0 Cubic Feet
    Total soil loss =      58882.3 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     24.534(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        3 - H O U R   S T O R M
                   R u n o f f     H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0040       0.58  Q         |         |         |         |
  0+10       0.0180       2.04  V Q       |         |         |         |
  0+15       0.0347       2.42  V  Q      |         |         |         |
  0+20       0.0525       2.59  |V Q      |         |         |         |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
    0+25       0.0738      3.08  |V  Q     |         |         |         |
    0+30       0.0972      3.41  | V Q     |         |         |         |
    0+35       0.1228      3.71  | V Q     |         |         |         |
    0+40       0.1481      3.67  |  VQ     |         |         |         |
    0+45       0.1755      3.98  |  V Q    |         |         |         |
    0+50       0.2026      3.94  |   VQ    |         |         |         |
    0+55       0.2281      3.70  |   Q     |         |         |         |
    1+ 0       0.2544      3.82  |    Q    |         |         |         |
    1+ 5       0.2834      4.22  |    QV   |         |         |         |
    1+10       0.3161      4.74  |     Q   |         |         |         |
    1+15       0.3499      4.91  |     QV  |         |         |         |
    1+20       0.3837      4.90  |     Q V |         |         |         |
    1+25       0.4180      4.99  |     Q  V|         |         |         |
    1+30       0.4571      5.67  |      Q V|         |         |         |
    1+35       0.4974      5.85  |      Q  V         |         |         |
    1+40       0.5372      5.78  |      Q  |V        |         |         |
    1+45       0.5808      6.34  |       Q | V       |         |         |
    1+50       0.6292      7.02  |        Q|  V      |         |         |
    1+55       0.6772      6.97  |        Q|   V     |         |         |
    2+ 0       0.7243      6.84  |        Q|    V    |         |         |
    2+ 5       0.7723      6.96  |        Q|     V   |         |         |
    2+10       0.8262      7.83  |         Q      V  |         |         |
    2+15       0.8981     10.44  |         |  Q     V|         |         |
    2+20       0.9779     11.59  |         |    Q    |V        |         |
    2+25       1.0614     12.12  |         |     Q   |  V      |         |
    2+30       1.1935     19.19  |         |         |    Q    |         |
    2+35       1.3536     23.24  |         |         |        VQ         |
    2+40       1.5225     24.53  |         |         |         | Q       |
    2+45       1.6464     17.98  |         |         |  Q      |    V    |
    2+50       1.7156     10.05  |         |  Q      |         |      V  |
    2+55       1.7655      7.25  |        Q|         |         |       V |
    3+ 0       1.8033      5.48  |      Q  |         |         |        V|
    3+ 5       1.8250      3.16  |   Q     |         |         |        V|
    3+10       1.8357      1.55  | Q       |         |         |        V|
    3+15       1.8412      0.80  |Q        |         |         |        V|
    3+20       1.8438      0.38  Q         |         |         |        V|
    3+25       1.8450      0.17  Q         |         |         |        V|
    3+30       1.8456      0.09  Q         |         |         |        V|
    3+35       1.8458      0.04  Q         |         |         |        V|
    3+40       1.8459      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop610.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 10 Year 6 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             1.10                   34.43

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30             2.50                   78.25
```

```
STORM EVENT (YEAR) =   10.00
Area Averaged 2-Year Rainfall =    1.100(In)
Area Averaged 100-Year Rainfall =    2.500(In)

Point rain (area averaged) =    1.676(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    1.676(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     4.900           69.00         0.500
    26.400           56.00         0.500
 Total Area Entered =     31.30(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
69.0  69.0      0.373     0.500        0.205       0.157      0.032
56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                     Sum (F) =   0.269
Area averaged mean soil loss (F) (In/Hr) =  0.269
Minimum soil loss rate ((In/Hr)) =  0.135
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
---------------------------------------------------------------------

            U n i t  H y d r o g r a p h
                  VALLEY S-Curve
--------------------------------------------------------------------
            Unit Hydrograph Data
---------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %           (CFS)
---------------------------------------------------------------------
    1   0.083         99.785         19.134              6.036
    2   0.167        199.570         48.386             15.263
    3   0.250        299.355         15.668              4.942
    4   0.333        399.141          7.074              2.231
    5   0.417        498.926          3.984              1.257
    6   0.500        598.711          2.581              0.814
    7   0.583        698.496          1.607              0.507
    8   0.667        798.281          1.051              0.331
    9   0.750        898.066          0.516              0.163
                              Sum = 100.000   Sum=      31.545
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)    Percent   (In/Hr)          Max    |   Low         (In/Hr)
   1   0.08      0.50      0.101        (  0.269)      0.050        0.050
   2   0.17      0.60      0.121        (  0.269)      0.060        0.060
   3   0.25      0.60      0.121        (  0.269)      0.060        0.060
   4   0.33      0.60      0.121        (  0.269)      0.060        0.060
```

```
  5   0.42      0.60      0.121        (   0.269)       0.060         0.060
  6   0.50      0.70      0.141        (   0.269)       0.070         0.070
  7   0.58      0.70      0.141        (   0.269)       0.070         0.070
  8   0.67      0.70      0.141        (   0.269)       0.070         0.070
  9   0.75      0.70      0.141        (   0.269)       0.070         0.070
 10   0.83      0.70      0.141        (   0.269)       0.070         0.070
 11   0.92      0.70      0.141        (   0.269)       0.070         0.070
 12   1.00      0.80      0.161        (   0.269)       0.080         0.080
 13   1.08      0.80      0.161        (   0.269)       0.080         0.080
 14   1.17      0.80      0.161        (   0.269)       0.080         0.080
 15   1.25      0.80      0.161        (   0.269)       0.080         0.080
 16   1.33      0.80      0.161        (   0.269)       0.080         0.080
 17   1.42      0.80      0.161        (   0.269)       0.080         0.080
 18   1.50      0.80      0.161        (   0.269)       0.080         0.080
 19   1.58      0.80      0.161        (   0.269)       0.080         0.080
 20   1.67      0.80      0.161        (   0.269)       0.080         0.080
 21   1.75      0.80      0.161        (   0.269)       0.080         0.080
 22   1.83      0.80      0.161        (   0.269)       0.080         0.080
 23   1.92      0.80      0.161        (   0.269)       0.080         0.080
 24   2.00      0.90      0.181        (   0.269)       0.090         0.090
 25   2.08      0.80      0.161        (   0.269)       0.080         0.080
 26   2.17      0.90      0.181        (   0.269)       0.090         0.090
 27   2.25      0.90      0.181        (   0.269)       0.090         0.090
 28   2.33      0.90      0.181        (   0.269)       0.090         0.090
 29   2.42      0.90      0.181        (   0.269)       0.090         0.090
 30   2.50      0.90      0.181        (   0.269)       0.090         0.090
 31   2.58      0.90      0.181        (   0.269)       0.090         0.090
 32   2.67      0.90      0.181        (   0.269)       0.090         0.090
 33   2.75      1.00      0.201        (   0.269)       0.101         0.101
 34   2.83      1.00      0.201        (   0.269)       0.101         0.101
 35   2.92      1.00      0.201        (   0.269)       0.101         0.101
 36   3.00      1.00      0.201        (   0.269)       0.101         0.101
 37   3.08      1.00      0.201        (   0.269)       0.101         0.101
 38   3.17      1.10      0.221        (   0.269)       0.111         0.111
 39   3.25      1.10      0.221        (   0.269)       0.111         0.111
 40   3.33      1.10      0.221        (   0.269)       0.111         0.111
 41   3.42      1.20      0.241        (   0.269)       0.121         0.121
 42   3.50      1.30      0.261        (   0.269)       0.131         0.131
 43   3.58      1.40      0.282        (   0.269)       0.141         0.141
 44   3.67      1.40      0.282        (   0.269)       0.141         0.141
 45   3.75      1.50      0.302        (   0.269)       0.151         0.151
 46   3.83      1.50      0.302        (   0.269)       0.151         0.151
 47   3.92      1.60      0.322        (   0.269)       0.161         0.161
 48   4.00      1.60      0.322        (   0.269)       0.161         0.161
 49   4.08      1.70      0.342        (   0.269)       0.171         0.171
 50   4.17      1.80      0.362        (   0.269)       0.181         0.181
 51   4.25      1.90      0.382        (   0.269)       0.191         0.191
 52   4.33      2.00      0.402        (   0.269)       0.201         0.201
 53   4.42      2.10      0.422        (   0.269)       0.211         0.211
 54   4.50      2.10      0.422        (   0.269)       0.211         0.211
 55   4.58      2.20      0.442        (   0.269)       0.221         0.221
 56   4.67      2.30      0.463        (   0.269)       0.231         0.231
 57   4.75      2.40      0.483        (   0.269)       0.241         0.241
 58   4.83      2.40      0.483        (   0.269)       0.241         0.241
 59   4.92      2.50      0.503        (   0.269)       0.251         0.251
 60   5.00      2.60      0.523        (   0.269)       0.261         0.261
 61   5.08      3.10      0.623            0.269    (   0.312)        0.354
```

```
62   5.17     3.60      0.724          0.269    (  0.362)       0.455
63   5.25     3.90      0.784          0.269    (  0.392)       0.515
64   5.33     4.20      0.845          0.269    (  0.422)       0.576
65   5.42     4.70      0.945          0.269    (  0.473)       0.676
66   5.50     5.60      1.126          0.269    (  0.563)       0.857
67   5.58     1.90      0.382       (  0.269)       0.191        0.191
68   5.67     0.90      0.181       (  0.269)       0.090        0.090
69   5.75     0.60      0.121       (  0.269)       0.060        0.060
70   5.83     0.50      0.101       (  0.269)       0.050        0.050
71   5.92     0.30      0.060       (  0.269)       0.030        0.030
72   6.00     0.20      0.040       (  0.269)       0.020        0.020
           (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    11.0
    Flood volume = Effective rainfall      0.91(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       2.4(Ac.Ft)
    Total soil loss =      0.76(In)
    Total soil loss =     1.988(Ac.Ft)
    Total rainfall =      1.68(In)
    Flood volume =      103811.2 Cubic Feet
    Total soil loss =       86590.5 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =     20.612(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        6 - H O U R    S T O R M
                   R u n o f f      H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0021      0.30  Q         |         |         |         |
  0+10       0.0099      1.13  VQ        |         |         |         |
  0+15       0.0205      1.53  V Q       |         |         |         |
  0+20       0.0321      1.70  V Q       |         |         |         |
  0+25       0.0444      1.78  V Q       |         |         |         |
  0+30       0.0575      1.90  V Q       |         |         |         |
  0+35       0.0718      2.08  |VQ       |         |         |         |
  0+40       0.0867      2.15  |VQ       |         |         |         |
  0+45       0.1017      2.19  |VQ       |         |         |         |
  0+50       0.1169      2.20  |VQ       |         |         |         |
  0+55       0.1321      2.21  | Q       |         |         |         |
  1+ 0       0.1478      2.28  | VQ      |         |         |         |
  1+ 5       0.1646      2.43  | VQ      |         |         |         |
  1+10       0.1817      2.49  |  Q      |         |         |         |
  1+15       0.1990      2.51  |  Q      |         |         |         |
  1+20       0.2163      2.52  |  Q      |         |         |         |
  1+25       0.2337      2.53  |  Q      |         |         |         |
  1+30       0.2512      2.53  |  QV     |         |         |         |
  1+35       0.2687      2.54  |  QV     |         |         |         |
  1+40       0.2861      2.54  |  QV     |         |         |         |
  1+45       0.3036      2.54  |  Q V    |         |         |         |
  1+50       0.3211      2.54  |  Q V    |         |         |         |
  1+55       0.3386      2.54  |  Q V    |         |         |         |
  2+ 0       0.3565      2.60  |  Q V    |         |         |         |
  2+ 5       0.3750      2.69  |  Q  V   |         |         |         |
```

```
    2+10       0.3933      2.65  |  Q  V   |         |         |         |
    2+15       0.4124      2.78  |  Q  V   |         |         |         |
    2+20       0.4318      2.82  |  Q   V  |         |         |         |
    2+25       0.4513      2.83  |  Q   V  |         |         |         |
    2+30       0.4709      2.84  |  Q   V  |         |         |         |
    2+35       0.4905      2.85  |  Q    V |         |         |         |
    2+40       0.5101      2.85  |  Q    V |         |         |         |
    2+45       0.5302      2.92  |  Q    V |         |         |         |
    2+50       0.5514      3.07  |   Q    V|         |         |         |
    2+55       0.5729      3.12  |   Q    V|         |         |         |
    3+ 0       0.5945      3.14  |   Q    V|         |         |         |
    3+ 5       0.6162      3.16  |   Q     V         |         |         |
    3+10       0.6384      3.22  |   Q     V         |         |         |
    3+15       0.6617      3.38  |   Q     |V        |         |         |
    3+20       0.6854      3.44  |   Q     |V        |         |         |
    3+25       0.7096      3.52  |   Q     |V        |         |         |
    3+30       0.7354      3.75  |   Q     | V       |         |         |
    3+35       0.7631      4.02  |    Q    | V       |         |         |
    3+40       0.7924      4.25  |    Q    |  V      |         |         |
    3+45       0.8227      4.40  |    Q    |  V      |         |         |
    3+50       0.8544      4.60  |     Q   |   V     |         |         |
    3+55       0.8870      4.73  |     Q   |   V     |         |         |
    4+ 0       0.9209      4.93  |     Q   |    V    |         |         |
    4+ 5       0.9557      5.06  |     Q   |     V   |         |         |
    4+10       0.9923      5.31  |      Q  |     V   |         |         |
    4+15       1.0308      5.59  |      Q  |      V  |         |         |
    4+20       1.0714      5.89  |      Q  |      V  |         |         |
    4+25       1.1141      6.20  |       Q |       V |         |         |
    4+30       1.1585      6.45  |       Q |        V|         |         |
    4+35       1.2040      6.61  |       Q |         V         |         |
    4+40       1.2513      6.87  |        Q|         |V        |         |
    4+45       1.3007      7.17  |        Q|         |V        |         |
    4+50       1.3517      7.41  |        Q|         | V       |         |
    4+55       1.4039      7.57  |         Q         |  V      |         |
    5+ 0       1.4578      7.83  |         Q         |   V     |         |
    5+ 5       1.5172      8.62  |         |Q        |    V    |         |
    5+10       1.5911     10.74  |         |   Q     |     V   |         |
    5+15       1.6816     13.14  |         |      Q  |       V |         |
    5+20       1.7860     15.16  |         |         Q        V|         |
    5+25       1.9054     17.34  |         |         |  Q      |V        |
    5+30       2.0474     20.61  |         |         |      Q  |   V     |
    5+35       2.1865     20.20  |         |         |     Q   |     V   |
    5+40       2.2605     10.75  |         |   Q     |         |      V  |
    5+45       2.3045      6.39  |       Q |         |         |       V |
    5+50       2.3339      4.26  |    Q    |         |         |        V|
    5+55       2.3546      3.01  |   Q     |         |         |        V|
    6+ 0       2.3683      1.99  | Q       |         |         |        V|
    6+ 5       2.3766      1.21  |Q        |         |         |        V|
    6+10       2.3802      0.53  Q         |         |         |        V|
    6+15       2.3817      0.22  Q         |         |         |        V|
    6+20       2.3825      0.11  Q         |         |         |        V|
    6+25       2.3829      0.06  Q         |         |         |        V|
    6+30       2.3831      0.03  Q         |         |         |        V|
    6+35       2.3832      0.01  Q         |         |         |        V|
    6+40       2.3832      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
            Study date  09/07/21 File: tr31589prop2410.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6194

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
```

TR 31589

Proposed Condition 10 Year 24 Hour Unit Hydrograph

```
--------------------------------------------------------------------
Drainage Area =      31.30(Ac.)  =      0.049 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 31.30(Ac.)  =  0.049 Sq. Mi.
Length along longest watercourse =    1610.00(Ft.)
Length along longest watercourse measured to centroid =     540.00(Ft.)
Length along longest watercourse =      0.305 Mi.
Length along longest watercourse measured to centroid =      0.102 Mi.
Difference in elevation =      24.90(Ft.)
Slope along watercourse =     81.6596 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.084 Hr.
Lag time =     5.01 Min.
25% of lag time =     1.25 Min.
40% of lag time =     2.00 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              1.70                 53.21

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       31.30              4.30                134.59
```

```
      STORM EVENT (YEAR) =   10.00
      Area Averaged 2-Year Rainfall =    1.700(In)
      Area Averaged 100-Year Rainfall =    4.300(In)

      Point rain (area averaged) =    2.770(In)
      Areal adjustment factor =   99.99 %
      Adjusted average point rain =    2.769(In)

      Sub-Area Data:
      Area(Ac.)         Runoff Index   Impervious %
           4.900           69.00         0.500
          26.400           56.00         0.500
       Total Area Entered =     31.30(Ac.)


      RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
      AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
      69.0  69.0      0.373     0.500        0.205       0.157      0.032
      56.0  56.0      0.511     0.500        0.281       0.843      0.237
                                                          Sum (F) =   0.269
      Area averaged mean soil loss (F) (In/Hr) =  0.269
      Minimum soil loss rate ((In/Hr)) =  0.135
      (for 24 hour storm duration)
      Soil low loss rate (decimal) =   0.500
      ---------------------------------------------------------------------

                  U n i t  H y d r o g r a p h
                        VALLEY S-Curve
      -------------------------------------------------------------------
                  Unit Hydrograph Data
      ---------------------------------------------------------------------
      Unit time period   Time % of lag   Distribution   Unit Hydrograph
          (hrs)                           Graph %            (CFS)
      ---------------------------------------------------------------------
          1   0.083         99.785         19.134              6.036
          2   0.167        199.570         48.386             15.263
          3   0.250        299.355         15.668              4.942
          4   0.333        399.141          7.074              2.231
          5   0.417        498.926          3.984              1.257
          6   0.500        598.711          2.581              0.814
          7   0.583        698.496          1.607              0.507
          8   0.667        798.281          1.051              0.331
          9   0.750        898.066          0.516              0.163
                                    Sum = 100.000   Sum=      31.545
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time    Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low         (In/Hr)
   1   0.08     0.07     0.022       (  0.477)      0.011        0.011
   2   0.17     0.07     0.022       (  0.475)      0.011        0.011
   3   0.25     0.07     0.022       (  0.473)      0.011        0.011
   4   0.33     0.10     0.033       (  0.471)      0.017        0.017
```

```
  5   0.42     0.10      0.033        (  0.470)      0.017       0.017
  6   0.50     0.10      0.033        (  0.468)      0.017       0.017
  7   0.58     0.10      0.033        (  0.466)      0.017       0.017
  8   0.67     0.10      0.033        (  0.464)      0.017       0.017
  9   0.75     0.10      0.033        (  0.462)      0.017       0.017
 10   0.83     0.13      0.044        (  0.460)      0.022       0.022
 11   0.92     0.13      0.044        (  0.459)      0.022       0.022
 12   1.00     0.13      0.044        (  0.457)      0.022       0.022
 13   1.08     0.10      0.033        (  0.455)      0.017       0.017
 14   1.17     0.10      0.033        (  0.453)      0.017       0.017
 15   1.25     0.10      0.033        (  0.451)      0.017       0.017
 16   1.33     0.10      0.033        (  0.450)      0.017       0.017
 17   1.42     0.10      0.033        (  0.448)      0.017       0.017
 18   1.50     0.10      0.033        (  0.446)      0.017       0.017
 19   1.58     0.10      0.033        (  0.444)      0.017       0.017
 20   1.67     0.10      0.033        (  0.443)      0.017       0.017
 21   1.75     0.10      0.033        (  0.441)      0.017       0.017
 22   1.83     0.13      0.044        (  0.439)      0.022       0.022
 23   1.92     0.13      0.044        (  0.437)      0.022       0.022
 24   2.00     0.13      0.044        (  0.435)      0.022       0.022
 25   2.08     0.13      0.044        (  0.434)      0.022       0.022
 26   2.17     0.13      0.044        (  0.432)      0.022       0.022
 27   2.25     0.13      0.044        (  0.430)      0.022       0.022
 28   2.33     0.13      0.044        (  0.428)      0.022       0.022
 29   2.42     0.13      0.044        (  0.427)      0.022       0.022
 30   2.50     0.13      0.044        (  0.425)      0.022       0.022
 31   2.58     0.17      0.055        (  0.423)      0.028       0.028
 32   2.67     0.17      0.055        (  0.421)      0.028       0.028
 33   2.75     0.17      0.055        (  0.420)      0.028       0.028
 34   2.83     0.17      0.055        (  0.418)      0.028       0.028
 35   2.92     0.17      0.055        (  0.416)      0.028       0.028
 36   3.00     0.17      0.055        (  0.415)      0.028       0.028
 37   3.08     0.17      0.055        (  0.413)      0.028       0.028
 38   3.17     0.17      0.055        (  0.411)      0.028       0.028
 39   3.25     0.17      0.055        (  0.409)      0.028       0.028
 40   3.33     0.17      0.055        (  0.408)      0.028       0.028
 41   3.42     0.17      0.055        (  0.406)      0.028       0.028
 42   3.50     0.17      0.055        (  0.404)      0.028       0.028
 43   3.58     0.17      0.055        (  0.403)      0.028       0.028
 44   3.67     0.17      0.055        (  0.401)      0.028       0.028
 45   3.75     0.17      0.055        (  0.399)      0.028       0.028
 46   3.83     0.20      0.066        (  0.398)      0.033       0.033
 47   3.92     0.20      0.066        (  0.396)      0.033       0.033
 48   4.00     0.20      0.066        (  0.394)      0.033       0.033
 49   4.08     0.20      0.066        (  0.393)      0.033       0.033
 50   4.17     0.20      0.066        (  0.391)      0.033       0.033
 51   4.25     0.20      0.066        (  0.389)      0.033       0.033
 52   4.33     0.23      0.078        (  0.388)      0.039       0.039
 53   4.42     0.23      0.078        (  0.386)      0.039       0.039
 54   4.50     0.23      0.078        (  0.384)      0.039       0.039
 55   4.58     0.23      0.078        (  0.383)      0.039       0.039
 56   4.67     0.23      0.078        (  0.381)      0.039       0.039
 57   4.75     0.23      0.078        (  0.379)      0.039       0.039
 58   4.83     0.27      0.089        (  0.378)      0.044       0.044
 59   4.92     0.27      0.089        (  0.376)      0.044       0.044
 60   5.00     0.27      0.089        (  0.374)      0.044       0.044
 61   5.08     0.20      0.066        (  0.373)      0.033       0.033
```

```
  62   5.17     0.20     0.066     (   0.371)     0.033     0.033
  63   5.25     0.20     0.066     (   0.370)     0.033     0.033
  64   5.33     0.23     0.078     (   0.368)     0.039     0.039
  65   5.42     0.23     0.078     (   0.366)     0.039     0.039
  66   5.50     0.23     0.078     (   0.365)     0.039     0.039
  67   5.58     0.27     0.089     (   0.363)     0.044     0.044
  68   5.67     0.27     0.089     (   0.362)     0.044     0.044
  69   5.75     0.27     0.089     (   0.360)     0.044     0.044
  70   5.83     0.27     0.089     (   0.358)     0.044     0.044
  71   5.92     0.27     0.089     (   0.357)     0.044     0.044
  72   6.00     0.27     0.089     (   0.355)     0.044     0.044
  73   6.08     0.30     0.100     (   0.354)     0.050     0.050
  74   6.17     0.30     0.100     (   0.352)     0.050     0.050
  75   6.25     0.30     0.100     (   0.350)     0.050     0.050
  76   6.33     0.30     0.100     (   0.349)     0.050     0.050
  77   6.42     0.30     0.100     (   0.347)     0.050     0.050
  78   6.50     0.30     0.100     (   0.346)     0.050     0.050
  79   6.58     0.33     0.111     (   0.344)     0.055     0.055
  80   6.67     0.33     0.111     (   0.343)     0.055     0.055
  81   6.75     0.33     0.111     (   0.341)     0.055     0.055
  82   6.83     0.33     0.111     (   0.340)     0.055     0.055
  83   6.92     0.33     0.111     (   0.338)     0.055     0.055
  84   7.00     0.33     0.111     (   0.336)     0.055     0.055
  85   7.08     0.33     0.111     (   0.335)     0.055     0.055
  86   7.17     0.33     0.111     (   0.333)     0.055     0.055
  87   7.25     0.33     0.111     (   0.332)     0.055     0.055
  88   7.33     0.37     0.122     (   0.330)     0.061     0.061
  89   7.42     0.37     0.122     (   0.329)     0.061     0.061
  90   7.50     0.37     0.122     (   0.327)     0.061     0.061
  91   7.58     0.40     0.133     (   0.326)     0.066     0.066
  92   7.67     0.40     0.133     (   0.324)     0.066     0.066
  93   7.75     0.40     0.133     (   0.323)     0.066     0.066
  94   7.83     0.43     0.144     (   0.321)     0.072     0.072
  95   7.92     0.43     0.144     (   0.320)     0.072     0.072
  96   8.00     0.43     0.144     (   0.318)     0.072     0.072
  97   8.08     0.50     0.166     (   0.317)     0.083     0.083
  98   8.17     0.50     0.166     (   0.315)     0.083     0.083
  99   8.25     0.50     0.166     (   0.314)     0.083     0.083
 100   8.33     0.50     0.166     (   0.313)     0.083     0.083
 101   8.42     0.50     0.166     (   0.311)     0.083     0.083
 102   8.50     0.50     0.166     (   0.310)     0.083     0.083
 103   8.58     0.53     0.177     (   0.308)     0.089     0.089
 104   8.67     0.53     0.177     (   0.307)     0.089     0.089
 105   8.75     0.53     0.177     (   0.305)     0.089     0.089
 106   8.83     0.57     0.188     (   0.304)     0.094     0.094
 107   8.92     0.57     0.188     (   0.302)     0.094     0.094
 108   9.00     0.57     0.188     (   0.301)     0.094     0.094
 109   9.08     0.63     0.210     (   0.300)     0.105     0.105
 110   9.17     0.63     0.210     (   0.298)     0.105     0.105
 111   9.25     0.63     0.210     (   0.297)     0.105     0.105
 112   9.33     0.67     0.222     (   0.295)     0.111     0.111
 113   9.42     0.67     0.222     (   0.294)     0.111     0.111
 114   9.50     0.67     0.222     (   0.292)     0.111     0.111
 115   9.58     0.70     0.233     (   0.291)     0.116     0.116
 116   9.67     0.70     0.233     (   0.290)     0.116     0.116
 117   9.75     0.70     0.233     (   0.288)     0.116     0.116
 118   9.83     0.73     0.244     (   0.287)     0.122     0.122
```

```
119   9.92      0.73      0.244      (  0.286)      0.122       0.122
120  10.00      0.73      0.244      (  0.284)      0.122       0.122
121  10.08      0.50      0.166      (  0.283)      0.083       0.083
122  10.17      0.50      0.166      (  0.281)      0.083       0.083
123  10.25      0.50      0.166      (  0.280)      0.083       0.083
124  10.33      0.50      0.166      (  0.279)      0.083       0.083
125  10.42      0.50      0.166      (  0.277)      0.083       0.083
126  10.50      0.50      0.166      (  0.276)      0.083       0.083
127  10.58      0.67      0.222      (  0.275)      0.111       0.111
128  10.67      0.67      0.222      (  0.273)      0.111       0.111
129  10.75      0.67      0.222      (  0.272)      0.111       0.111
130  10.83      0.67      0.222      (  0.271)      0.111       0.111
131  10.92      0.67      0.222      (  0.269)      0.111       0.111
132  11.00      0.67      0.222      (  0.268)      0.111       0.111
133  11.08      0.63      0.210      (  0.267)      0.105       0.105
134  11.17      0.63      0.210      (  0.265)      0.105       0.105
135  11.25      0.63      0.210      (  0.264)      0.105       0.105
136  11.33      0.63      0.210      (  0.263)      0.105       0.105
137  11.42      0.63      0.210      (  0.261)      0.105       0.105
138  11.50      0.63      0.210      (  0.260)      0.105       0.105
139  11.58      0.57      0.188      (  0.259)      0.094       0.094
140  11.67      0.57      0.188      (  0.258)      0.094       0.094
141  11.75      0.57      0.188      (  0.256)      0.094       0.094
142  11.83      0.60      0.199      (  0.255)      0.100       0.100
143  11.92      0.60      0.199      (  0.254)      0.100       0.100
144  12.00      0.60      0.199      (  0.252)      0.100       0.100
145  12.08      0.83      0.277      (  0.251)      0.138       0.138
146  12.17      0.83      0.277      (  0.250)      0.138       0.138
147  12.25      0.83      0.277      (  0.249)      0.138       0.138
148  12.33      0.87      0.288      (  0.247)      0.144       0.144
149  12.42      0.87      0.288      (  0.246)      0.144       0.144
150  12.50      0.87      0.288      (  0.245)      0.144       0.144
151  12.58      0.93      0.310      (  0.244)      0.155       0.155
152  12.67      0.93      0.310      (  0.242)      0.155       0.155
153  12.75      0.93      0.310      (  0.241)      0.155       0.155
154  12.83      0.97      0.321      (  0.240)      0.161       0.161
155  12.92      0.97      0.321      (  0.239)      0.161       0.161
156  13.00      0.97      0.321      (  0.238)      0.161       0.161
157  13.08      1.13      0.377      (  0.236)      0.188       0.188
158  13.17      1.13      0.377      (  0.235)      0.188       0.188
159  13.25      1.13      0.377      (  0.234)      0.188       0.188
160  13.33      1.13      0.377      (  0.233)      0.188       0.188
161  13.42      1.13      0.377      (  0.232)      0.188       0.188
162  13.50      1.13      0.377      (  0.230)      0.188       0.188
163  13.58      0.77      0.255      (  0.229)      0.127       0.127
164  13.67      0.77      0.255      (  0.228)      0.127       0.127
165  13.75      0.77      0.255      (  0.227)      0.127       0.127
166  13.83      0.77      0.255      (  0.226)      0.127       0.127
167  13.92      0.77      0.255      (  0.225)      0.127       0.127
168  14.00      0.77      0.255      (  0.223)      0.127       0.127
169  14.08      0.90      0.299      (  0.222)      0.150       0.150
170  14.17      0.90      0.299      (  0.221)      0.150       0.150
171  14.25      0.90      0.299      (  0.220)      0.150       0.150
172  14.33      0.87      0.288      (  0.219)      0.144       0.144
173  14.42      0.87      0.288      (  0.218)      0.144       0.144
174  14.50      0.87      0.288      (  0.217)      0.144       0.144
175  14.58      0.87      0.288      (  0.216)      0.144       0.144
```

```
176  14.67     0.87      0.288      (  0.215)      0.144      0.144
177  14.75     0.87      0.288      (  0.213)      0.144      0.144
178  14.83     0.83      0.277      (  0.212)      0.138      0.138
179  14.92     0.83      0.277      (  0.211)      0.138      0.138
180  15.00     0.83      0.277      (  0.210)      0.138      0.138
181  15.08     0.80      0.266      (  0.209)      0.133      0.133
182  15.17     0.80      0.266      (  0.208)      0.133      0.133
183  15.25     0.80      0.266      (  0.207)      0.133      0.133
184  15.33     0.77      0.255      (  0.206)      0.127      0.127
185  15.42     0.77      0.255      (  0.205)      0.127      0.127
186  15.50     0.77      0.255      (  0.204)      0.127      0.127
187  15.58     0.63      0.210      (  0.203)      0.105      0.105
188  15.67     0.63      0.210      (  0.202)      0.105      0.105
189  15.75     0.63      0.210      (  0.201)      0.105      0.105
190  15.83     0.63      0.210      (  0.200)      0.105      0.105
191  15.92     0.63      0.210      (  0.199)      0.105      0.105
192  16.00     0.63      0.210      (  0.198)      0.105      0.105
193  16.08     0.13      0.044      (  0.197)      0.022      0.022
194  16.17     0.13      0.044      (  0.196)      0.022      0.022
195  16.25     0.13      0.044      (  0.195)      0.022      0.022
196  16.33     0.13      0.044      (  0.194)      0.022      0.022
197  16.42     0.13      0.044      (  0.193)      0.022      0.022
198  16.50     0.13      0.044      (  0.192)      0.022      0.022
199  16.58     0.10      0.033      (  0.191)      0.017      0.017
200  16.67     0.10      0.033      (  0.190)      0.017      0.017
201  16.75     0.10      0.033      (  0.189)      0.017      0.017
202  16.83     0.10      0.033      (  0.188)      0.017      0.017
203  16.92     0.10      0.033      (  0.187)      0.017      0.017
204  17.00     0.10      0.033      (  0.186)      0.017      0.017
205  17.08     0.17      0.055      (  0.185)      0.028      0.028
206  17.17     0.17      0.055      (  0.184)      0.028      0.028
207  17.25     0.17      0.055      (  0.183)      0.028      0.028
208  17.33     0.17      0.055      (  0.182)      0.028      0.028
209  17.42     0.17      0.055      (  0.181)      0.028      0.028
210  17.50     0.17      0.055      (  0.180)      0.028      0.028
211  17.58     0.17      0.055      (  0.179)      0.028      0.028
212  17.67     0.17      0.055      (  0.179)      0.028      0.028
213  17.75     0.17      0.055      (  0.178)      0.028      0.028
214  17.83     0.13      0.044      (  0.177)      0.022      0.022
215  17.92     0.13      0.044      (  0.176)      0.022      0.022
216  18.00     0.13      0.044      (  0.175)      0.022      0.022
217  18.08     0.13      0.044      (  0.174)      0.022      0.022
218  18.17     0.13      0.044      (  0.173)      0.022      0.022
219  18.25     0.13      0.044      (  0.172)      0.022      0.022
220  18.33     0.13      0.044      (  0.172)      0.022      0.022
221  18.42     0.13      0.044      (  0.171)      0.022      0.022
222  18.50     0.13      0.044      (  0.170)      0.022      0.022
223  18.58     0.10      0.033      (  0.169)      0.017      0.017
224  18.67     0.10      0.033      (  0.168)      0.017      0.017
225  18.75     0.10      0.033      (  0.167)      0.017      0.017
226  18.83     0.07      0.022      (  0.167)      0.011      0.011
227  18.92     0.07      0.022      (  0.166)      0.011      0.011
228  19.00     0.07      0.022      (  0.165)      0.011      0.011
229  19.08     0.10      0.033      (  0.164)      0.017      0.017
230  19.17     0.10      0.033      (  0.164)      0.017      0.017
231  19.25     0.10      0.033      (  0.163)      0.017      0.017
232  19.33     0.13      0.044      (  0.162)      0.022      0.022
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 233  19.42     0.13      0.044      (  0.161)      0.022        0.022
 234  19.50     0.13      0.044      (  0.161)      0.022        0.022
 235  19.58     0.10      0.033      (  0.160)      0.017        0.017
 236  19.67     0.10      0.033      (  0.159)      0.017        0.017
 237  19.75     0.10      0.033      (  0.158)      0.017        0.017
 238  19.83     0.07      0.022      (  0.158)      0.011        0.011
 239  19.92     0.07      0.022      (  0.157)      0.011        0.011
 240  20.00     0.07      0.022      (  0.156)      0.011        0.011
 241  20.08     0.10      0.033      (  0.156)      0.017        0.017
 242  20.17     0.10      0.033      (  0.155)      0.017        0.017
 243  20.25     0.10      0.033      (  0.154)      0.017        0.017
 244  20.33     0.10      0.033      (  0.154)      0.017        0.017
 245  20.42     0.10      0.033      (  0.153)      0.017        0.017
 246  20.50     0.10      0.033      (  0.152)      0.017        0.017
 247  20.58     0.10      0.033      (  0.152)      0.017        0.017
 248  20.67     0.10      0.033      (  0.151)      0.017        0.017
 249  20.75     0.10      0.033      (  0.150)      0.017        0.017
 250  20.83     0.07      0.022      (  0.150)      0.011        0.011
 251  20.92     0.07      0.022      (  0.149)      0.011        0.011
 252  21.00     0.07      0.022      (  0.149)      0.011        0.011
 253  21.08     0.10      0.033      (  0.148)      0.017        0.017
 254  21.17     0.10      0.033      (  0.147)      0.017        0.017
 255  21.25     0.10      0.033      (  0.147)      0.017        0.017
 256  21.33     0.07      0.022      (  0.146)      0.011        0.011
 257  21.42     0.07      0.022      (  0.146)      0.011        0.011
 258  21.50     0.07      0.022      (  0.145)      0.011        0.011
 259  21.58     0.10      0.033      (  0.145)      0.017        0.017
 260  21.67     0.10      0.033      (  0.144)      0.017        0.017
 261  21.75     0.10      0.033      (  0.144)      0.017        0.017
 262  21.83     0.07      0.022      (  0.143)      0.011        0.011
 263  21.92     0.07      0.022      (  0.143)      0.011        0.011
 264  22.00     0.07      0.022      (  0.142)      0.011        0.011
 265  22.08     0.10      0.033      (  0.142)      0.017        0.017
 266  22.17     0.10      0.033      (  0.141)      0.017        0.017
 267  22.25     0.10      0.033      (  0.141)      0.017        0.017
 268  22.33     0.07      0.022      (  0.140)      0.011        0.011
 269  22.42     0.07      0.022      (  0.140)      0.011        0.011
 270  22.50     0.07      0.022      (  0.139)      0.011        0.011
 271  22.58     0.07      0.022      (  0.139)      0.011        0.011
 272  22.67     0.07      0.022      (  0.139)      0.011        0.011
 273  22.75     0.07      0.022      (  0.138)      0.011        0.011
 274  22.83     0.07      0.022      (  0.138)      0.011        0.011
 275  22.92     0.07      0.022      (  0.138)      0.011        0.011
 276  23.00     0.07      0.022      (  0.137)      0.011        0.011
 277  23.08     0.07      0.022      (  0.137)      0.011        0.011
 278  23.17     0.07      0.022      (  0.137)      0.011        0.011
 279  23.25     0.07      0.022      (  0.136)      0.011        0.011
 280  23.33     0.07      0.022      (  0.136)      0.011        0.011
 281  23.42     0.07      0.022      (  0.136)      0.011        0.011
 282  23.50     0.07      0.022      (  0.135)      0.011        0.011
 283  23.58     0.07      0.022      (  0.135)      0.011        0.011
 284  23.67     0.07      0.022      (  0.135)      0.011        0.011
 285  23.75     0.07      0.022      (  0.135)      0.011        0.011
 286  23.83     0.07      0.022      (  0.135)      0.011        0.011
 287  23.92     0.07      0.022      (  0.135)      0.011        0.011
 288  24.00     0.07      0.022      (  0.135)      0.011        0.011
               (Loss Rate Not Used)
```

```
   Sum =     100.0                                 Sum =    16.6
    Flood volume = Effective rainfall      1.38(In)
     times area      31.3(Ac.)/[(In)/(Ft.)] =       3.6(Ac.Ft)
    Total soil loss =      1.38(In)
    Total soil loss =     3.612(Ac.Ft)
    Total rainfall =      2.77(In)
    Flood volume =      157333.4 Cubic Feet
    Total soil loss =      157333.4 Cubic Feet
    --------------------------------------------------------------------
     Peak flow rate of this hydrograph =      5.916(CFS)
    --------------------------------------------------------------------
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                        24 - H O U R   S T O R M
                   R u n o f f     H y d r o g r a p h
    --------------------------------------------------------------------
                Hydrograph in   5   Minute intervals ((CFS))

    --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0005      0.07  Q         |         |         |         |
  0+10       0.0021      0.24  Q         |         |         |         |
  0+15       0.0041      0.29  VQ        |         |         |         |
  0+20       0.0065      0.35  VQ        |         |         |         |
  0+25       0.0096      0.45  VQ        |         |         |         |
  0+30       0.0129      0.48  VQ        |         |         |         |
  0+35       0.0164      0.50  V Q       |         |         |         |
  0+40       0.0199      0.51  V Q       |         |         |         |
  0+45       0.0235      0.52  V Q       |         |         |         |
  0+50       0.0273      0.56  V Q       |         |         |         |
  0+55       0.0317      0.64  V Q       |         |         |         |
  1+ 0       0.0363      0.67  V Q       |         |         |         |
  1+ 5       0.0408      0.65  V Q       |         |         |         |
  1+10       0.0447      0.57  V Q       |         |         |         |
  1+15       0.0485      0.55  V Q       |         |         |         |
  1+20       0.0522      0.54  V Q       |         |         |         |
  1+25       0.0559      0.53  V Q       |         |         |         |
  1+30       0.0595      0.53  V Q       |         |         |         |
  1+35       0.0632      0.53  V Q       |         |         |         |
  1+40       0.0668      0.53  V Q       |         |         |         |
  1+45       0.0704      0.52  V Q       |         |         |         |
  1+50       0.0742      0.56  V Q       |         |         |         |
  1+55       0.0787      0.64  V Q       |         |         |         |
  2+ 0       0.0833      0.67  V Q       |         |         |         |
  2+ 5       0.0880      0.68  V Q       |         |         |         |
  2+10       0.0927      0.69  |VQ       |         |         |         |
  2+15       0.0975      0.69  |VQ       |         |         |         |
  2+20       0.1023      0.70  |VQ       |         |         |         |
  2+25       0.1071      0.70  |VQ       |         |         |         |
  2+30       0.1119      0.70  |VQ       |         |         |         |
  2+35       0.1170      0.73  |VQ       |         |         |         |
  2+40       0.1226      0.82  |V Q      |         |         |         |
  2+45       0.1284      0.84  |V Q      |         |         |         |
  2+50       0.1343      0.86  |V Q      |         |         |         |
  2+55       0.1403      0.86  |V Q      |         |         |         |
  3+ 0       0.1463      0.87  |V Q      |         |         |         |
  3+ 5       0.1523      0.87  |V Q      |         |         |         |
```

```
3+10       0.1583      0.87  |V Q      |         |         |         |
3+15       0.1643      0.87  |V Q      |         |         |         |
3+20       0.1703      0.87  |V Q      |         |         |         |
3+25       0.1763      0.87  |V Q      |         |         |         |
3+30       0.1823      0.87  | VQ      |         |         |         |
3+35       0.1884      0.87  | VQ      |         |         |         |
3+40       0.1944      0.87  | VQ      |         |         |         |
3+45       0.2004      0.87  | VQ      |         |         |         |
3+50       0.2067      0.91  | VQ      |         |         |         |
3+55       0.2135      0.99  | VQ      |         |         |         |
4+ 0       0.2205      1.02  | V Q     |         |         |         |
4+ 5       0.2276      1.03  | V Q     |         |         |         |
4+10       0.2348      1.04  | V Q     |         |         |         |
4+15       0.2420      1.04  | V Q     |         |         |         |
4+20       0.2494      1.08  | V Q     |         |         |         |
4+25       0.2574      1.17  | V Q     |         |         |         |
4+30       0.2656      1.19  | V Q     |         |         |         |
4+35       0.2740      1.21  |  VQ     |         |         |         |
4+40       0.2823      1.21  |  VQ     |         |         |         |
4+45       0.2907      1.22  |  VQ     |         |         |         |
4+50       0.2993      1.25  |  V Q    |         |         |         |
4+55       0.3086      1.34  |  V Q    |         |         |         |
5+ 0       0.3180      1.37  |  V Q    |         |         |         |
5+ 5       0.3271      1.31  |  V Q    |         |         |         |
5+10       0.3350      1.15  |  VQ     |         |         |         |
5+15       0.3426      1.10  |  VQ     |         |         |         |
5+20       0.3503      1.11  |  VQ     |         |         |         |
5+25       0.3584      1.19  |  VQ     |         |         |         |
5+30       0.3667      1.21  |   Q     |         |         |         |
5+35       0.3753      1.25  |   Q     |         |         |         |
5+40       0.3845      1.33  |   VQ    |         |         |         |
5+45       0.3939      1.36  |   VQ    |         |         |         |
5+50       0.4034      1.38  |   VQ    |         |         |         |
5+55       0.4129      1.39  |   VQ    |         |         |         |
6+ 0       0.4225      1.39  |   VQ    |         |         |         |
6+ 5       0.4324      1.43  |   VQ    |         |         |         |
6+10       0.4428      1.52  |   V Q   |         |         |         |
6+15       0.4534      1.54  |    VQ   |         |         |         |
6+20       0.4642      1.56  |    VQ   |         |         |         |
6+25       0.4749      1.56  |    VQ   |         |         |         |
6+30       0.4857      1.57  |    VQ   |         |         |         |
6+35       0.4968      1.60  |    VQ   |         |         |         |
6+40       0.5084      1.69  |    VQ   |         |         |         |
6+45       0.5203      1.72  |    VQ   |         |         |         |
6+50       0.5322      1.73  |    VQ   |         |         |         |
6+55       0.5441      1.74  |     Q   |         |         |         |
7+ 0       0.5561      1.74  |     Q   |         |         |         |
7+ 5       0.5682      1.75  |     Q   |         |         |         |
7+10       0.5802      1.75  |     Q   |         |         |         |
7+15       0.5922      1.75  |     Q   |         |         |         |
7+20       0.6045      1.78  |     VQ  |         |         |         |
7+25       0.6174      1.87  |     VQ  |         |         |         |
7+30       0.6304      1.89  |     VQ  |         |         |         |
7+35       0.6438      1.94  |      Q  |         |         |         |
7+40       0.6577      2.03  |      VQ |         |         |         |
7+45       0.6720      2.06  |      VQ |         |         |         |
7+50       0.6865      2.11  |      VQ |         |         |         |
```

```
 7+55       0.7017      2.20  |      VQ |         |         |         |
 8+ 0       0.7171      2.24  |      VQ |         |         |         |
 8+ 5       0.7331      2.32  |       VQ|         |         |         |
 8+10       0.7503      2.50  |       VQ|         |         |         |
 8+15       0.7679      2.56  |       V Q         |         |         |
 8+20       0.7857      2.59  |       V Q         |         |         |
 8+25       0.8036      2.60  |       V Q         |         |         |
 8+30       0.8216      2.61  |        VQ         |         |         |
 8+35       0.8398      2.65  |        VQ         |         |         |
 8+40       0.8587      2.74  |        VQ         |         |         |
 8+45       0.8778      2.77  |        V|Q        |         |         |
 8+50       0.8971      2.81  |        V|Q        |         |         |
 8+55       0.9171      2.91  |         VQ        |         |         |
 9+ 0       0.9374      2.94  |         VQ        |         |         |
 9+ 5       0.9582      3.02  |         V Q       |         |         |
 9+10       0.9802      3.20  |         V Q       |         |         |
 9+15       1.0026      3.26  |         |V Q      |         |         |
 9+20       1.0255      3.32  |         |V Q      |         |         |
 9+25       1.0490      3.42  |         |V Q      |         |         |
 9+30       1.0728      3.46  |         |V Q      |         |         |
 9+35       1.0970      3.51  |         | V Q     |         |         |
 9+40       1.1218      3.60  |         | V Q     |         |         |
 9+45       1.1468      3.64  |         | V Q     |         |         |
 9+50       1.1722      3.68  |         | V Q     |         |         |
 9+55       1.1982      3.78  |         |  V Q    |         |         |
10+ 0       1.2245      3.81  |         |  V Q    |         |         |
10+ 5       1.2492      3.59  |         |  VQ     |         |         |
10+10       1.2699      3.01  |         | Q V     |         |         |
10+15       1.2894      2.82  |         |Q  V     |         |         |
10+20       1.3082      2.74  |         Q   V     |         |         |
10+25       1.3268      2.69  |         Q   V     |         |         |
10+30       1.3451      2.66  |         Q   V     |         |         |
10+35       1.3644      2.81  |         |Q   V    |         |         |
10+40       1.3866      3.22  |         | Q  V    |         |         |
10+45       1.4097      3.35  |         |  Q V    |         |         |
10+50       1.4332      3.41  |         |  Q V    |         |         |
10+55       1.4569      3.45  |         |  Q  V   |         |         |
11+ 0       1.4808      3.47  |         |  Q  V   |         |         |
11+ 5       1.5045      3.45  |         |  Q  V   |         |         |
11+10       1.5278      3.37  |         |  Q  V   |         |         |
11+15       1.5508      3.35  |         |  Q   V  |         |         |
11+20       1.5738      3.34  |         |  Q   V  |         |         |
11+25       1.5968      3.33  |         |  Q   V  |         |         |
11+30       1.6197      3.33  |         |  Q   V  |         |         |
11+35       1.6421      3.26  |         |  Q    V |         |         |
11+40       1.6634      3.09  |         | Q     V |         |         |
11+45       1.6843      3.03  |         | Q     V |         |         |
11+50       1.7052      3.04  |         | Q     V |         |         |
11+55       1.7266      3.11  |         | Q      V|         |         |
12+ 0       1.7482      3.13  |         | Q      V|         |         |
12+ 5       1.7714      3.37  |         |  Q     V|         |         |
12+10       1.7987      3.96  |         |    Q   V|         |         |
12+15       1.8273      4.16  |         |     Q   V         |         |
12+20       1.8568      4.28  |         |      Q  V         |         |
12+25       1.8872      4.42  |         |      Q  V         |         |
12+30       1.9180      4.48  |         |      Q  |V        |         |
12+35       1.9496      4.58  |         |       Q |V        |         |
```

```
12+40       1.9824      4.76  |         |        Q|V        |         |
12+45       2.0156      4.83  |         |        Q| V       |         |
12+50       2.0493      4.89  |         |        Q| V       |         |
12+55       2.0837      4.99  |         |        Q|  V      |         |
13+ 0       2.1183      5.03  |         |         Q  V      |         |
13+ 5       2.1543      5.21  |         |         Q  V      |         |
13+10       2.1932      5.65  |         |         | Q V     |         |
13+15       2.2330      5.79  |         |         |  QV     |         |
13+20       2.2734      5.86  |         |         |  Q V    |         |
13+25       2.3140      5.89  |         |         |  Q V    |         |
13+30       2.3547      5.92  |         |         |  Q  V   |         |
13+35       2.3930      5.56  |         |         | Q   V   |         |
13+40       2.4250      4.64  |         |       Q |     V   |         |
13+45       2.4549      4.34  |         |      Q  |      V  |         |
13+50       2.4839      4.21  |         |     Q   |      V  |         |
13+55       2.5123      4.13  |         |     Q   |      V  |         |
14+ 0       2.5404      4.08  |         |     Q   |       V |         |
14+ 5       2.5692      4.18  |         |     Q   |       V |         |
14+10       2.6003      4.50  |         |       Q |       V |         |
14+15       2.6320      4.60  |         |       Q |        V|         |
14+20       2.6638      4.62  |         |       Q |        V|         |
14+25       2.6952      4.56  |         |       Q |        V|         |
14+30       2.7265      4.55  |         |       Q |         V         |
14+35       2.7579      4.55  |         |       Q |         V         |
14+40       2.7892      4.55  |         |       Q |         V         |
14+45       2.8206      4.55  |         |       Q |         |V        |
14+50       2.8517      4.51  |         |       Q |         |V        |
14+55       2.8822      4.43  |         |      Q  |         |V        |
15+ 0       2.9125      4.40  |         |      Q  |         | V       |
15+ 5       2.9424      4.35  |         |      Q  |         | V       |
15+10       2.9718      4.26  |         |      Q  |         | V       |
15+15       3.0009      4.23  |         |     Q   |         |  V      |
15+20       3.0297      4.18  |         |     Q   |         |  V      |
15+25       3.0579      4.09  |         |     Q   |         |  V      |
15+30       3.0858      4.06  |         |     Q   |         |   V     |
15+35       3.1127      3.91  |         |    Q    |         |   V     |
15+40       3.1372      3.56  |         |   Q     |         |   V     |
15+45       3.1610      3.44  |         |  Q      |         |    V    |
15+50       3.1843      3.39  |         |  Q      |         |    V    |
15+55       3.2075      3.36  |         |  Q      |         |    V    |
16+ 0       3.2305      3.34  |         |  Q      |         |    V    |
16+ 5       3.2500      2.83  |         |Q        |         |    V    |
16+10       3.2607      1.55  |     Q   |         |         |     V   |
16+15       3.2686      1.14  |   Q     |         |         |     V   |
16+20       3.2751      0.95  |  Q      |         |         |     V   |
16+25       3.2810      0.85  |  Q      |         |         |     V   |
16+30       3.2864      0.78  |  Q      |         |         |     V   |
16+35       3.2913      0.71  | Q       |         |         |     V   |
16+40       3.2954      0.59  | Q       |         |         |     V   |
16+45       3.2992      0.55  | Q       |         |         |     V   |
16+50       3.3029      0.54  | Q       |         |         |     V   |
16+55       3.3066      0.53  | Q       |         |         |     V   |
17+ 0       3.3102      0.53  | Q       |         |         |     V   |
17+ 5       3.3143      0.59  | Q       |         |         |     V   |
17+10       3.3196      0.76  |  Q      |         |         |     V   |
17+15       3.3252      0.82  |  Q      |         |         |     V   |
17+20       3.3310      0.84  |  Q      |         |         |     V   |
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17+25       3.3368      0.85  |  Q      |         |         |     V   |
17+30       3.3428      0.86  |  Q      |         |         |      V  |
17+35       3.3488      0.87  |  Q      |         |         |      V  |
17+40       3.3548      0.87  |  Q      |         |         |      V  |
17+45       3.3608      0.87  |  Q      |         |         |      V  |
17+50       3.3666      0.84  |  Q      |         |         |      V  |
17+55       3.3718      0.76  |  Q      |         |         |      V  |
18+ 0       3.3768      0.73  | Q       |         |         |      V  |
18+ 5       3.3817      0.72  | Q       |         |         |      V  |
18+10       3.3866      0.71  | Q       |         |         |      V  |
18+15       3.3915      0.70  | Q       |         |         |      V  |
18+20       3.3963      0.70  | Q       |         |         |      V  |
18+25       3.4011      0.70  | Q       |         |         |      V  |
18+30       3.4060      0.70  | Q       |         |         |      V  |
18+35       3.4105      0.67  | Q       |         |         |      V  |
18+40       3.4145      0.58  | Q       |         |         |      V  |
18+45       3.4184      0.55  | Q       |         |         |      V  |
18+50       3.4219      0.51  | Q       |         |         |      V  |
18+55       3.4247      0.42  |Q        |         |         |      V  |
19+ 0       3.4274      0.38  |Q        |         |         |      V  |
19+ 5       3.4302      0.40  |Q        |         |         |      V  |
19+10       3.4334      0.48  |Q        |         |         |       V |
19+15       3.4369      0.50  | Q       |         |         |       V |
19+20       3.4406      0.54  | Q       |         |         |       V |
19+25       3.4450      0.63  | Q       |         |         |       V |
19+30       3.4496      0.66  | Q       |         |         |       V |
19+35       3.4540      0.65  | Q       |         |         |       V |
19+40       3.4580      0.57  | Q       |         |         |       V |
19+45       3.4617      0.55  | Q       |         |         |       V |
19+50       3.4652      0.51  | Q       |         |         |       V |
19+55       3.4681      0.42  |Q        |         |         |       V |
20+ 0       3.4707      0.38  |Q        |         |         |       V |
20+ 5       3.4735      0.40  |Q        |         |         |       V |
20+10       3.4768      0.48  |Q        |         |         |       V |
20+15       3.4802      0.50  | Q       |         |         |       V |
20+20       3.4838      0.51  | Q       |         |         |       V |
20+25       3.4873      0.52  | Q       |         |         |       V |
20+30       3.4909      0.52  | Q       |         |         |       V |
20+35       3.4945      0.52  | Q       |         |         |       V |
20+40       3.4981      0.52  | Q       |         |         |       V |
20+45       3.5017      0.52  | Q       |         |         |       V |
20+50       3.5051      0.49  |Q        |         |         |       V |
20+55       3.5079      0.41  |Q        |         |         |       V |
21+ 0       3.5105      0.38  |Q        |         |         |       V |
21+ 5       3.5132      0.40  |Q        |         |         |       V |
21+10       3.5165      0.48  |Q        |         |         |       V |
21+15       3.5200      0.50  | Q       |         |         |       V |
21+20       3.5233      0.48  |Q        |         |         |        V|
21+25       3.5260      0.40  |Q        |         |         |        V|
21+30       3.5286      0.37  |Q        |         |         |        V|
21+35       3.5313      0.40  |Q        |         |         |        V|
21+40       3.5346      0.48  |Q        |         |         |        V|
21+45       3.5380      0.50  | Q       |         |         |        V|
21+50       3.5413      0.48  |Q        |         |         |        V|
21+55       3.5440      0.40  |Q        |         |         |        V|
22+ 0       3.5466      0.37  |Q        |         |         |        V|
22+ 5       3.5494      0.40  |Q        |         |         |        V|
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
   22+10       3.5526      0.48  |Q        |         |         |        V|
   22+15       3.5561      0.50  | Q       |         |         |        V|
   22+20       3.5594      0.48  |Q        |         |         |        V|
   22+25       3.5621      0.40  |Q        |         |         |        V|
   22+30       3.5647      0.37  |Q        |         |         |        V|
   22+35       3.5672      0.36  |Q        |         |         |        V|
   22+40       3.5697      0.36  |Q        |         |         |        V|
   22+45       3.5721      0.36  |Q        |         |         |        V|
   22+50       3.5745      0.35  |Q        |         |         |        V|
   22+55       3.5769      0.35  |Q        |         |         |        V|
   23+ 0       3.5793      0.35  |Q        |         |         |        V|
   23+ 5       3.5818      0.35  |Q        |         |         |        V|
   23+10       3.5842      0.35  |Q        |         |         |        V|
   23+15       3.5866      0.35  |Q        |         |         |        V|
   23+20       3.5890      0.35  |Q        |         |         |        V|
   23+25       3.5914      0.35  |Q        |         |         |        V|
   23+30       3.5938      0.35  |Q        |         |         |        V|
   23+35       3.5962      0.35  |Q        |         |         |        V|
   23+40       3.5986      0.35  |Q        |         |         |        V|
   23+45       3.6010      0.35  |Q        |         |         |        V|
   23+50       3.6034      0.35  |Q        |         |         |        V|
   23+55       3.6058      0.35  |Q        |         |         |        V|
   24+ 0       3.6082      0.35  |Q        |         |         |        V|
   24+ 5       3.6102      0.28  |Q        |         |         |        V|
   24+10       3.6110      0.11  Q         |         |         |        V|
   24+15       3.6114      0.06  Q         |         |         |        V|
   24+20       3.6116      0.03  Q         |         |         |        V|
   24+25       3.6118      0.02  Q         |         |         |        V|
   24+30       3.6118      0.01  Q         |         |         |        V|
   24+35       3.6119      0.01  Q         |         |         |        V|
   24+40       3.6119      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

APPENDIX "D"

RETARDING BASIN FLOOD ROUTING ANALYSIS

Tract 31589 Basin

This Table compares the Results of Flood Routing Onsite Hydrograph through Retarding Basin & Combining the Natural Offsite Hydrographs to the Point of Concentration of the Existing Hydrograph.

Peak Flow Rate (cfs)

		Existing				Flood Routed			
		37.9 AC				31.3 AC			
		1-hr	3-hr	6-hr	24-hr	1-hr	3-hr	6-hr	24-hr
2-yr	Q cfs	30.3	11.3	9.2	0.89	0.55	0.64	0.71	0.75
5-yr	Q cfs	46.4	20.1	17.0	1.2	0.65	0.73	0.81	0.92
10-yr	Q cfs	65.9	34.1	30.1	6.1	0.72	0.80	0.93	4.13

DEPTH vs OUTFLOW CALCULATIONS

Tr. 38123 Water Quality & Retarding Basin

	Holes	Holes	Holes	Holes	Holes	Holes	Holes	Holes	Holes	Slots	Slots	Weir	Weir	
No. of Holes & Slots	1	1	1						0	0	0	0	1	No. of Weir
	Hole C	Hole C	Hole C	Hole C	Hole C	Hole C	Hole C	Hole C	Hole C	Slot C	Slot C	Weir C	Weir C	
Discharge Coefficient	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	3.33	3.33	Weir Coefficient
	Hole FL	Hole FL	Hole FL	Hole FL	Hole FL	Hole FL	Hole FL	Hole FL	Hole FL	Slot FL	Slot FL	Dist to Weir	Dist to Weir	
Distance of Holes to Basin Bottom (in)	0	48	72	76	113	117	121	124	0	0	0	0	84	Distance of Top of Riser Pipe from Basin Bottom (in)
	Hole R	Hole R	Hole R	Hole R	Hole R	Hole R	Hole R	Hole R	Hole R	Area	Area	Weir Length (ft)	Weir Length (ft)	
Hole Radius (in) Slots Area (sq ft)	1.5	1	1	1	1.5	1.45	1	1	0	0	0	0	30	Riser Perimeter (ft) = 2(12)+6
	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Cen Elev	Weir Elev	Weir Elev	
Hole Centerline Elev (ft)	585.63	589.58	591.58	591.92	595.04	595.37	595.67	595.92	585.50	585.50	585.50	585.50	592.50	Top of Riser Elevation (ft)

Elevation	Depth	Basin Volume	Outflow													
585.50	0	0	0													
586.50	1.00	0.15	0.2432	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
587.50	2.00	0.30	0.3560	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
588.50	3.00	0.45	0.44	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
589.50	4.00	0.60	0.51	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
590.50	5.00	1.12	0.68	0.57	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
591.50	6.00	1.70	0.79	0.63	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
592.50	7.00	2.34	0.99	0.68	0.20	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
593.50	8.00	3.04	101.02	0.73	0.23	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.90
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[Σ Flows (Holes + Weir)]

(Outflow through Holes)

(Outflow through Slots)

(Outflow over Top of Weir)

Note:

1. Orifice outflow is based on:
   $Q=CA(2gH)^{0.5}$
   where:
   C = Coefficient, 0.66 used here
   A = Orifice Area
   H = Headwater, Elevation of Water to Cen. of Orifice

2. Slot outflow is based on:
   $Q=CA(2gH)^{0.5}$
   where:
   C = Coefficient, 0.66 used here
   A = Slot Area (sq.ft.)
   H = Headwater, Elevation of Water to Cen. of Slot

3. Weir flow is based on:
   $Q=CLH^{1.5}$
   where:
   C = Coefficient, 3.33 used here
   L = Weir Length, Riser Pipe Perimeter was used here
   H = Headwater, Elevation of Water to Top of Weir

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for 177 Single Family Lots)

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
              Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 10/28/21

----------------------------------------------------------------------
```

TTM 31589
2-Year 1-Hour Flood Hydrograph Basin Routing
Developed Condition

```
---------------------------------------------------------------------


Program License Serial Number 6194

---------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop12.rte
***************************HYDROGRAPH DATA****************************
            Number of intervals =    20
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       25.964 (CFS)
            Total volume =       0.768 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
**********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
---------------------------------------------------------------------
Total number of inflow hydrograph intervals = 20
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
---------------------------------------------------------------------
---------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
----------------------------------------------------------------------
---------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
----------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

```
       585.500      0.001      0.001      0.001        0.001
       586.500      0.150      0.240      0.149        0.151
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       6.5   12.98   19.47   25.96 (Ft.)
 0.083    0.73    0.00      0.003  O       |       |       |       |   585.51
 0.167    2.59    0.02      0.014  O  I    |       |       |       |   585.59
 0.250    3.36    0.05      0.034  O   I   |       |       |       |   585.72
 0.333    3.95    0.09      0.059  O   I   |       |       |       |   585.89
 0.417    4.35    0.14      0.087  O    I  |       |       |       |   586.07
 0.500    4.97    0.19      0.117  O     I |       |       |       |   586.28
 0.583    5.63    0.24      0.153  O     I |       |       |       |   586.52
 0.667    6.45    0.27      0.192  O      I|       |       |       |   586.78
 0.750    8.37    0.31      0.241  O       | I     |       |       |   587.11
 0.833   17.41    0.37      0.328  O       |       |    I  |       |   587.68
 0.917   25.96    0.45      0.474  O       |       |       |       I   588.66
 1.000   12.45    0.51      0.603  O       |      I|       |       |   589.51
 1.083    7.26    0.53      0.668  O       I       |       |       |   589.63
 1.167    3.50    0.54      0.701  O   I   |       |       |       |   589.69
 1.250    2.05    0.55      0.716  O I     |       |       |       |   589.72
 1.333    1.24    0.55      0.724  OI      |       |       |       |   589.74
 1.417    0.75    0.55      0.727  O       |       |       |       |   589.74
 1.500    0.37    0.55      0.727  O       |       |       |       |   589.74
 1.583    0.08    0.55      0.725  O       |       |       |       |   589.74
 1.667    0.02    0.55      0.721  O       |       |       |       |   589.73
 1.750    0.00    0.55      0.718  O       |       |       |       |   589.73
 1.833    0.00    0.55      0.714  O       |       |       |       |   589.72
 1.917    0.00    0.55      0.710  O       |       |       |       |   589.71
 2.000    0.00    0.54      0.706  O       |       |       |       |   589.70
 2.083    0.00    0.54      0.703  O       |       |       |       |   589.70
 2.167    0.00    0.54      0.699  O       |       |       |       |   589.69
 2.250    0.00    0.54      0.695  O       |       |       |       |   589.68
 2.333    0.00    0.54      0.691  O       |       |       |       |   589.68
 2.417    0.00    0.54      0.688  O       |       |       |       |   589.67
 2.500    0.00    0.54      0.684  O       |       |       |       |   589.66
 2.583    0.00    0.54      0.680  O       |       |       |       |   589.65
 2.667    0.00    0.54      0.677  O       |       |       |       |   589.65
 2.750    0.00    0.53      0.673  O       |       |       |       |   589.64
 2.833    0.00    0.53      0.669  O       |       |       |       |   589.63
 2.917    0.00    0.53      0.666  O       |       |       |       |   589.63
 3.000    0.00    0.53      0.662  O       |       |       |       |   589.62
 3.083    0.00    0.53      0.658  O       |       |       |       |   589.61
 3.167    0.00    0.53      0.655  O       |       |       |       |   589.60
 3.250    0.00    0.53      0.651  O       |       |       |       |   589.60
 3.333    0.00    0.53      0.647  O       |       |       |       |   589.59
```

```
3.417    0.00    0.52      0.644  O        |       |       |       |   589.58
3.500    0.00    0.52      0.640  O        |       |       |       |   589.58
3.583    0.00    0.52      0.636  O        |       |       |       |   589.57
3.667    0.00    0.52      0.633  O        |       |       |       |   589.56
3.750    0.00    0.52      0.629  O        |       |       |       |   589.56
3.833    0.00    0.52      0.626  O        |       |       |       |   589.55
3.917    0.00    0.52      0.622  O        |       |       |       |   589.54
4.000    0.00    0.52      0.619  O        |       |       |       |   589.54
4.083    0.00    0.51      0.615  O        |       |       |       |   589.53
4.167    0.00    0.51      0.612  O        |       |       |       |   589.52
4.250    0.00    0.51      0.608  O        |       |       |       |   589.52
4.333    0.00    0.51      0.604  O        |       |       |       |   589.51
4.417    0.00    0.51      0.601  O        |       |       |       |   589.50
4.500    0.00    0.51      0.597  O        |       |       |       |   589.48
4.583    0.00    0.51      0.594  O        |       |       |       |   589.46
4.667    0.00    0.51      0.590  O        |       |       |       |   589.44
4.750    0.00    0.50      0.587  O        |       |       |       |   589.41
4.833    0.00    0.50      0.584  O        |       |       |       |   589.39
4.917    0.00    0.50      0.580  O        |       |       |       |   589.37
5.000    0.00    0.50      0.577  O        |       |       |       |   589.34
5.083    0.00    0.50      0.573  O        |       |       |       |   589.32
5.167    0.00    0.50      0.570  O        |       |       |       |   589.30
5.250    0.00    0.49      0.566  O        |       |       |       |   589.28
5.333    0.00    0.49      0.563  O        |       |       |       |   589.25
5.417    0.00    0.49      0.560  O        |       |       |       |   589.23
5.500    0.00    0.49      0.556  O        |       |       |       |   589.21
5.583    0.00    0.49      0.553  O        |       |       |       |   589.19
5.667    0.00    0.49      0.549  O        |       |       |       |   589.16
5.750    0.00    0.48      0.546  O        |       |       |       |   589.14
5.833    0.00    0.48      0.543  O        |       |       |       |   589.12
5.917    0.00    0.48      0.539  O        |       |       |       |   589.10
6.000    0.00    0.48      0.536  O        |       |       |       |   589.07
6.083    0.00    0.48      0.533  O        |       |       |       |   589.05
6.167    0.00    0.48      0.530  O        |       |       |       |   589.03
6.250    0.00    0.48      0.526  O        |       |       |       |   589.01
6.333    0.00    0.47      0.523  O        |       |       |       |   588.99
6.417    0.00    0.47      0.520  O        |       |       |       |   588.96
6.500    0.00    0.47      0.516  O        |       |       |       |   588.94
6.583    0.00    0.47      0.513  O        |       |       |       |   588.92
6.667    0.00    0.47      0.510  O        |       |       |       |   588.90
6.750    0.00    0.47      0.507  O        |       |       |       |   588.88
6.833    0.00    0.47      0.504  O        |       |       |       |   588.86
6.917    0.00    0.46      0.500  O        |       |       |       |   588.84
7.000    0.00    0.46      0.497  O        |       |       |       |   588.81
7.083    0.00    0.46      0.494  O        |       |       |       |   588.79
7.167    0.00    0.46      0.491  O        |       |       |       |   588.77
7.250    0.00    0.46      0.488  O        |       |       |       |   588.75
7.333    0.00    0.46      0.485  O        |       |       |       |   588.73
7.417    0.00    0.45      0.481  O        |       |       |       |   588.71
7.500    0.00    0.45      0.478  O        |       |       |       |   588.69
7.583    0.00    0.45      0.475  O        |       |       |       |   588.67
7.667    0.00    0.45      0.472  O        |       |       |       |   588.65
7.750    0.00    0.45      0.469  O        |       |       |       |   588.63
7.833    0.00    0.45      0.466  O        |       |       |       |   588.61
7.917    0.00    0.45      0.463  O        |       |       |       |   588.59
8.000    0.00    0.44      0.460  O        |       |       |       |   588.57
8.083    0.00    0.44      0.457  O        |       |       |       |   588.54
```

```
   8.167    0.00    0.44      0.454  O       |       |       |       |      588.52
   8.250    0.00    0.44      0.451  O       |       |       |       |      588.50
   8.333    0.00    0.44      0.448  O       |       |       |       |      588.48
   8.417    0.00    0.44      0.445  O       |       |       |       |      588.46
   8.500    0.00    0.44      0.442  O       |       |       |       |      588.44
   8.583    0.00    0.43      0.439  O       |       |       |       |      588.42
   8.667    0.00    0.43      0.436  O       |       |       |       |      588.40
   8.750    0.00    0.43      0.433  O       |       |       |       |      588.38
   8.833    0.00    0.43      0.430  O       |       |       |       |      588.36
   8.917    0.00    0.43      0.427  O       |       |       |       |      588.34
   9.000    0.00    0.43      0.424  O       |       |       |       |      588.33
   9.083    0.00    0.42      0.421  O       |       |       |       |      588.31
   9.167    0.00    0.42      0.418  O       |       |       |       |      588.29
   9.250    0.00    0.42      0.415  O       |       |       |       |      588.27
   9.333    0.00    0.42      0.412  O       |       |       |       |      588.25
   9.417    0.00    0.42      0.409  O       |       |       |       |      588.23
   9.500    0.00    0.42      0.406  O       |       |       |       |      588.21
   9.583    0.00    0.42      0.403  O       |       |       |       |      588.19
   9.667    0.00    0.41      0.401  O       |       |       |       |      588.17
   9.750    0.00    0.41      0.398  O       |       |       |       |      588.15
   9.833    0.00    0.41      0.395  O       |       |       |       |      588.13
   9.917    0.00    0.41      0.392  O       |       |       |       |      588.11
  10.000    0.00    0.41      0.389  O       |       |       |       |      588.10
  10.083    0.00    0.41      0.387  O       |       |       |       |      588.08
  10.167    0.00    0.40      0.384  O       |       |       |       |      588.06
  10.250    0.00    0.40      0.381  O       |       |       |       |      588.04
  10.333    0.00    0.40      0.378  O       |       |       |       |      588.02
  10.417    0.00    0.40      0.375  O       |       |       |       |      588.00
  10.500    0.00    0.40      0.373  O       |       |       |       |      587.98
  10.583    0.00    0.40      0.370  O       |       |       |       |      587.97
  10.667    0.00    0.40      0.367  O       |       |       |       |      587.95
  10.750    0.00    0.39      0.364  O       |       |       |       |      587.93
  10.833    0.00    0.39      0.362  O       |       |       |       |      587.91
  10.917    0.00    0.39      0.359  O       |       |       |       |      587.89
  11.000    0.00    0.39      0.356  O       |       |       |       |      587.88
  11.083    0.00    0.39      0.354  O       |       |       |       |      587.86
  11.167    0.00    0.39      0.351  O       |       |       |       |      587.84
  11.250    0.00    0.39      0.348  O       |       |       |       |      587.82
  11.333    0.00    0.38      0.346  O       |       |       |       |      587.80
  11.417    0.00    0.38      0.343  O       |       |       |       |      587.79
  11.500    0.00    0.38      0.340  O       |       |       |       |      587.77
  11.583    0.00    0.38      0.338  O       |       |       |       |      587.75
  11.667    0.00    0.38      0.335  O       |       |       |       |      587.73
  11.750    0.00    0.38      0.333  O       |       |       |       |      587.72
  11.833    0.00    0.38      0.330  O       |       |       |       |      587.70
  11.917    0.00    0.37      0.327  O       |       |       |       |      587.68
  12.000    0.00    0.37      0.325  O       |       |       |       |      587.67
  12.083    0.00    0.37      0.322  O       |       |       |       |      587.65
  12.167    0.00    0.37      0.320  O       |       |       |       |      587.63
  12.250    0.00    0.37      0.317  O       |       |       |       |      587.61
  12.333    0.00    0.37      0.315  O       |       |       |       |      587.60
  12.417    0.00    0.37      0.312  O       |       |       |       |      587.58
  12.500    0.00    0.37      0.310  O       |       |       |       |      587.56
  12.583    0.00    0.36      0.307  O       |       |       |       |      587.55
  12.667    0.00    0.36      0.305  O       |       |       |       |      587.53
  12.750    0.00    0.36      0.302  O       |       |       |       |      587.51
  12.833    0.00    0.36      0.300  O       |       |       |       |      587.50
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 12.917     0.00     0.36      0.297  O        |         |         |         |    587.48
 13.000     0.00     0.36      0.295  O        |         |         |         |    587.46
 13.083     0.00     0.35      0.292  O        |         |         |         |    587.45
 13.167     0.00     0.35      0.290  O        |         |         |         |    587.43
 13.250     0.00     0.35      0.287  O        |         |         |         |    587.42
 13.333     0.00     0.35      0.285  O        |         |         |         |    587.40
 13.417     0.00     0.35      0.283  O        |         |         |         |    587.38
 13.500     0.00     0.34      0.280  O        |         |         |         |    587.37
 13.583     0.00     0.34      0.278  O        |         |         |         |    587.35
 13.667     0.00     0.34      0.275  O        |         |         |         |    587.34
 13.750     0.00     0.34      0.273  O        |         |         |         |    587.32
 13.833     0.00     0.34      0.271  O        |         |         |         |    587.31
 13.917     0.00     0.33      0.269  O        |         |         |         |    587.29
 14.000     0.00     0.33      0.266  O        |         |         |         |    587.27
 14.083     0.00     0.33      0.264  O        |         |         |         |    587.26
 14.167     0.00     0.33      0.262  O        |         |         |         |    587.24
 14.250     0.00     0.33      0.259  O        |         |         |         |    587.23
 14.333     0.00     0.33      0.257  O        |         |         |         |    587.21
 14.417     0.00     0.32      0.255  O        |         |         |         |    587.20
 14.500     0.00     0.32      0.253  O        |         |         |         |    587.18
 14.583     0.00     0.32      0.250  O        |         |         |         |    587.17
 14.667     0.00     0.32      0.248  O        |         |         |         |    587.16
 14.750     0.00     0.32      0.246  O        |         |         |         |    587.14
 14.833     0.00     0.32      0.244  O        |         |         |         |    587.13
 14.917     0.00     0.31      0.242  O        |         |         |         |    587.11
 15.000     0.00     0.31      0.240  O        |         |         |         |    587.10
 15.083     0.00     0.31      0.237  O        |         |         |         |    587.08
 15.167     0.00     0.31      0.235  O        |         |         |         |    587.07
 15.250     0.00     0.31      0.233  O        |         |         |         |    587.05
 15.333     0.00     0.30      0.231  O        |         |         |         |    587.04
 15.417     0.00     0.30      0.229  O        |         |         |         |    587.03
 15.500     0.00     0.30      0.227  O        |         |         |         |    587.01
 15.583     0.00     0.30      0.225  O        |         |         |         |    587.00
 15.667     0.00     0.30      0.223  O        |         |         |         |    586.99
 15.750     0.00     0.30      0.221  O        |         |         |         |    586.97
 15.833     0.00     0.29      0.219  O        |         |         |         |    586.96
 15.917     0.00     0.29      0.217  O        |         |         |         |    586.94
 16.000     0.00     0.29      0.215  O        |         |         |         |    586.93
 16.083     0.00     0.29      0.213  O        |         |         |         |    586.92
 16.167     0.00     0.29      0.211  O        |         |         |         |    586.90
 16.250     0.00     0.29      0.209  O        |         |         |         |    586.89
 16.333     0.00     0.29      0.207  O        |         |         |         |    586.88
 16.417     0.00     0.28      0.205  O        |         |         |         |    586.87
 16.500     0.00     0.28      0.203  O        |         |         |         |    586.85
 16.583     0.00     0.28      0.201  O        |         |         |         |    586.84
 16.667     0.00     0.28      0.199  O        |         |         |         |    586.83
 16.750     0.00     0.28      0.197  O        |         |         |         |    586.81
 16.833     0.00     0.28      0.195  O        |         |         |         |    586.80
 16.917     0.00     0.27      0.193  O        |         |         |         |    586.79
 17.000     0.00     0.27      0.191  O        |         |         |         |    586.78
 17.083     0.00     0.27      0.189  O        |         |         |         |    586.76
 17.167     0.00     0.27      0.188  O        |         |         |         |    586.75
 17.250     0.00     0.27      0.186  O        |         |         |         |    586.74
 17.333     0.00     0.27      0.184  O        |         |         |         |    586.73
 17.417     0.00     0.27      0.182  O        |         |         |         |    586.71
 17.500     0.00     0.26      0.180  O        |         |         |         |    586.70
 17.583     0.00     0.26      0.178  O        |         |         |         |    586.69
```

```
17.667    0.00    0.26     0.177  O        |         |         |         |    586.68
17.750    0.00    0.26     0.175  O        |         |         |         |    586.67
17.833    0.00    0.26     0.173  O        |         |         |         |    586.65
17.917    0.00    0.26     0.171  O        |         |         |         |    586.64
18.000    0.00    0.26     0.169  O        |         |         |         |    586.63
18.083    0.00    0.25     0.168  O        |         |         |         |    586.62
18.167    0.00    0.25     0.166  O        |         |         |         |    586.61
18.250    0.00    0.25     0.164  O        |         |         |         |    586.60
18.333    0.00    0.25     0.163  O        |         |         |         |    586.58
18.417    0.00    0.25     0.161  O        |         |         |         |    586.57
18.500    0.00    0.25     0.159  O        |         |         |         |    586.56
18.583    0.00    0.25     0.157  O        |         |         |         |    586.55
18.667    0.00    0.24     0.156  O        |         |         |         |    586.54
18.750    0.00    0.24     0.154  O        |         |         |         |    586.53
18.833    0.00    0.24     0.152  O        |         |         |         |    586.52
18.917    0.00    0.24     0.151  O        |         |         |         |    586.50
19.000    0.00    0.24     0.149  O        |         |         |         |    586.49
19.083    0.00    0.24     0.147  O        |         |         |         |    586.48
19.167    0.00    0.23     0.146  O        |         |         |         |    586.47
19.250    0.00    0.23     0.144  O        |         |         |         |    586.46
19.333    0.00    0.23     0.143  O        |         |         |         |    586.45
19.417    0.00    0.23     0.141  O        |         |         |         |    586.44
19.500    0.00    0.22     0.140  O        |         |         |         |    586.43
19.583    0.00    0.22     0.138  O        |         |         |         |    586.42
19.667    0.00    0.22     0.136  O        |         |         |         |    586.41
19.750    0.00    0.22     0.135  O        |         |         |         |    586.40
19.833    0.00    0.21     0.134  O        |         |         |         |    586.39
19.917    0.00    0.21     0.132  O        |         |         |         |    586.38
20.000    0.00    0.21     0.131  O        |         |         |         |    586.37
20.083    0.00    0.21     0.129  O        |         |         |         |    586.36
20.167    0.00    0.20     0.128  O        |         |         |         |    586.35
20.250    0.00    0.20     0.126  O        |         |         |         |    586.34
20.333    0.00    0.20     0.125  O        |         |         |         |    586.33
20.417    0.00    0.20     0.124  O        |         |         |         |    586.32
20.500    0.00    0.20     0.122  O        |         |         |         |    586.31
20.583    0.00    0.19     0.121  O        |         |         |         |    586.30
20.667    0.00    0.19     0.120  O        |         |         |         |    586.30
20.750    0.00    0.19     0.118  O        |         |         |         |    586.29
20.833    0.00    0.19     0.117  O        |         |         |         |    586.28
20.917    0.00    0.18     0.116  O        |         |         |         |    586.27
21.000    0.00    0.18     0.114  O        |         |         |         |    586.26
21.083    0.00    0.18     0.113  O        |         |         |         |    586.25
21.167    0.00    0.18     0.112  O        |         |         |         |    586.24
21.250    0.00    0.18     0.111  O        |         |         |         |    586.24
21.333    0.00    0.18     0.110  O        |         |         |         |    586.23
21.417    0.00    0.17     0.108  O        |         |         |         |    586.22
21.500    0.00    0.17     0.107  O        |         |         |         |    586.21
21.583    0.00    0.17     0.106  O        |         |         |         |    586.20
21.667    0.00    0.17     0.105  O        |         |         |         |    586.20
21.750    0.00    0.17     0.104  O        |         |         |         |    586.19
21.833    0.00    0.16     0.103  O        |         |         |         |    586.18
21.917    0.00    0.16     0.101  O        |         |         |         |    586.17
22.000    0.00    0.16     0.100  O        |         |         |         |    586.17
22.083    0.00    0.16     0.099  O        |         |         |         |    586.16
22.167    0.00    0.16     0.098  O        |         |         |         |    586.15
22.250    0.00    0.16     0.097  O        |         |         |         |    586.14
22.333    0.00    0.15     0.096  O        |         |         |         |    586.14
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
22.417    0.00    0.15      0.095  O       |       |       |       |   586.13
22.500    0.00    0.15      0.094  O       |       |       |       |   586.12
22.583    0.00    0.15      0.093  O       |       |       |       |   586.12
22.667    0.00    0.15      0.092  O       |       |       |       |   586.11
22.750    0.00    0.15      0.091  O       |       |       |       |   586.10
22.833    0.00    0.14      0.090  O       |       |       |       |   586.10
22.917    0.00    0.14      0.089  O       |       |       |       |   586.09
23.000    0.00    0.14      0.088  O       |       |       |       |   586.08
23.083    0.00    0.14      0.087  O       |       |       |       |   586.08
23.167    0.00    0.14      0.086  O       |       |       |       |   586.07
23.250    0.00    0.14      0.085  O       |       |       |       |   586.06
23.333    0.00    0.13      0.084  O       |       |       |       |   586.06
23.417    0.00    0.13      0.083  O       |       |       |       |   586.05
23.500    0.00    0.13      0.082  O       |       |       |       |   586.05
23.583    0.00    0.13      0.081  O       |       |       |       |   586.04
23.667    0.00    0.13      0.080  O       |       |       |       |   586.03
23.750    0.00    0.13      0.080  O       |       |       |       |   586.03
23.833    0.00    0.13      0.079  O       |       |       |       |   586.02
23.917    0.00    0.12      0.078  O       |       |       |       |   586.02
24.000    0.00    0.12      0.077  O       |       |       |       |   586.01
24.083    0.00    0.12      0.076  O       |       |       |       |   586.00
24.167    0.00    0.12      0.075  O       |       |       |       |   586.00
24.250    0.00    0.12      0.075  O       |       |       |       |   585.99
24.333    0.00    0.12      0.074  O       |       |       |       |   585.99
24.417    0.00    0.12      0.073  O       |       |       |       |   585.98
24.500    0.00    0.12      0.072  O       |       |       |       |   585.98
24.583    0.00    0.11      0.071  O       |       |       |       |   585.97
24.667    0.00    0.11      0.071  O       |       |       |       |   585.97
24.750    0.00    0.11      0.070  O       |       |       |       |   585.96
24.833    0.00    0.11      0.069  O       |       |       |       |   585.96
24.917    0.00    0.11      0.068  O       |       |       |       |   585.95
25.000    0.00    0.11      0.067  O       |       |       |       |   585.95
25.083    0.00    0.11      0.067  O       |       |       |       |   585.94
25.167    0.00    0.11      0.066  O       |       |       |       |   585.94
25.250    0.00    0.10      0.065  O       |       |       |       |   585.93
25.333    0.00    0.10      0.065  O       |       |       |       |   585.93
25.417    0.00    0.10      0.064  O       |       |       |       |   585.92
25.500    0.00    0.10      0.063  O       |       |       |       |   585.92
25.583    0.00    0.10      0.062  O       |       |       |       |   585.91
25.667    0.00    0.10      0.062  O       |       |       |       |   585.91
25.750    0.00    0.10      0.061  O       |       |       |       |   585.90
25.833    0.00    0.10      0.060  O       |       |       |       |   585.90
25.917    0.00    0.10      0.060  O       |       |       |       |   585.89
26.000    0.00    0.09      0.059  O       |       |       |       |   585.89
26.083    0.00    0.09      0.059  O       |       |       |       |   585.89
26.167    0.00    0.09      0.058  O       |       |       |       |   585.88
26.250    0.00    0.09      0.057  O       |       |       |       |   585.88
26.333    0.00    0.09      0.057  O       |       |       |       |   585.87
26.417    0.00    0.09      0.056  O       |       |       |       |   585.87
26.500    0.00    0.09      0.055  O       |       |       |       |   585.87
26.583    0.00    0.09      0.055  O       |       |       |       |   585.86
26.667    0.00    0.09      0.054  O       |       |       |       |   585.86
26.750    0.00    0.09      0.054  O       |       |       |       |   585.85
26.833    0.00    0.08      0.053  O       |       |       |       |   585.85
26.917    0.00    0.08      0.052  O       |       |       |       |   585.85
27.000    0.00    0.08      0.052  O       |       |       |       |   585.84
27.083    0.00    0.08      0.051  O       |       |       |       |   585.84
```

```
 27.167     0.00     0.08       0.051  O        |         |         |         |     585.83
 27.250     0.00     0.08       0.050  O        |         |         |         |     585.83
 27.333     0.00     0.08       0.050  O        |         |         |         |     585.83
 27.417     0.00     0.08       0.049  O        |         |         |         |     585.82
 27.500     0.00     0.08       0.049  O        |         |         |         |     585.82
 27.583     0.00     0.08       0.048  O        |         |         |         |     585.82
 27.667     0.00     0.08       0.048  O        |         |         |         |     585.81
 27.750     0.00     0.07       0.047  O        |         |         |         |     585.81
 27.833     0.00     0.07       0.046  O        |         |         |         |     585.81
 27.917     0.00     0.07       0.046  O        |         |         |         |     585.80
 28.000     0.00     0.07       0.045  O        |         |         |         |     585.80
 28.083     0.00     0.07       0.045  O        |         |         |         |     585.80
 28.167     0.00     0.07       0.044  O        |         |         |         |     585.79
 28.250     0.00     0.07       0.044  O        |         |         |         |     585.79
 28.333     0.00     0.07       0.044  O        |         |         |         |     585.79
 28.417     0.00     0.07       0.043  O        |         |         |         |     585.78
 28.500     0.00     0.07       0.043  O        |         |         |         |     585.78
 28.583     0.00     0.07       0.042  O        |         |         |         |     585.78
 28.667     0.00     0.07       0.042  O        |         |         |         |     585.77
 28.750     0.00     0.07       0.041  O        |         |         |         |     585.77
 28.833     0.00     0.06       0.041  O        |         |         |         |     585.77
 28.917     0.00     0.06       0.040  O        |         |         |         |     585.76
 29.000     0.00     0.06       0.040  O        |         |         |         |     585.76
 29.083     0.00     0.06       0.039  O        |         |         |         |     585.76
 29.167     0.00     0.06       0.039  O        |         |         |         |     585.76
 29.250     0.00     0.06       0.039  O        |         |         |         |     585.75
 29.333     0.00     0.06       0.038  O        |         |         |         |     585.75
 29.417     0.00     0.06       0.038  O        |         |         |         |     585.75
 29.500     0.00     0.06       0.037  O        |         |         |         |     585.74
 29.583     0.00     0.06       0.037  O        |         |         |         |     585.74
 29.667     0.00     0.06       0.037  O        |         |         |         |     585.74
 29.750     0.00     0.06       0.036  O        |         |         |         |     585.74
 29.833     0.00     0.06       0.036  O        |         |         |         |     585.73
 29.917     0.00     0.06       0.035  O        |         |         |         |     585.73
 30.000     0.00     0.06       0.035  O        |         |         |         |     585.73
 30.083     0.00     0.05       0.035  O        |         |         |         |     585.73
 30.167     0.00     0.05       0.034  O        |         |         |         |     585.72
 30.250     0.00     0.05       0.034  O        |         |         |         |     585.72
 30.333     0.00     0.05       0.033  O        |         |         |         |     585.72
 30.417     0.00     0.05       0.033  O        |         |         |         |     585.72
 30.500     0.00     0.05       0.033  O        |         |         |         |     585.71
 30.583     0.00     0.05       0.032  O        |         |         |         |     585.71
 30.667     0.00     0.05       0.032  O        |         |         |         |     585.71
 30.750     0.00     0.05       0.032  O        |         |         |         |     585.71
 30.833     0.00     0.05       0.031  O        |         |         |         |     585.70
 30.917     0.00     0.05       0.031  O        |         |         |         |     585.70
 31.000     0.00     0.05       0.031  O        |         |         |         |     585.70
 31.083     0.00     0.05       0.030  O        |         |         |         |     585.70
 31.167     0.00     0.05       0.030  O        |         |         |         |     585.69
 31.250     0.00     0.05       0.030  O        |         |         |         |     585.69
 31.333     0.00     0.05       0.029  O        |         |         |         |     585.69
 31.417     0.00     0.05       0.029  O        |         |         |         |     585.69
 31.500     0.00     0.05       0.029  O        |         |         |         |     585.69
 31.583     0.00     0.04       0.028  O        |         |         |         |     585.68
 31.667     0.00     0.04       0.028  O        |         |         |         |     585.68
 31.750     0.00     0.04       0.028  O        |         |         |         |     585.68
 31.833     0.00     0.04       0.028  O        |         |         |         |     585.68
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
31.917     0.00     0.04       0.027  O        |        |        |        |    585.68
32.000     0.00     0.04       0.027  O        |        |        |        |    585.67
32.083     0.00     0.04       0.027  O        |        |        |        |    585.67
32.167     0.00     0.04       0.026  O        |        |        |        |    585.67
32.250     0.00     0.04       0.026  O        |        |        |        |    585.67
32.333     0.00     0.04       0.026  O        |        |        |        |    585.67
32.417     0.00     0.04       0.025  O        |        |        |        |    585.66
32.500     0.00     0.04       0.025  O        |        |        |        |    585.66
32.583     0.00     0.04       0.025  O        |        |        |        |    585.66
32.667     0.00     0.04       0.025  O        |        |        |        |    585.66
32.750     0.00     0.04       0.024  O        |        |        |        |    585.66
32.833     0.00     0.04       0.024  O        |        |        |        |    585.66
32.917     0.00     0.04       0.024  O        |        |        |        |    585.65
33.000     0.00     0.04       0.024  O        |        |        |        |    585.65
33.083     0.00     0.04       0.023  O        |        |        |        |    585.65
33.167     0.00     0.04       0.023  O        |        |        |        |    585.65
33.250     0.00     0.04       0.023  O        |        |        |        |    585.65
33.333     0.00     0.04       0.023  O        |        |        |        |    585.65
33.417     0.00     0.04       0.022  O        |        |        |        |    585.64
33.500     0.00     0.03       0.022  O        |        |        |        |    585.64
33.583     0.00     0.03       0.022  O        |        |        |        |    585.64
33.667     0.00     0.03       0.022  O        |        |        |        |    585.64
33.750     0.00     0.03       0.021  O        |        |        |        |    585.64
33.833     0.00     0.03       0.021  O        |        |        |        |    585.64
33.917     0.00     0.03       0.021  O        |        |        |        |    585.63
34.000     0.00     0.03       0.021  O        |        |        |        |    585.63
34.083     0.00     0.03       0.021  O        |        |        |        |    585.63
34.167     0.00     0.03       0.020  O        |        |        |        |    585.63
34.250     0.00     0.03       0.020  O        |        |        |        |    585.63
34.333     0.00     0.03       0.020  O        |        |        |        |    585.63
34.417     0.00     0.03       0.020  O        |        |        |        |    585.63
34.500     0.00     0.03       0.019  O        |        |        |        |    585.62
34.583     0.00     0.03       0.019  O        |        |        |        |    585.62
34.667     0.00     0.03       0.019  O        |        |        |        |    585.62
34.750     0.00     0.03       0.019  O        |        |        |        |    585.62
34.833     0.00     0.03       0.019  O        |        |        |        |    585.62
34.917     0.00     0.03       0.018  O        |        |        |        |    585.62
35.000     0.00     0.03       0.018  O        |        |        |        |    585.62
35.083     0.00     0.03       0.018  O        |        |        |        |    585.61
35.167     0.00     0.03       0.018  O        |        |        |        |    585.61
35.250     0.00     0.03       0.018  O        |        |        |        |    585.61
35.333     0.00     0.03       0.017  O        |        |        |        |    585.61
35.417     0.00     0.03       0.017  O        |        |        |        |    585.61
35.500     0.00     0.03       0.017  O        |        |        |        |    585.61
35.583     0.00     0.03       0.017  O        |        |        |        |    585.61
35.667     0.00     0.03       0.017  O        |        |        |        |    585.61
35.750     0.00     0.03       0.017  O        |        |        |        |    585.60
35.833     0.00     0.03       0.016  O        |        |        |        |    585.60
35.917     0.00     0.03       0.016  O        |        |        |        |    585.60
36.000     0.00     0.03       0.016  O        |        |        |        |    585.60
36.083     0.00     0.02       0.016  O        |        |        |        |    585.60
36.167     0.00     0.02       0.016  O        |        |        |        |    585.60
36.250     0.00     0.02       0.015  O        |        |        |        |    585.60
36.333     0.00     0.02       0.015  O        |        |        |        |    585.60
36.417     0.00     0.02       0.015  O        |        |        |        |    585.59
36.500     0.00     0.02       0.015  O        |        |        |        |    585.59
36.583     0.00     0.02       0.015  O        |        |        |        |    585.59
```

```
36.667    0.00    0.02      0.015  O       |       |       |       |   585.59
36.750    0.00    0.02      0.015  O       |       |       |       |   585.59
36.833    0.00    0.02      0.014  O       |       |       |       |   585.59
36.917    0.00    0.02      0.014  O       |       |       |       |   585.59
37.000    0.00    0.02      0.014  O       |       |       |       |   585.59
37.083    0.00    0.02      0.014  O       |       |       |       |   585.59
37.167    0.00    0.02      0.014  O       |       |       |       |   585.59
37.250    0.00    0.02      0.014  O       |       |       |       |   585.58
37.333    0.00    0.02      0.013  O       |       |       |       |   585.58
37.417    0.00    0.02      0.013  O       |       |       |       |   585.58
37.500    0.00    0.02      0.013  O       |       |       |       |   585.58
37.583    0.00    0.02      0.013  O       |       |       |       |   585.58
37.667    0.00    0.02      0.013  O       |       |       |       |   585.58
37.750    0.00    0.02      0.013  O       |       |       |       |   585.58
37.833    0.00    0.02      0.013  O       |       |       |       |   585.58
37.917    0.00    0.02      0.012  O       |       |       |       |   585.58
38.000    0.00    0.02      0.012  O       |       |       |       |   585.58
38.083    0.00    0.02      0.012  O       |       |       |       |   585.58
38.167    0.00    0.02      0.012  O       |       |       |       |   585.57
38.250    0.00    0.02      0.012  O       |       |       |       |   585.57
38.333    0.00    0.02      0.012  O       |       |       |       |   585.57
38.417    0.00    0.02      0.012  O       |       |       |       |   585.57
38.500    0.00    0.02      0.012  O       |       |       |       |   585.57
38.583    0.00    0.02      0.011  O       |       |       |       |   585.57
38.667    0.00    0.02      0.011  O       |       |       |       |   585.57
38.750    0.00    0.02      0.011  O       |       |       |       |   585.57
38.833    0.00    0.02      0.011  O       |       |       |       |   585.57
38.917    0.00    0.02      0.011  O       |       |       |       |   585.57
39.000    0.00    0.02      0.011  O       |       |       |       |   585.57
39.083    0.00    0.02      0.011  O       |       |       |       |   585.57
39.167    0.00    0.02      0.011  O       |       |       |       |   585.56
39.250    0.00    0.02      0.011  O       |       |       |       |   585.56
39.333    0.00    0.02      0.010  O       |       |       |       |   585.56
39.417    0.00    0.02      0.010  O       |       |       |       |   585.56
39.500    0.00    0.02      0.010  O       |       |       |       |   585.56
39.583    0.00    0.02      0.010  O       |       |       |       |   585.56
39.667    0.00    0.02      0.010  O       |       |       |       |   585.56
39.750    0.00    0.02      0.010  O       |       |       |       |   585.56
39.833    0.00    0.02      0.010  O       |       |       |       |   585.56
39.917    0.00    0.01      0.010  O       |       |       |       |   585.56
40.000    0.00    0.01      0.010  O       |       |       |       |   585.56
40.083    0.00    0.01      0.009  O       |       |       |       |   585.56
40.167    0.00    0.01      0.009  O       |       |       |       |   585.56
40.250    0.00    0.01      0.009  O       |       |       |       |   585.56
40.333    0.00    0.01      0.009  O       |       |       |       |   585.55
40.417    0.00    0.01      0.009  O       |       |       |       |   585.55
40.500    0.00    0.01      0.009  O       |       |       |       |   585.55
40.583    0.00    0.01      0.009  O       |       |       |       |   585.55
40.667    0.00    0.01      0.009  O       |       |       |       |   585.55
40.750    0.00    0.01      0.009  O       |       |       |       |   585.55
40.833    0.00    0.01      0.009  O       |       |       |       |   585.55
40.917    0.00    0.01      0.009  O       |       |       |       |   585.55
41.000    0.00    0.01      0.008  O       |       |       |       |   585.55
41.083    0.00    0.01      0.008  O       |       |       |       |   585.55
41.167    0.00    0.01      0.008  O       |       |       |       |   585.55
41.250    0.00    0.01      0.008  O       |       |       |       |   585.55
41.333    0.00    0.01      0.008  O       |       |       |       |   585.55
```

```
  41.417     0.00     0.01       0.008  O         |         |         |         |    585.55
  41.500     0.00     0.01       0.008  O         |         |         |         |    585.55
  41.583     0.00     0.01       0.008  O         |         |         |         |    585.55
  41.667     0.00     0.01       0.008  O         |         |         |         |    585.55
  41.750     0.00     0.01       0.008  O         |         |         |         |    585.54
  41.833     0.00     0.01       0.008  O         |         |         |         |    585.54
  41.917     0.00     0.01       0.008  O         |         |         |         |    585.54
  42.000     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.083     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.167     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.250     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.333     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.417     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.500     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.583     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.667     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.750     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.833     0.00     0.01       0.007  O         |         |         |         |    585.54
  42.917     0.00     0.01       0.007  O         |         |         |         |    585.54
  43.000     0.00     0.01       0.007  O         |         |         |         |    585.54
  43.083     0.00     0.01       0.006  O         |         |         |         |    585.54
  43.167     0.00     0.01       0.006  O         |         |         |         |    585.54
  43.250     0.00     0.01       0.006  O         |         |         |         |    585.54
  43.333     0.00     0.01       0.006  O         |         |         |         |    585.54
  43.417     0.00     0.01       0.006  O         |         |         |         |    585.54
  43.500     0.00     0.01       0.006  O         |         |         |         |    585.53
  43.583     0.00     0.01       0.006  O         |         |         |         |    585.53
  43.667     0.00     0.01       0.006  O         |         |         |         |    585.53
  43.750     0.00     0.01       0.006  O         |         |         |         |    585.53
  43.833     0.00     0.01       0.006  O         |         |         |         |    585.53
  43.917     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.000     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.083     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.167     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.250     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.333     0.00     0.01       0.006  O         |         |         |         |    585.53
  44.417     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.500     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.583     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.667     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.750     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.833     0.00     0.01       0.005  O         |         |         |         |    585.53
  44.917     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.000     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.083     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.167     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.250     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.333     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.417     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.500     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.583     0.00     0.01       0.005  O         |         |         |         |    585.53
  45.667     0.00     0.01       0.005  O         |         |         |         |    585.52
  45.750     0.00     0.01       0.005  O         |         |         |         |    585.52
  45.833     0.00     0.01       0.005  O         |         |         |         |    585.52
  45.917     0.00     0.01       0.005  O         |         |         |         |    585.52
  46.000     0.00     0.01       0.005  O         |         |         |         |    585.52
  46.083     0.00     0.01       0.004  O         |         |         |         |    585.52
```

```
46.167     0.00     0.01      0.004  O       |       |       |       |    585.52
46.250     0.00     0.01      0.004  O       |       |       |       |    585.52
46.333     0.00     0.01      0.004  O       |       |       |       |    585.52
46.417     0.00     0.01      0.004  O       |       |       |       |    585.52
46.500     0.00     0.01      0.004  O       |       |       |       |    585.52
46.583     0.00     0.01      0.004  O       |       |       |       |    585.52
46.667     0.00     0.01      0.004  O       |       |       |       |    585.52
46.750     0.00     0.01      0.004  O       |       |       |       |    585.52
46.833     0.00     0.01      0.004  O       |       |       |       |    585.52
46.917     0.00     0.01      0.004  O       |       |       |       |    585.52
47.000     0.00     0.01      0.004  O       |       |       |       |    585.52
47.083     0.00     0.01      0.004  O       |       |       |       |    585.52
47.167     0.00     0.01      0.004  O       |       |       |       |    585.52
47.250     0.00     0.01      0.004  O       |       |       |       |    585.52
47.333     0.00     0.01      0.004  O       |       |       |       |    585.52
47.417     0.00     0.01      0.004  O       |       |       |       |    585.52
47.500     0.00     0.01      0.004  O       |       |       |       |    585.52
47.583     0.00     0.01      0.004  O       |       |       |       |    585.52
47.667     0.00     0.01      0.004  O       |       |       |       |    585.52
47.750     0.00     0.01      0.004  O       |       |       |       |    585.52
47.833     0.00     0.01      0.004  O       |       |       |       |    585.52
47.917     0.00     0.01      0.004  O       |       |       |       |    585.52
48.000     0.00     0.01      0.004  O       |       |       |       |    585.52
48.083     0.00     0.01      0.004  O       |       |       |       |    585.52
48.167     0.00     0.00      0.003  O       |       |       |       |    585.52
48.250     0.00     0.00      0.003  O       |       |       |       |    585.52
48.333     0.00     0.00      0.003  O       |       |       |       |    585.52
48.417     0.00     0.00      0.003  O       |       |       |       |    585.52
48.500     0.00     0.00      0.003  O       |       |       |       |    585.52
48.583     0.00     0.00      0.003  O       |       |       |       |    585.52
48.667     0.00     0.00      0.003  O       |       |       |       |    585.52
48.750     0.00     0.00      0.003  O       |       |       |       |    585.52
48.833     0.00     0.00      0.003  O       |       |       |       |    585.51
48.917     0.00     0.00      0.003  O       |       |       |       |    585.51
49.000     0.00     0.00      0.003  O       |       |       |       |    585.51
49.083     0.00     0.00      0.003  O       |       |       |       |    585.51
49.167     0.00     0.00      0.003  O       |       |       |       |    585.51
49.250     0.00     0.00      0.003  O       |       |       |       |    585.51
49.333     0.00     0.00      0.003  O       |       |       |       |    585.51
49.417     0.00     0.00      0.003  O       |       |       |       |    585.51
49.500     0.00     0.00      0.003  O       |       |       |       |    585.51
49.583     0.00     0.00      0.003  O       |       |       |       |    585.51
49.667     0.00     0.00      0.003  O       |       |       |       |    585.51
49.750     0.00     0.00      0.003  O       |       |       |       |    585.51
49.833     0.00     0.00      0.003  O       |       |       |       |    585.51
49.917     0.00     0.00      0.003  O       |       |       |       |    585.51
50.000     0.00     0.00      0.003  O       |       |       |       |    585.51
50.083     0.00     0.00      0.003  O       |       |       |       |    585.51
50.167     0.00     0.00      0.003  O       |       |       |       |    585.51
50.250     0.00     0.00      0.003  O       |       |       |       |    585.51
50.333     0.00     0.00      0.003  O       |       |       |       |    585.51
50.417     0.00     0.00      0.003  O       |       |       |       |    585.51
50.500     0.00     0.00      0.003  O       |       |       |       |    585.51
50.583     0.00     0.00      0.003  O       |       |       |       |    585.51
50.667     0.00     0.00      0.003  O       |       |       |       |    585.51
50.750     0.00     0.00      0.003  O       |       |       |       |    585.51
50.833     0.00     0.00      0.003  O       |       |       |       |    585.51
```

```
   50.917     0.00     0.00       0.003  O         |        |        |        |    585.51
   51.000     0.00     0.00       0.003  O         |        |        |        |    585.51
   51.083     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.167     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.250     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.333     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.417     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.500     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.583     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.667     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.750     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.833     0.00     0.00       0.002  O         |        |        |        |    585.51
   51.917     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.000     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.083     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.167     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.250     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.333     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.417     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.500     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.583     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.667     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.750     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.833     0.00     0.00       0.002  O         |        |        |        |    585.51
   52.917     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.000     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.083     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.167     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.250     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.333     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.417     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.500     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.583     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.667     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.750     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.833     0.00     0.00       0.002  O         |        |        |        |    585.51
   53.917     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.000     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.083     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.167     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.250     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.333     0.00     0.00       0.002  O         |        |        |        |    585.51
   54.417     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.500     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.583     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.667     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.750     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.833     0.00     0.00       0.002  O         |        |        |        |    585.50
   54.917     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.000     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.083     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.167     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.250     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.333     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.417     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.500     0.00     0.00       0.002  O         |        |        |        |    585.50
   55.583     0.00     0.00       0.002  O         |        |        |        |    585.50
```

```
  55.667     0.00     0.00      0.002  O          |         |         |         |    585.50
  55.750     0.00     0.00      0.002  O          |         |         |         |    585.50
  55.833     0.00     0.00      0.002  O          |         |         |         |    585.50
  55.917     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.000     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.083     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.167     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.250     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.333     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.417     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.500     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.583     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.667     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.750     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.833     0.00     0.00      0.001  O          |         |         |         |    585.50
  56.917     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.000     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.083     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.167     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.250     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.333     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.417     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.500     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.583     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.667     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.750     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.833     0.00     0.00      0.001  O          |         |         |         |    585.50
  57.917     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.000     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.083     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.167     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.250     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.333     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.417     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.500     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.583     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.667     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.750     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.833     0.00     0.00      0.001  O          |         |         |         |    585.50
  58.917     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.000     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.083     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.167     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.250     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.333     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.417     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.500     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.583     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.667     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.750     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.833     0.00     0.00      0.001  O          |         |         |         |    585.50
  59.917     0.00     0.00      0.001  O          |         |         |         |    585.50
  60.000     0.00     0.00      0.001  O          |         |         |         |    585.50
  60.083     0.00     0.00      0.001  O          |         |         |         |    585.50
  60.167     0.00     0.00      0.001  O          |         |         |         |    585.50
  60.250     0.00     0.00      0.001  O          |         |         |         |    585.50
  60.333     0.00     0.00      0.001  O          |         |         |         |    583.66
```

```
****************************HYDROGRAPH DATA****************************
            Number of intervals =   724
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =        0.552 (CFS)
            Total volume =       0.767 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************

--------------------------------------------------------------------
```

```
                   FLOOD HYDROGRAPH ROUTING PROGRAM
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                      Study date: 10/28/21

---------------------------------------------------------------------
```

TTM 31589
2-Year 3-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop32.rte
***************************HYDROGRAPH DATA****************************
            Number of intervals =    44
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       13.017 (CFS)
            Total volume =       1.087 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 44
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

```
       585.500      0.001      0.001      0.001        0.001
       586.500      0.150      0.240      0.149        0.151
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       3.3    6.51    9.76   13.02 (Ft.)
 0.083    0.37    0.00      0.001  O       |       |       |       |   585.50
 0.167    1.31    0.01      0.007  O  I    |       |       |       |   585.54
 0.250    1.56    0.03      0.017  O  I    |       |       |       |   585.61
 0.333    1.67    0.04      0.028  O   I   |       |       |       |   585.68
 0.417    1.99    0.06      0.040  O   I   |       |       |       |   585.76
 0.500    2.20    0.09      0.054  O    I  |       |       |       |   585.85
 0.583    2.39    0.11      0.069  O    I  |       |       |       |   585.96
 0.667    2.36    0.13      0.084  O    I  |       |       |       |   586.06
 0.750    2.56    0.16      0.100  O     I |       |       |       |   586.17
 0.833    2.54    0.19      0.117  O     I |       |       |       |   586.28
 0.917    2.38    0.21      0.132  O    I  |       |       |       |   586.38
 1.000    2.46    0.24      0.147  O     I |       |       |       |   586.48
 1.083    2.72    0.25      0.164  O     I |       |       |       |   586.59
 1.167    3.05    0.27      0.182  O      I|       |       |       |   586.71
 1.250    3.16    0.28      0.201  O      I|       |       |       |   586.84
 1.333    3.16    0.30      0.221  O      I|       |       |       |   586.97
 1.417    3.22    0.31      0.241  O      I|       |       |       |   587.11
 1.500    3.65    0.33      0.262  O       I       |       |       |   587.25
 1.583    3.77    0.35      0.286  O       |I      |       |       |   587.40
 1.667    3.72    0.36      0.309  O       |I      |       |       |   587.56
 1.750    4.08    0.38      0.333  O       | I     |       |       |   587.72
 1.833    4.52    0.39      0.360  O       |  I    |       |       |   587.90
 1.917    4.49    0.41      0.389  |O      |  I    |       |       |   588.09
 2.000    4.41    0.42      0.416  |O      | I     |       |       |   588.28
 2.083    4.49    0.44      0.444  |O      |  I    |       |       |   588.46
 2.167    4.89    0.45      0.473  |O      |   I   |       |       |   588.65
 2.250    5.95    0.47      0.507  |O      |     I |       |       |   588.88
 2.333    6.37    0.49      0.547  |O      |      I|       |       |   589.14
 2.417    6.86    0.50      0.589  |O      |       I       |       |   589.42
 2.500   10.15    0.52      0.644  |O      |       |       I       |   589.58
 2.583   12.36    0.55      0.718  |O      |       |       |      I |   589.73
 2.667   13.02    0.58      0.801  |O      |       |       |       I   589.89
 2.750    9.28    0.60      0.874  |O      |       |     I |       |   590.03
 2.833    5.56    0.61      0.921  |O      |    I  |       |       |   590.12
 2.917    4.20    0.62      0.950  |O      | I     |       |       |   590.17
 3.000    3.25    0.63      0.971  |O     I|       |       |       |   590.21
 3.083    1.86    0.64      0.985  |O  I   |       |       |       |   590.24
 3.167    0.90    0.64      0.990  |OI     |       |       |       |   590.25
 3.250    0.47    0.64      0.990  |O      |       |       |       |   590.25
 3.333    0.23    0.64      0.988  IO      |       |       |       |   590.25
```

```
 3.417    0.11    0.64     0.985  IO      |       |       |       |    590.24
 3.500    0.06    0.63     0.981  IO      |       |       |       |    590.23
 3.583    0.02    0.63     0.977  IO      |       |       |       |    590.22
 3.667    0.00    0.63     0.973  IO      |       |       |       |    590.22
 3.750    0.00    0.63     0.968  IO      |       |       |       |    590.21
 3.833    0.00    0.63     0.964  IO      |       |       |       |    590.20
 3.917    0.00    0.63     0.960  IO      |       |       |       |    590.19
 4.000    0.00    0.63     0.955  IO      |       |       |       |    590.18
 4.083    0.00    0.62     0.951  IO      |       |       |       |    590.18
 4.167    0.00    0.62     0.947  IO      |       |       |       |    590.17
 4.250    0.00    0.62     0.943  IO      |       |       |       |    590.16
 4.333    0.00    0.62     0.938  IO      |       |       |       |    590.15
 4.417    0.00    0.62     0.934  IO      |       |       |       |    590.14
 4.500    0.00    0.62     0.930  IO      |       |       |       |    590.13
 4.583    0.00    0.62     0.925  IO      |       |       |       |    590.13
 4.667    0.00    0.62     0.921  IO      |       |       |       |    590.12
 4.750    0.00    0.61     0.917  IO      |       |       |       |    590.11
 4.833    0.00    0.61     0.913  IO      |       |       |       |    590.10
 4.917    0.00    0.61     0.909  IO      |       |       |       |    590.09
 5.000    0.00    0.61     0.904  IO      |       |       |       |    590.09
 5.083    0.00    0.61     0.900  IO      |       |       |       |    590.08
 5.167    0.00    0.61     0.896  IO      |       |       |       |    590.07
 5.250    0.00    0.61     0.892  IO      |       |       |       |    590.06
 5.333    0.00    0.60     0.888  IO      |       |       |       |    590.05
 5.417    0.00    0.60     0.883  IO      |       |       |       |    590.05
 5.500    0.00    0.60     0.879  IO      |       |       |       |    590.04
 5.583    0.00    0.60     0.875  IO      |       |       |       |    590.03
 5.667    0.00    0.60     0.871  IO      |       |       |       |    590.02
 5.750    0.00    0.60     0.867  IO      |       |       |       |    590.01
 5.833    0.00    0.60     0.863  IO      |       |       |       |    590.01
 5.917    0.00    0.59     0.859  IO      |       |       |       |    590.00
 6.000    0.00    0.59     0.855  IO      |       |       |       |    589.99
 6.083    0.00    0.59     0.851  IO      |       |       |       |    589.98
 6.167    0.00    0.59     0.847  IO      |       |       |       |    589.97
 6.250    0.00    0.59     0.842  IO      |       |       |       |    589.97
 6.333    0.00    0.59     0.838  IO      |       |       |       |    589.96
 6.417    0.00    0.59     0.834  IO      |       |       |       |    589.95
 6.500    0.00    0.59     0.830  IO      |       |       |       |    589.94
 6.583    0.00    0.58     0.826  IO      |       |       |       |    589.94
 6.667    0.00    0.58     0.822  IO      |       |       |       |    589.93
 6.750    0.00    0.58     0.818  IO      |       |       |       |    589.92
 6.833    0.00    0.58     0.814  IO      |       |       |       |    589.91
 6.917    0.00    0.58     0.810  IO      |       |       |       |    589.90
 7.000    0.00    0.58     0.806  IO      |       |       |       |    589.90
 7.083    0.00    0.58     0.802  IO      |       |       |       |    589.89
 7.167    0.00    0.57     0.798  IO      |       |       |       |    589.88
 7.250    0.00    0.57     0.794  IO      |       |       |       |    589.87
 7.333    0.00    0.57     0.790  IO      |       |       |       |    589.87
 7.417    0.00    0.57     0.787  IO      |       |       |       |    589.86
 7.500    0.00    0.57     0.783  IO      |       |       |       |    589.85
 7.583    0.00    0.57     0.779  IO      |       |       |       |    589.84
 7.667    0.00    0.57     0.775  IO      |       |       |       |    589.84
 7.750    0.00    0.57     0.771  IO      |       |       |       |    589.83
 7.833    0.00    0.56     0.767  IO      |       |       |       |    589.82
 7.917    0.00    0.56     0.763  IO      |       |       |       |    589.81
 8.000    0.00    0.56     0.759  IO      |       |       |       |    589.81
 8.083    0.00    0.56     0.755  IO      |       |       |       |    589.80
```

```
     8.167     0.00     0.56       0.751  IO        |         |         |         |     589.79
     8.250     0.00     0.56       0.748  IO        |         |         |         |     589.78
     8.333     0.00     0.56       0.744  IO        |         |         |         |     589.78
     8.417     0.00     0.56       0.740  IO        |         |         |         |     589.77
     8.500     0.00     0.55       0.736  IO        |         |         |         |     589.76
     8.583     0.00     0.55       0.732  IO        |         |         |         |     589.75
     8.667     0.00     0.55       0.729  IO        |         |         |         |     589.75
     8.750     0.00     0.55       0.725  IO        |         |         |         |     589.74
     8.833     0.00     0.55       0.721  IO        |         |         |         |     589.73
     8.917     0.00     0.55       0.717  IO        |         |         |         |     589.73
     9.000     0.00     0.55       0.713  IO        |         |         |         |     589.72
     9.083     0.00     0.55       0.710  IO        |         |         |         |     589.71
     9.167     0.00     0.54       0.706  IO        |         |         |         |     589.70
     9.250     0.00     0.54       0.702  IO        |         |         |         |     589.70
     9.333     0.00     0.54       0.698  IO        |         |         |         |     589.69
     9.417     0.00     0.54       0.695  IO        |         |         |         |     589.68
     9.500     0.00     0.54       0.691  IO        |         |         |         |     589.67
     9.583     0.00     0.54       0.687  IO        |         |         |         |     589.67
     9.667     0.00     0.54       0.684  IO        |         |         |         |     589.66
     9.750     0.00     0.54       0.680  IO        |         |         |         |     589.65
     9.833     0.00     0.53       0.676  IO        |         |         |         |     589.65
     9.917     0.00     0.53       0.672  IO        |         |         |         |     589.64
    10.000     0.00     0.53       0.669  IO        |         |         |         |     589.63
    10.083     0.00     0.53       0.665  IO        |         |         |         |     589.63
    10.167     0.00     0.53       0.661  IO        |         |         |         |     589.62
    10.250     0.00     0.53       0.658  IO        |         |         |         |     589.61
    10.333     0.00     0.53       0.654  IO        |         |         |         |     589.60
    10.417     0.00     0.53       0.651  IO        |         |         |         |     589.60
    10.500     0.00     0.53       0.647  IO        |         |         |         |     589.59
    10.583     0.00     0.52       0.643  IO        |         |         |         |     589.58
    10.667     0.00     0.52       0.640  IO        |         |         |         |     589.58
    10.750     0.00     0.52       0.636  IO        |         |         |         |     589.57
    10.833     0.00     0.52       0.633  IO        |         |         |         |     589.56
    10.917     0.00     0.52       0.629  IO        |         |         |         |     589.56
    11.000     0.00     0.52       0.625  IO        |         |         |         |     589.55
    11.083     0.00     0.52       0.622  IO        |         |         |         |     589.54
    11.167     0.00     0.52       0.618  IO        |         |         |         |     589.54
    11.250     0.00     0.51       0.615  IO        |         |         |         |     589.53
    11.333     0.00     0.51       0.611  IO        |         |         |         |     589.52
    11.417     0.00     0.51       0.608  IO        |         |         |         |     589.51
    11.500     0.00     0.51       0.604  IO        |         |         |         |     589.51
    11.583     0.00     0.51       0.601  IO        |         |         |         |     589.50
    11.667     0.00     0.51       0.597  IO        |         |         |         |     589.48
    11.750     0.00     0.51       0.594  IO        |         |         |         |     589.46
    11.833     0.00     0.51       0.590  IO        |         |         |         |     589.43
    11.917     0.00     0.50       0.587  IO        |         |         |         |     589.41
    12.000     0.00     0.50       0.583  IO        |         |         |         |     589.39
    12.083     0.00     0.50       0.580  IO        |         |         |         |     589.36
    12.167     0.00     0.50       0.576  IO        |         |         |         |     589.34
    12.250     0.00     0.50       0.573  IO        |         |         |         |     589.32
    12.333     0.00     0.50       0.569  IO        |         |         |         |     589.30
    12.417     0.00     0.49       0.566  IO        |         |         |         |     589.27
    12.500     0.00     0.49       0.563  IO        |         |         |         |     589.25
    12.583     0.00     0.49       0.559  IO        |         |         |         |     589.23
    12.667     0.00     0.49       0.556  IO        |         |         |         |     589.21
    12.750     0.00     0.49       0.552  IO        |         |         |         |     589.18
    12.833     0.00     0.49       0.549  IO        |         |         |         |     589.16
```

```
12.917    0.00    0.48      0.546  IO      |       |       |       |   589.14
13.000    0.00    0.48      0.542  IO      |       |       |       |   589.12
13.083    0.00    0.48      0.539  IO      |       |       |       |   589.09
13.167    0.00    0.48      0.536  IO      |       |       |       |   589.07
13.250    0.00    0.48      0.532  IO      |       |       |       |   589.05
13.333    0.00    0.48      0.529  IO      |       |       |       |   589.03
13.417    0.00    0.48      0.526  IO      |       |       |       |   589.01
13.500    0.00    0.47      0.523  IO      |       |       |       |   588.98
13.583    0.00    0.47      0.519  IO      |       |       |       |   588.96
13.667    0.00    0.47      0.516  IO      |       |       |       |   588.94
13.750    0.00    0.47      0.513  IO      |       |       |       |   588.92
13.833    0.00    0.47      0.510  IO      |       |       |       |   588.90
13.917    0.00    0.47      0.506  IO      |       |       |       |   588.88
14.000    0.00    0.46      0.503  IO      |       |       |       |   588.86
14.083    0.00    0.46      0.500  IO      |       |       |       |   588.83
14.167    0.00    0.46      0.497  IO      |       |       |       |   588.81
14.250    0.00    0.46      0.494  IO      |       |       |       |   588.79
14.333    0.00    0.46      0.491  IO      |       |       |       |   588.77
14.417    0.00    0.46      0.487  IO      |       |       |       |   588.75
14.500    0.00    0.46      0.484  IO      |       |       |       |   588.73
14.583    0.00    0.45      0.481  IO      |       |       |       |   588.71
14.667    0.00    0.45      0.478  IO      |       |       |       |   588.69
14.750    0.00    0.45      0.475  IO      |       |       |       |   588.67
14.833    0.00    0.45      0.472  IO      |       |       |       |   588.64
14.917    0.00    0.45      0.469  IO      |       |       |       |   588.62
15.000    0.00    0.45      0.466  IO      |       |       |       |   588.60
15.083    0.00    0.45      0.462  IO      |       |       |       |   588.58
15.167    0.00    0.44      0.459  IO      |       |       |       |   588.56
15.250    0.00    0.44      0.456  IO      |       |       |       |   588.54
15.333    0.00    0.44      0.453  IO      |       |       |       |   588.52
15.417    0.00    0.44      0.450  IO      |       |       |       |   588.50
15.500    0.00    0.44      0.447  IO      |       |       |       |   588.48
15.583    0.00    0.44      0.444  IO      |       |       |       |   588.46
15.667    0.00    0.44      0.441  IO      |       |       |       |   588.44
15.750    0.00    0.43      0.438  IO      |       |       |       |   588.42
15.833    0.00    0.43      0.435  IO      |       |       |       |   588.40
15.917    0.00    0.43      0.432  IO      |       |       |       |   588.38
16.000    0.00    0.43      0.429  IO      |       |       |       |   588.36
16.083    0.00    0.43      0.426  IO      |       |       |       |   588.34
16.167    0.00    0.43      0.423  IO      |       |       |       |   588.32
16.250    0.00    0.42      0.421  IO      |       |       |       |   588.30
16.333    0.00    0.42      0.418  IO      |       |       |       |   588.28
16.417    0.00    0.42      0.415  IO      |       |       |       |   588.26
16.500    0.00    0.42      0.412  IO      |       |       |       |   588.25
16.583    0.00    0.42      0.409  IO      |       |       |       |   588.23
16.667    0.00    0.42      0.406  IO      |       |       |       |   588.21
16.750    0.00    0.42      0.403  IO      |       |       |       |   588.19
16.833    0.00    0.41      0.400  IO      |       |       |       |   588.17
16.917    0.00    0.41      0.397  IO      |       |       |       |   588.15
17.000    0.00    0.41      0.395  IO      |       |       |       |   588.13
17.083    0.00    0.41      0.392  IO      |       |       |       |   588.11
17.167    0.00    0.41      0.389  IO      |       |       |       |   588.09
17.250    0.00    0.41      0.386  O       |       |       |       |   588.07
17.333    0.00    0.40      0.383  O       |       |       |       |   588.06
17.417    0.00    0.40      0.381  O       |       |       |       |   588.04
17.500    0.00    0.40      0.378  O       |       |       |       |   588.02
17.583    0.00    0.40      0.375  O       |       |       |       |   588.00
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 17.667     0.00     0.40      0.372  O        |        |        |        |    587.98
 17.750     0.00     0.40      0.370  O        |        |        |        |    587.96
 17.833     0.00     0.40      0.367  O        |        |        |        |    587.95
 17.917     0.00     0.39      0.364  O        |        |        |        |    587.93
 18.000     0.00     0.39      0.361  O        |        |        |        |    587.91
 18.083     0.00     0.39      0.359  O        |        |        |        |    587.89
 18.167     0.00     0.39      0.356  O        |        |        |        |    587.87
 18.250     0.00     0.39      0.353  O        |        |        |        |    587.86
 18.333     0.00     0.39      0.351  O        |        |        |        |    587.84
 18.417     0.00     0.39      0.348  O        |        |        |        |    587.82
 18.500     0.00     0.38      0.345  O        |        |        |        |    587.80
 18.583     0.00     0.38      0.343  O        |        |        |        |    587.79
 18.667     0.00     0.38      0.340  O        |        |        |        |    587.77
 18.750     0.00     0.38      0.338  O        |        |        |        |    587.75
 18.833     0.00     0.38      0.335  O        |        |        |        |    587.73
 18.917     0.00     0.38      0.332  O        |        |        |        |    587.72
 19.000     0.00     0.38      0.330  O        |        |        |        |    587.70
 19.083     0.00     0.37      0.327  O        |        |        |        |    587.68
 19.167     0.00     0.37      0.325  O        |        |        |        |    587.66
 19.250     0.00     0.37      0.322  O        |        |        |        |    587.65
 19.333     0.00     0.37      0.319  O        |        |        |        |    587.63
 19.417     0.00     0.37      0.317  O        |        |        |        |    587.61
 19.500     0.00     0.37      0.314  O        |        |        |        |    587.60
 19.583     0.00     0.37      0.312  O        |        |        |        |    587.58
 19.667     0.00     0.36      0.309  O        |        |        |        |    587.56
 19.750     0.00     0.36      0.307  O        |        |        |        |    587.55
 19.833     0.00     0.36      0.304  O        |        |        |        |    587.53
 19.917     0.00     0.36      0.302  O        |        |        |        |    587.51
 20.000     0.00     0.36      0.299  O        |        |        |        |    587.50
 20.083     0.00     0.36      0.297  O        |        |        |        |    587.48
 20.167     0.00     0.36      0.294  O        |        |        |        |    587.46
 20.250     0.00     0.35      0.292  O        |        |        |        |    587.45
 20.333     0.00     0.35      0.290  O        |        |        |        |    587.43
 20.417     0.00     0.35      0.287  O        |        |        |        |    587.41
 20.500     0.00     0.35      0.285  O        |        |        |        |    587.40
 20.583     0.00     0.35      0.282  O        |        |        |        |    587.38
 20.667     0.00     0.34      0.280  O        |        |        |        |    587.37
 20.750     0.00     0.34      0.278  O        |        |        |        |    587.35
 20.833     0.00     0.34      0.275  O        |        |        |        |    587.33
 20.917     0.00     0.34      0.273  O        |        |        |        |    587.32
 21.000     0.00     0.34      0.271  O        |        |        |        |    587.30
 21.083     0.00     0.33      0.268  O        |        |        |        |    587.29
 21.167     0.00     0.33      0.266  O        |        |        |        |    587.27
 21.250     0.00     0.33      0.264  O        |        |        |        |    587.26
 21.333     0.00     0.33      0.261  O        |        |        |        |    587.24
 21.417     0.00     0.33      0.259  O        |        |        |        |    587.23
 21.500     0.00     0.33      0.257  O        |        |        |        |    587.21
 21.583     0.00     0.32      0.255  O        |        |        |        |    587.20
 21.667     0.00     0.32      0.252  O        |        |        |        |    587.18
 21.750     0.00     0.32      0.250  O        |        |        |        |    587.17
 21.833     0.00     0.32      0.248  O        |        |        |        |    587.15
 21.917     0.00     0.32      0.246  O        |        |        |        |    587.14
 22.000     0.00     0.31      0.244  O        |        |        |        |    587.12
 22.083     0.00     0.31      0.242  O        |        |        |        |    587.11
 22.167     0.00     0.31      0.239  O        |        |        |        |    587.10
 22.250     0.00     0.31      0.237  O        |        |        |        |    587.08
 22.333     0.00     0.31      0.235  O        |        |        |        |    587.07
```

```
  22.417     0.00     0.31       0.233  O         |         |         |         |     587.05
  22.500     0.00     0.30       0.231  O         |         |         |         |     587.04
  22.583     0.00     0.30       0.229  O         |         |         |         |     587.03
  22.667     0.00     0.30       0.227  O         |         |         |         |     587.01
  22.750     0.00     0.30       0.225  O         |         |         |         |     587.00
  22.833     0.00     0.30       0.223  O         |         |         |         |     586.98
  22.917     0.00     0.30       0.221  O         |         |         |         |     586.97
  23.000     0.00     0.29       0.218  O         |         |         |         |     586.96
  23.083     0.00     0.29       0.216  O         |         |         |         |     586.94
  23.167     0.00     0.29       0.214  O         |         |         |         |     586.93
  23.250     0.00     0.29       0.212  O         |         |         |         |     586.92
  23.333     0.00     0.29       0.210  O         |         |         |         |     586.90
  23.417     0.00     0.29       0.208  O         |         |         |         |     586.89
  23.500     0.00     0.29       0.207  O         |         |         |         |     586.88
  23.583     0.00     0.28       0.205  O         |         |         |         |     586.86
  23.667     0.00     0.28       0.203  O         |         |         |         |     586.85
  23.750     0.00     0.28       0.201  O         |         |         |         |     586.84
  23.833     0.00     0.28       0.199  O         |         |         |         |     586.82
  23.917     0.00     0.28       0.197  O         |         |         |         |     586.81
  24.000     0.00     0.28       0.195  O         |         |         |         |     586.80
  24.083     0.00     0.27       0.193  O         |         |         |         |     586.79
  24.167     0.00     0.27       0.191  O         |         |         |         |     586.77
  24.250     0.00     0.27       0.189  O         |         |         |         |     586.76
  24.333     0.00     0.27       0.187  O         |         |         |         |     586.75
  24.417     0.00     0.27       0.186  O         |         |         |         |     586.74
  24.500     0.00     0.27       0.184  O         |         |         |         |     586.72
  24.583     0.00     0.27       0.182  O         |         |         |         |     586.71
  24.667     0.00     0.26       0.180  O         |         |         |         |     586.70
  24.750     0.00     0.26       0.178  O         |         |         |         |     586.69
  24.833     0.00     0.26       0.176  O         |         |         |         |     586.68
  24.917     0.00     0.26       0.175  O         |         |         |         |     586.66
  25.000     0.00     0.26       0.173  O         |         |         |         |     586.65
  25.083     0.00     0.26       0.171  O         |         |         |         |     586.64
  25.167     0.00     0.26       0.169  O         |         |         |         |     586.63
  25.250     0.00     0.25       0.168  O         |         |         |         |     586.62
  25.333     0.00     0.25       0.166  O         |         |         |         |     586.61
  25.417     0.00     0.25       0.164  O         |         |         |         |     586.59
  25.500     0.00     0.25       0.162  O         |         |         |         |     586.58
  25.583     0.00     0.25       0.161  O         |         |         |         |     586.57
  25.667     0.00     0.25       0.159  O         |         |         |         |     586.56
  25.750     0.00     0.25       0.157  O         |         |         |         |     586.55
  25.833     0.00     0.24       0.156  O         |         |         |         |     586.54
  25.917     0.00     0.24       0.154  O         |         |         |         |     586.53
  26.000     0.00     0.24       0.152  O         |         |         |         |     586.51
  26.083     0.00     0.24       0.151  O         |         |         |         |     586.50
  26.167     0.00     0.24       0.149  O         |         |         |         |     586.49
  26.250     0.00     0.24       0.147  O         |         |         |         |     586.48
  26.333     0.00     0.23       0.146  O         |         |         |         |     586.47
  26.417     0.00     0.23       0.144  O         |         |         |         |     586.46
  26.500     0.00     0.23       0.142  O         |         |         |         |     586.45
  26.583     0.00     0.23       0.141  O         |         |         |         |     586.44
  26.667     0.00     0.22       0.139  O         |         |         |         |     586.43
  26.750     0.00     0.22       0.138  O         |         |         |         |     586.42
  26.833     0.00     0.22       0.136  O         |         |         |         |     586.41
  26.917     0.00     0.22       0.135  O         |         |         |         |     586.40
  27.000     0.00     0.21       0.133  O         |         |         |         |     586.39
  27.083     0.00     0.21       0.132  O         |         |         |         |     586.38
```

```
 27.167     0.00     0.21      0.130  O         |         |         |         |    586.37
 27.250     0.00     0.21      0.129  O         |         |         |         |    586.36
 27.333     0.00     0.20      0.128  O         |         |         |         |    586.35
 27.417     0.00     0.20      0.126  O         |         |         |         |    586.34
 27.500     0.00     0.20      0.125  O         |         |         |         |    586.33
 27.583     0.00     0.20      0.123  O         |         |         |         |    586.32
 27.667     0.00     0.20      0.122  O         |         |         |         |    586.31
 27.750     0.00     0.19      0.121  O         |         |         |         |    586.30
 27.833     0.00     0.19      0.119  O         |         |         |         |    586.29
 27.917     0.00     0.19      0.118  O         |         |         |         |    586.29
 28.000     0.00     0.19      0.117  O         |         |         |         |    586.28
 28.083     0.00     0.18      0.116  O         |         |         |         |    586.27
 28.167     0.00     0.18      0.114  O         |         |         |         |    586.26
 28.250     0.00     0.18      0.113  O         |         |         |         |    586.25
 28.333     0.00     0.18      0.112  O         |         |         |         |    586.24
 28.417     0.00     0.18      0.111  O         |         |         |         |    586.24
 28.500     0.00     0.17      0.109  O         |         |         |         |    586.23
 28.583     0.00     0.17      0.108  O         |         |         |         |    586.22
 28.667     0.00     0.17      0.107  O         |         |         |         |    586.21
 28.750     0.00     0.17      0.106  O         |         |         |         |    586.20
 28.833     0.00     0.17      0.105  O         |         |         |         |    586.20
 28.917     0.00     0.17      0.104  O         |         |         |         |    586.19
 29.000     0.00     0.16      0.102  O         |         |         |         |    586.18
 29.083     0.00     0.16      0.101  O         |         |         |         |    586.17
 29.167     0.00     0.16      0.100  O         |         |         |         |    586.17
 29.250     0.00     0.16      0.099  O         |         |         |         |    586.16
 29.333     0.00     0.16      0.098  O         |         |         |         |    586.15
 29.417     0.00     0.15      0.097  O         |         |         |         |    586.14
 29.500     0.00     0.15      0.096  O         |         |         |         |    586.14
 29.583     0.00     0.15      0.095  O         |         |         |         |    586.13
 29.667     0.00     0.15      0.094  O         |         |         |         |    586.12
 29.750     0.00     0.15      0.093  O         |         |         |         |    586.12
 29.833     0.00     0.15      0.092  O         |         |         |         |    586.11
 29.917     0.00     0.14      0.091  O         |         |         |         |    586.10
 30.000     0.00     0.14      0.090  O         |         |         |         |    586.10
 30.083     0.00     0.14      0.089  O         |         |         |         |    586.09
 30.167     0.00     0.14      0.088  O         |         |         |         |    586.08
 30.250     0.00     0.14      0.087  O         |         |         |         |    586.08
 30.333     0.00     0.14      0.086  O         |         |         |         |    586.07
 30.417     0.00     0.14      0.085  O         |         |         |         |    586.06
 30.500     0.00     0.13      0.084  O         |         |         |         |    586.06
 30.583     0.00     0.13      0.083  O         |         |         |         |    586.05
 30.667     0.00     0.13      0.082  O         |         |         |         |    586.04
 30.750     0.00     0.13      0.081  O         |         |         |         |    586.04
 30.833     0.00     0.13      0.080  O         |         |         |         |    586.03
 30.917     0.00     0.13      0.079  O         |         |         |         |    586.03
 31.000     0.00     0.13      0.079  O         |         |         |         |    586.02
 31.083     0.00     0.12      0.078  O         |         |         |         |    586.02
 31.167     0.00     0.12      0.077  O         |         |         |         |    586.01
 31.250     0.00     0.12      0.076  O         |         |         |         |    586.00
 31.333     0.00     0.12      0.075  O         |         |         |         |    586.00
 31.417     0.00     0.12      0.074  O         |         |         |         |    585.99
 31.500     0.00     0.12      0.074  O         |         |         |         |    585.99
 31.583     0.00     0.12      0.073  O         |         |         |         |    585.98
 31.667     0.00     0.11      0.072  O         |         |         |         |    585.98
 31.750     0.00     0.11      0.071  O         |         |         |         |    585.97
 31.833     0.00     0.11      0.070  O         |         |         |         |    585.97
```

```
 31.917     0.00     0.11      0.070  O          |         |         |         |     585.96
 32.000     0.00     0.11      0.069  O          |         |         |         |     585.96
 32.083     0.00     0.11      0.068  O          |         |         |         |     585.95
 32.167     0.00     0.11      0.067  O          |         |         |         |     585.95
 32.250     0.00     0.11      0.067  O          |         |         |         |     585.94
 32.333     0.00     0.11      0.066  O          |         |         |         |     585.94
 32.417     0.00     0.10      0.065  O          |         |         |         |     585.93
 32.500     0.00     0.10      0.065  O          |         |         |         |     585.93
 32.583     0.00     0.10      0.064  O          |         |         |         |     585.92
 32.667     0.00     0.10      0.063  O          |         |         |         |     585.92
 32.750     0.00     0.10      0.062  O          |         |         |         |     585.91
 32.833     0.00     0.10      0.062  O          |         |         |         |     585.91
 32.917     0.00     0.10      0.061  O          |         |         |         |     585.90
 33.000     0.00     0.10      0.060  O          |         |         |         |     585.90
 33.083     0.00     0.10      0.060  O          |         |         |         |     585.89
 33.167     0.00     0.09      0.059  O          |         |         |         |     585.89
 33.250     0.00     0.09      0.058  O          |         |         |         |     585.89
 33.333     0.00     0.09      0.058  O          |         |         |         |     585.88
 33.417     0.00     0.09      0.057  O          |         |         |         |     585.88
 33.500     0.00     0.09      0.057  O          |         |         |         |     585.87
 33.583     0.00     0.09      0.056  O          |         |         |         |     585.87
 33.667     0.00     0.09      0.055  O          |         |         |         |     585.86
 33.750     0.00     0.09      0.055  O          |         |         |         |     585.86
 33.833     0.00     0.09      0.054  O          |         |         |         |     585.86
 33.917     0.00     0.09      0.054  O          |         |         |         |     585.85
 34.000     0.00     0.08      0.053  O          |         |         |         |     585.85
 34.083     0.00     0.08      0.052  O          |         |         |         |     585.84
 34.167     0.00     0.08      0.052  O          |         |         |         |     585.84
 34.250     0.00     0.08      0.051  O          |         |         |         |     585.84
 34.333     0.00     0.08      0.051  O          |         |         |         |     585.83
 34.417     0.00     0.08      0.050  O          |         |         |         |     585.83
 34.500     0.00     0.08      0.050  O          |         |         |         |     585.83
 34.583     0.00     0.08      0.049  O          |         |         |         |     585.82
 34.667     0.00     0.08      0.049  O          |         |         |         |     585.82
 34.750     0.00     0.08      0.048  O          |         |         |         |     585.82
 34.833     0.00     0.08      0.047  O          |         |         |         |     585.81
 34.917     0.00     0.07      0.047  O          |         |         |         |     585.81
 35.000     0.00     0.07      0.046  O          |         |         |         |     585.80
 35.083     0.00     0.07      0.046  O          |         |         |         |     585.80
 35.167     0.00     0.07      0.045  O          |         |         |         |     585.80
 35.250     0.00     0.07      0.045  O          |         |         |         |     585.79
 35.333     0.00     0.07      0.044  O          |         |         |         |     585.79
 35.417     0.00     0.07      0.044  O          |         |         |         |     585.79
 35.500     0.00     0.07      0.043  O          |         |         |         |     585.79
 35.583     0.00     0.07      0.043  O          |         |         |         |     585.78
 35.667     0.00     0.07      0.043  O          |         |         |         |     585.78
 35.750     0.00     0.07      0.042  O          |         |         |         |     585.78
 35.833     0.00     0.07      0.042  O          |         |         |         |     585.77
 35.917     0.00     0.07      0.041  O          |         |         |         |     585.77
 36.000     0.00     0.06      0.041  O          |         |         |         |     585.77
 36.083     0.00     0.06      0.040  O          |         |         |         |     585.76
 36.167     0.00     0.06      0.040  O          |         |         |         |     585.76
 36.250     0.00     0.06      0.039  O          |         |         |         |     585.76
 36.333     0.00     0.06      0.039  O          |         |         |         |     585.75
 36.417     0.00     0.06      0.039  O          |         |         |         |     585.75
 36.500     0.00     0.06      0.038  O          |         |         |         |     585.75
 36.583     0.00     0.06      0.038  O          |         |         |         |     585.75
```

```
36.667    0.00    0.06      0.037  O       |       |       |       |  585.74
36.750    0.00    0.06      0.037  O       |       |       |       |  585.74
36.833    0.00    0.06      0.036  O       |       |       |       |  585.74
36.917    0.00    0.06      0.036  O       |       |       |       |  585.74
37.000    0.00    0.06      0.036  O       |       |       |       |  585.73
37.083    0.00    0.06      0.035  O       |       |       |       |  585.73
37.167    0.00    0.06      0.035  O       |       |       |       |  585.73
37.250    0.00    0.05      0.035  O       |       |       |       |  585.73
37.333    0.00    0.05      0.034  O       |       |       |       |  585.72
37.417    0.00    0.05      0.034  O       |       |       |       |  585.72
37.500    0.00    0.05      0.033  O       |       |       |       |  585.72
37.583    0.00    0.05      0.033  O       |       |       |       |  585.72
37.667    0.00    0.05      0.033  O       |       |       |       |  585.71
37.750    0.00    0.05      0.032  O       |       |       |       |  585.71
37.833    0.00    0.05      0.032  O       |       |       |       |  585.71
37.917    0.00    0.05      0.032  O       |       |       |       |  585.71
38.000    0.00    0.05      0.031  O       |       |       |       |  585.70
38.083    0.00    0.05      0.031  O       |       |       |       |  585.70
38.167    0.00    0.05      0.031  O       |       |       |       |  585.70
38.250    0.00    0.05      0.030  O       |       |       |       |  585.70
38.333    0.00    0.05      0.030  O       |       |       |       |  585.69
38.417    0.00    0.05      0.030  O       |       |       |       |  585.69
38.500    0.00    0.05      0.029  O       |       |       |       |  585.69
38.583    0.00    0.05      0.029  O       |       |       |       |  585.69
38.667    0.00    0.05      0.029  O       |       |       |       |  585.69
38.750    0.00    0.04      0.028  O       |       |       |       |  585.68
38.833    0.00    0.04      0.028  O       |       |       |       |  585.68
38.917    0.00    0.04      0.028  O       |       |       |       |  585.68
39.000    0.00    0.04      0.027  O       |       |       |       |  585.68
39.083    0.00    0.04      0.027  O       |       |       |       |  585.68
39.167    0.00    0.04      0.027  O       |       |       |       |  585.67
39.250    0.00    0.04      0.027  O       |       |       |       |  585.67
39.333    0.00    0.04      0.026  O       |       |       |       |  585.67
39.417    0.00    0.04      0.026  O       |       |       |       |  585.67
39.500    0.00    0.04      0.026  O       |       |       |       |  585.67
39.583    0.00    0.04      0.025  O       |       |       |       |  585.66
39.667    0.00    0.04      0.025  O       |       |       |       |  585.66
39.750    0.00    0.04      0.025  O       |       |       |       |  585.66
39.833    0.00    0.04      0.025  O       |       |       |       |  585.66
39.917    0.00    0.04      0.024  O       |       |       |       |  585.66
40.000    0.00    0.04      0.024  O       |       |       |       |  585.66
40.083    0.00    0.04      0.024  O       |       |       |       |  585.65
40.167    0.00    0.04      0.024  O       |       |       |       |  585.65
40.250    0.00    0.04      0.023  O       |       |       |       |  585.65
40.333    0.00    0.04      0.023  O       |       |       |       |  585.65
40.417    0.00    0.04      0.023  O       |       |       |       |  585.65
40.500    0.00    0.04      0.023  O       |       |       |       |  585.64
40.583    0.00    0.04      0.022  O       |       |       |       |  585.64
40.667    0.00    0.03      0.022  O       |       |       |       |  585.64
40.750    0.00    0.03      0.022  O       |       |       |       |  585.64
40.833    0.00    0.03      0.022  O       |       |       |       |  585.64
40.917    0.00    0.03      0.021  O       |       |       |       |  585.64
41.000    0.00    0.03      0.021  O       |       |       |       |  585.64
41.083    0.00    0.03      0.021  O       |       |       |       |  585.63
41.167    0.00    0.03      0.021  O       |       |       |       |  585.63
41.250    0.00    0.03      0.020  O       |       |       |       |  585.63
41.333    0.00    0.03      0.020  O       |       |       |       |  585.63
```

```
41.417    0.00    0.03      0.020  O       |       |       |       |   585.63
41.500    0.00    0.03      0.020  O       |       |       |       |   585.63
41.583    0.00    0.03      0.020  O       |       |       |       |   585.62
41.667    0.00    0.03      0.019  O       |       |       |       |   585.62
41.750    0.00    0.03      0.019  O       |       |       |       |   585.62
41.833    0.00    0.03      0.019  O       |       |       |       |   585.62
41.917    0.00    0.03      0.019  O       |       |       |       |   585.62
42.000    0.00    0.03      0.019  O       |       |       |       |   585.62
42.083    0.00    0.03      0.018  O       |       |       |       |   585.62
42.167    0.00    0.03      0.018  O       |       |       |       |   585.62
42.250    0.00    0.03      0.018  O       |       |       |       |   585.61
42.333    0.00    0.03      0.018  O       |       |       |       |   585.61
42.417    0.00    0.03      0.018  O       |       |       |       |   585.61
42.500    0.00    0.03      0.017  O       |       |       |       |   585.61
42.583    0.00    0.03      0.017  O       |       |       |       |   585.61
42.667    0.00    0.03      0.017  O       |       |       |       |   585.61
42.750    0.00    0.03      0.017  O       |       |       |       |   585.61
42.833    0.00    0.03      0.017  O       |       |       |       |   585.61
42.917    0.00    0.03      0.016  O       |       |       |       |   585.60
43.000    0.00    0.03      0.016  O       |       |       |       |   585.60
43.083    0.00    0.03      0.016  O       |       |       |       |   585.60
43.167    0.00    0.03      0.016  O       |       |       |       |   585.60
43.250    0.00    0.02      0.016  O       |       |       |       |   585.60
43.333    0.00    0.02      0.016  O       |       |       |       |   585.60
43.417    0.00    0.02      0.015  O       |       |       |       |   585.60
43.500    0.00    0.02      0.015  O       |       |       |       |   585.60
43.583    0.00    0.02      0.015  O       |       |       |       |   585.59
43.667    0.00    0.02      0.015  O       |       |       |       |   585.59
43.750    0.00    0.02      0.015  O       |       |       |       |   585.59
43.833    0.00    0.02      0.015  O       |       |       |       |   585.59
43.917    0.00    0.02      0.014  O       |       |       |       |   585.59
44.000    0.00    0.02      0.014  O       |       |       |       |   585.59
44.083    0.00    0.02      0.014  O       |       |       |       |   585.59
44.167    0.00    0.02      0.014  O       |       |       |       |   585.59
44.250    0.00    0.02      0.014  O       |       |       |       |   585.59
44.333    0.00    0.02      0.014  O       |       |       |       |   585.59
44.417    0.00    0.02      0.014  O       |       |       |       |   585.58
44.500    0.00    0.02      0.013  O       |       |       |       |   585.58
44.583    0.00    0.02      0.013  O       |       |       |       |   585.58
44.667    0.00    0.02      0.013  O       |       |       |       |   585.58
44.750    0.00    0.02      0.013  O       |       |       |       |   585.58
44.833    0.00    0.02      0.013  O       |       |       |       |   585.58
44.917    0.00    0.02      0.013  O       |       |       |       |   585.58
45.000    0.00    0.02      0.013  O       |       |       |       |   585.58
45.083    0.00    0.02      0.012  O       |       |       |       |   585.58
45.167    0.00    0.02      0.012  O       |       |       |       |   585.58
45.250    0.00    0.02      0.012  O       |       |       |       |   585.58
45.333    0.00    0.02      0.012  O       |       |       |       |   585.57
45.417    0.00    0.02      0.012  O       |       |       |       |   585.57
45.500    0.00    0.02      0.012  O       |       |       |       |   585.57
45.583    0.00    0.02      0.012  O       |       |       |       |   585.57
45.667    0.00    0.02      0.012  O       |       |       |       |   585.57
45.750    0.00    0.02      0.011  O       |       |       |       |   585.57
45.833    0.00    0.02      0.011  O       |       |       |       |   585.57
45.917    0.00    0.02      0.011  O       |       |       |       |   585.57
46.000    0.00    0.02      0.011  O       |       |       |       |   585.57
46.083    0.00    0.02      0.011  O       |       |       |       |   585.57
```

```
  46.167     0.00     0.02       0.011  O        |        |        |        |    585.57
  46.250     0.00     0.02       0.011  O        |        |        |        |    585.57
  46.333     0.00     0.02       0.011  O        |        |        |        |    585.56
  46.417     0.00     0.02       0.011  O        |        |        |        |    585.56
  46.500     0.00     0.02       0.010  O        |        |        |        |    585.56
  46.583     0.00     0.02       0.010  O        |        |        |        |    585.56
  46.667     0.00     0.02       0.010  O        |        |        |        |    585.56
  46.750     0.00     0.02       0.010  O        |        |        |        |    585.56
  46.833     0.00     0.02       0.010  O        |        |        |        |    585.56
  46.917     0.00     0.02       0.010  O        |        |        |        |    585.56
  47.000     0.00     0.02       0.010  O        |        |        |        |    585.56
  47.083     0.00     0.01       0.010  O        |        |        |        |    585.56
  47.167     0.00     0.01       0.010  O        |        |        |        |    585.56
  47.250     0.00     0.01       0.009  O        |        |        |        |    585.56
  47.333     0.00     0.01       0.009  O        |        |        |        |    585.56
  47.417     0.00     0.01       0.009  O        |        |        |        |    585.56
  47.500     0.00     0.01       0.009  O        |        |        |        |    585.55
  47.583     0.00     0.01       0.009  O        |        |        |        |    585.55
  47.667     0.00     0.01       0.009  O        |        |        |        |    585.55
  47.750     0.00     0.01       0.009  O        |        |        |        |    585.55
  47.833     0.00     0.01       0.009  O        |        |        |        |    585.55
  47.917     0.00     0.01       0.009  O        |        |        |        |    585.55
  48.000     0.00     0.01       0.009  O        |        |        |        |    585.55
  48.083     0.00     0.01       0.009  O        |        |        |        |    585.55
  48.167     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.250     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.333     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.417     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.500     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.583     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.667     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.750     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.833     0.00     0.01       0.008  O        |        |        |        |    585.55
  48.917     0.00     0.01       0.008  O        |        |        |        |    585.54
  49.000     0.00     0.01       0.008  O        |        |        |        |    585.54
  49.083     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.167     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.250     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.333     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.417     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.500     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.583     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.667     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.750     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.833     0.00     0.01       0.007  O        |        |        |        |    585.54
  49.917     0.00     0.01       0.007  O        |        |        |        |    585.54
  50.000     0.00     0.01       0.007  O        |        |        |        |    585.54
  50.083     0.00     0.01       0.007  O        |        |        |        |    585.54
  50.167     0.00     0.01       0.007  O        |        |        |        |    585.54
  50.250     0.00     0.01       0.006  O        |        |        |        |    585.54
  50.333     0.00     0.01       0.006  O        |        |        |        |    585.54
  50.417     0.00     0.01       0.006  O        |        |        |        |    585.54
  50.500     0.00     0.01       0.006  O        |        |        |        |    585.54
  50.583     0.00     0.01       0.006  O        |        |        |        |    585.53
  50.667     0.00     0.01       0.006  O        |        |        |        |    585.53
  50.750     0.00     0.01       0.006  O        |        |        |        |    585.53
  50.833     0.00     0.01       0.006  O        |        |        |        |    585.53
```

```
50.917    0.00    0.01      0.006  O        |       |       |       |   585.53
51.000    0.00    0.01      0.006  O        |       |       |       |   585.53
51.083    0.00    0.01      0.006  O        |       |       |       |   585.53
51.167    0.00    0.01      0.006  O        |       |       |       |   585.53
51.250    0.00    0.01      0.006  O        |       |       |       |   585.53
51.333    0.00    0.01      0.006  O        |       |       |       |   585.53
51.417    0.00    0.01      0.006  O        |       |       |       |   585.53
51.500    0.00    0.01      0.006  O        |       |       |       |   585.53
51.583    0.00    0.01      0.005  O        |       |       |       |   585.53
51.667    0.00    0.01      0.005  O        |       |       |       |   585.53
51.750    0.00    0.01      0.005  O        |       |       |       |   585.53
51.833    0.00    0.01      0.005  O        |       |       |       |   585.53
51.917    0.00    0.01      0.005  O        |       |       |       |   585.53
52.000    0.00    0.01      0.005  O        |       |       |       |   585.53
52.083    0.00    0.01      0.005  O        |       |       |       |   585.53
52.167    0.00    0.01      0.005  O        |       |       |       |   585.53
52.250    0.00    0.01      0.005  O        |       |       |       |   585.53
52.333    0.00    0.01      0.005  O        |       |       |       |   585.53
52.417    0.00    0.01      0.005  O        |       |       |       |   585.53
52.500    0.00    0.01      0.005  O        |       |       |       |   585.53
52.583    0.00    0.01      0.005  O        |       |       |       |   585.53
52.667    0.00    0.01      0.005  O        |       |       |       |   585.53
52.750    0.00    0.01      0.005  O        |       |       |       |   585.53
52.833    0.00    0.01      0.005  O        |       |       |       |   585.52
52.917    0.00    0.01      0.005  O        |       |       |       |   585.52
53.000    0.00    0.01      0.005  O        |       |       |       |   585.52
53.083    0.00    0.01      0.005  O        |       |       |       |   585.52
53.167    0.00    0.01      0.005  O        |       |       |       |   585.52
53.250    0.00    0.01      0.004  O        |       |       |       |   585.52
53.333    0.00    0.01      0.004  O        |       |       |       |   585.52
53.417    0.00    0.01      0.004  O        |       |       |       |   585.52
53.500    0.00    0.01      0.004  O        |       |       |       |   585.52
53.583    0.00    0.01      0.004  O        |       |       |       |   585.52
53.667    0.00    0.01      0.004  O        |       |       |       |   585.52
53.750    0.00    0.01      0.004  O        |       |       |       |   585.52
53.833    0.00    0.01      0.004  O        |       |       |       |   585.52
53.917    0.00    0.01      0.004  O        |       |       |       |   585.52
54.000    0.00    0.01      0.004  O        |       |       |       |   585.52
54.083    0.00    0.01      0.004  O        |       |       |       |   585.52
54.167    0.00    0.01      0.004  O        |       |       |       |   585.52
54.250    0.00    0.01      0.004  O        |       |       |       |   585.52
54.333    0.00    0.01      0.004  O        |       |       |       |   585.52
54.417    0.00    0.01      0.004  O        |       |       |       |   585.52
54.500    0.00    0.01      0.004  O        |       |       |       |   585.52
54.583    0.00    0.01      0.004  O        |       |       |       |   585.52
54.667    0.00    0.01      0.004  O        |       |       |       |   585.52
54.750    0.00    0.01      0.004  O        |       |       |       |   585.52
54.833    0.00    0.01      0.004  O        |       |       |       |   585.52
54.917    0.00    0.01      0.004  O        |       |       |       |   585.52
55.000    0.00    0.01      0.004  O        |       |       |       |   585.52
55.083    0.00    0.01      0.004  O        |       |       |       |   585.52
55.167    0.00    0.01      0.004  O        |       |       |       |   585.52
55.250    0.00    0.01      0.004  O        |       |       |       |   585.52
55.333    0.00    0.00      0.003  O        |       |       |       |   585.52
55.417    0.00    0.00      0.003  O        |       |       |       |   585.52
55.500    0.00    0.00      0.003  O        |       |       |       |   585.52
55.583    0.00    0.00      0.003  O        |       |       |       |   585.52
```

```
  55.667     0.00     0.00       0.003  O        |        |        |        |    585.52
  55.750     0.00     0.00       0.003  O        |        |        |        |    585.52
  55.833     0.00     0.00       0.003  O        |        |        |        |    585.52
  55.917     0.00     0.00       0.003  O        |        |        |        |    585.52
  56.000     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.083     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.167     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.250     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.333     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.417     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.500     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.583     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.667     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.750     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.833     0.00     0.00       0.003  O        |        |        |        |    585.51
  56.917     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.000     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.083     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.167     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.250     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.333     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.417     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.500     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.583     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.667     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.750     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.833     0.00     0.00       0.003  O        |        |        |        |    585.51
  57.917     0.00     0.00       0.003  O        |        |        |        |    585.51
  58.000     0.00     0.00       0.003  O        |        |        |        |    585.51
  58.083     0.00     0.00       0.003  O        |        |        |        |    585.51
  58.167     0.00     0.00       0.003  O        |        |        |        |    585.51
  58.250     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.333     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.417     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.500     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.583     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.667     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.750     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.833     0.00     0.00       0.002  O        |        |        |        |    585.51
  58.917     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.000     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.083     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.167     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.250     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.333     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.417     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.500     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.583     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.667     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.750     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.833     0.00     0.00       0.002  O        |        |        |        |    585.51
  59.917     0.00     0.00       0.002  O        |        |        |        |    585.51
  60.000     0.00     0.00       0.002  O        |        |        |        |    585.51
  60.083     0.00     0.00       0.002  O        |        |        |        |    585.51
  60.167     0.00     0.00       0.002  O        |        |        |        |    585.51
  60.250     0.00     0.00       0.002  O        |        |        |        |    585.51
  60.333     0.00     0.00       0.002  O        |        |        |        |    585.51
```

```
60.417    0.00    0.00      0.002  O       |       |       |       |   585.51
60.500    0.00    0.00      0.002  O       |       |       |       |   585.51
60.583    0.00    0.00      0.002  O       |       |       |       |   585.51
60.667    0.00    0.00      0.002  O       |       |       |       |   585.51
60.750    0.00    0.00      0.002  O       |       |       |       |   585.51
60.833    0.00    0.00      0.002  O       |       |       |       |   585.51
60.917    0.00    0.00      0.002  O       |       |       |       |   585.51
61.000    0.00    0.00      0.002  O       |       |       |       |   585.51
61.083    0.00    0.00      0.002  O       |       |       |       |   585.51
61.167    0.00    0.00      0.002  O       |       |       |       |   585.51
61.250    0.00    0.00      0.002  O       |       |       |       |   585.51
61.333    0.00    0.00      0.002  O       |       |       |       |   585.51
61.417    0.00    0.00      0.002  O       |       |       |       |   585.51
61.500    0.00    0.00      0.002  O       |       |       |       |   585.51
61.583    0.00    0.00      0.002  O       |       |       |       |   585.50
61.667    0.00    0.00      0.002  O       |       |       |       |   585.50
61.750    0.00    0.00      0.002  O       |       |       |       |   585.50
61.833    0.00    0.00      0.002  O       |       |       |       |   585.50
61.917    0.00    0.00      0.002  O       |       |       |       |   585.50
62.000    0.00    0.00      0.002  O       |       |       |       |   585.50
62.083    0.00    0.00      0.002  O       |       |       |       |   585.50
62.167    0.00    0.00      0.002  O       |       |       |       |   585.50
62.250    0.00    0.00      0.002  O       |       |       |       |   585.50
62.333    0.00    0.00      0.002  O       |       |       |       |   585.50
62.417    0.00    0.00      0.002  O       |       |       |       |   585.50
62.500    0.00    0.00      0.002  O       |       |       |       |   585.50
62.583    0.00    0.00      0.002  O       |       |       |       |   585.50
62.667    0.00    0.00      0.002  O       |       |       |       |   585.50
62.750    0.00    0.00      0.002  O       |       |       |       |   585.50
62.833    0.00    0.00      0.002  O       |       |       |       |   585.50
62.917    0.00    0.00      0.002  O       |       |       |       |   585.50
63.000    0.00    0.00      0.002  O       |       |       |       |   585.50
63.083    0.00    0.00      0.001  O       |       |       |       |   585.50
63.167    0.00    0.00      0.001  O       |       |       |       |   585.50
63.250    0.00    0.00      0.001  O       |       |       |       |   585.50
63.333    0.00    0.00      0.001  O       |       |       |       |   585.50
63.417    0.00    0.00      0.001  O       |       |       |       |   585.50
63.500    0.00    0.00      0.001  O       |       |       |       |   585.50
63.583    0.00    0.00      0.001  O       |       |       |       |   585.50
63.667    0.00    0.00      0.001  O       |       |       |       |   585.50
63.750    0.00    0.00      0.001  O       |       |       |       |   585.50
63.833    0.00    0.00      0.001  O       |       |       |       |   585.50
63.917    0.00    0.00      0.001  O       |       |       |       |   585.50
64.000    0.00    0.00      0.001  O       |       |       |       |   585.50
64.083    0.00    0.00      0.001  O       |       |       |       |   585.50
64.167    0.00    0.00      0.001  O       |       |       |       |   585.50
64.250    0.00    0.00      0.001  O       |       |       |       |   585.50
64.333    0.00    0.00      0.001  O       |       |       |       |   585.50
64.417    0.00    0.00      0.001  O       |       |       |       |   585.50
64.500    0.00    0.00      0.001  O       |       |       |       |   585.50
64.583    0.00    0.00      0.001  O       |       |       |       |   585.50
64.667    0.00    0.00      0.001  O       |       |       |       |   585.50
64.750    0.00    0.00      0.001  O       |       |       |       |   585.50
64.833    0.00    0.00      0.001  O       |       |       |       |   585.50
64.917    0.00    0.00      0.001  O       |       |       |       |   585.50
65.000    0.00    0.00      0.001  O       |       |       |       |   585.50
65.083    0.00    0.00      0.001  O       |       |       |       |   585.50
```

```
65.167    0.00    0.00      0.001  O       |       |       |       |   585.50
65.250    0.00    0.00      0.001  O       |       |       |       |   585.50
65.333    0.00    0.00      0.001  O       |       |       |       |   585.50
65.417    0.00    0.00      0.001  O       |       |       |       |   585.50
65.500    0.00    0.00      0.001  O       |       |       |       |   585.50
65.583    0.00    0.00      0.001  O       |       |       |       |   585.50
65.667    0.00    0.00      0.001  O       |       |       |       |   585.50
65.750    0.00    0.00      0.001  O       |       |       |       |   585.50
65.833    0.00    0.00      0.001  O       |       |       |       |   585.50
65.917    0.00    0.00      0.001  O       |       |       |       |   585.50
66.000    0.00    0.00      0.001  O       |       |       |       |   585.50
66.083    0.00    0.00      0.001  O       |       |       |       |   585.50
66.167    0.00    0.00      0.001  O       |       |       |       |   585.50
66.250    0.00    0.00      0.001  O       |       |       |       |   585.50
66.333    0.00    0.00      0.001  O       |       |       |       |   585.50
66.417    0.00    0.00      0.001  O       |       |       |       |   585.50
66.500    0.00    0.00      0.001  O       |       |       |       |   585.50
66.583    0.00    0.00      0.001  O       |       |       |       |   585.50
66.667    0.00    0.00      0.001  O       |       |       |       |   585.50
66.750    0.00    0.00      0.001  O       |       |       |       |   585.50
66.833    0.00    0.00      0.001  O       |       |       |       |   585.50
66.917    0.00    0.00      0.001  O       |       |       |       |   585.50
67.000    0.00    0.00      0.001  O       |       |       |       |   585.50
67.083    0.00    0.00      0.001  O       |       |       |       |   585.50
67.167    0.00    0.00      0.001  O       |       |       |       |   585.50
67.250    0.00    0.00      0.001  O       |       |       |       |   585.50
67.333    0.00    0.00      0.001  O       |       |       |       |   585.50
67.417    0.00    0.00      0.001  O       |       |       |       |   585.50
67.500    0.00    0.00      0.001  O       |       |       |       |   583.22

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   810
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.638 (CFS)
                 Total volume =       1.086 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

```
                  FLOOD HYDROGRAPH ROUTING PROGRAM
             Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 10/28/21

--------------------------------------------------------------------
```

TTM 31589
2-Year 6-Hour Flood Hydrograph Basin Routing
Developed Condition

```
-------------------------------------------------------------------


Program License Serial Number 6194

-------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop62.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    80
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       11.014 (CFS)
            Total volume =       1.467 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
**********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
-------------------------------------------------------------------
Total number of inflow hydrograph intervals = 80
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
-------------------------------------------------------------------
-------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
--------------------------------------------------------------------
-------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
--------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

```
        585.500      0.001      0.001      0.001        0.001
        586.500      0.150      0.240      0.149        0.151
        587.500      0.300      0.360      0.299        0.301
        588.500      0.450      0.440      0.448        0.452
        589.500      0.600      0.510      0.598        0.602
        590.500      1.120      0.680      1.118        1.122
        591.500      1.700      0.790      1.697        1.703
        592.500      2.340      0.990      2.337        2.343
        593.500      3.040    101.020      2.692        3.388
      --------------------------------------------------------------------
                  Hydrograph Detention Basin Routing
      ---------------------------------------------------------------------

      Graph values: 'I'= unit inflow; 'O'=outflow at time shown
      ---------------------------------------------------------------------
  Time   Inflow  Outflow    Storage                                     Depth
 (Hours)  (CFS)   (CFS)     (Ac.Ft) .0       2.8    5.51    8.26    11.01 (Ft.)
  0.083    0.20    0.00      0.001  O       |       |       |       |   400.37
  0.167    0.74    0.01      0.004  O I     |       |       |       |   585.52
  0.250    1.01    0.02      0.010  O I     |       |       |       |   585.56
  0.333    1.11    0.03      0.017  O  I    |       |       |       |   585.61
  0.417    1.17    0.04      0.025  O  I    |       |       |       |   585.66
  0.500    1.24    0.05      0.033  O  I    |       |       |       |   585.71
  0.583    1.37    0.07      0.041  O  I    |       |       |       |   585.77
  0.667    1.41    0.08      0.050  O   I   |       |       |       |   585.83
  0.750    1.44    0.09      0.060  O   I   |       |       |       |   585.89
  0.833    1.45    0.11      0.069  O   I   |       |       |       |   585.95
  0.917    1.45    0.12      0.078  O   I   |       |       |       |   586.02
  1.000    1.49    0.14      0.087  O   I   |       |       |       |   586.08
  1.083    1.60    0.15      0.097  O   I   |       |       |       |   586.14
  1.167    1.63    0.17      0.107  O   I   |       |       |       |   586.21
  1.250    1.65    0.19      0.117  O   I   |       |       |       |   586.28
  1.333    1.65    0.20      0.127  O   I   |       |       |       |   586.34
  1.417    1.66    0.22      0.137  O   I   |       |       |       |   586.41
  1.500    1.66    0.23      0.147  O   I   |       |       |       |   586.48
  1.583    1.67    0.25      0.157  O   I   |       |       |       |   586.54
  1.667    1.67    0.25      0.166  O   I   |       |       |       |   586.61
  1.750    1.67    0.26      0.176  O   I   |       |       |       |   586.67
  1.833    1.67    0.27      0.186  O   I   |       |       |       |   586.74
  1.917    1.67    0.28      0.195  O   I   |       |       |       |   586.80
  2.000    1.71    0.28      0.205  O   I   |       |       |       |   586.87
  2.083    1.77    0.29      0.215  O    I  |       |       |       |   586.93
  2.167    1.74    0.30      0.225  O    I  |       |       |       |   587.00
  2.250    1.82    0.31      0.235  O    I  |       |       |       |   587.07
  2.333    1.85    0.32      0.246  O    I  |       |       |       |   587.14
  2.417    1.86    0.32      0.256  O    I  |       |       |       |   587.21
  2.500    1.87    0.33      0.267  O    I  |       |       |       |   587.28
  2.583    1.87    0.34      0.277  O    I  |       |       |       |   587.35
  2.667    1.87    0.35      0.288  |O   I  |       |       |       |   587.42
  2.750    1.91    0.36      0.298  |O   I  |       |       |       |   587.49
  2.833    2.02    0.36      0.309  |O   I  |       |       |       |   587.56
  2.917    2.05    0.37      0.321  |O   I  |       |       |       |   587.64
  3.000    2.06    0.38      0.332  |O   I  |       |       |       |   587.72
  3.083    2.07    0.38      0.344  |O    I |       |       |       |   587.79
  3.167    2.12    0.39      0.356  |O    I |       |       |       |   587.87
  3.250    2.22    0.40      0.368  |O    I |       |       |       |   587.95
  3.333    2.25    0.40      0.381  |O    I |       |       |       |   588.04
```

```
3.417    2.31    0.41      0.394  |O    I |       |       |       |   588.12
3.500    2.46    0.42      0.407  |O     I|       |       |       |   588.21
3.583    2.64    0.42      0.422  |O     I|       |       |       |   588.31
3.667    2.79    0.43      0.438  |O      I       |       |       |   588.42
3.750    2.89    0.44      0.454  |O      I       |       |       |   588.53
3.833    3.02    0.45      0.471  |O      I       |       |       |   588.64
3.917    3.11    0.46      0.489  |O      |I      |       |       |   588.76
4.000    3.23    0.47      0.508  |O      |I      |       |       |   588.89
4.083    3.32    0.48      0.527  |O      |I      |       |       |   589.02
4.167    3.48    0.49      0.547  |O      | I     |       |       |   589.15
4.250    3.67    0.50      0.569  |O      | I     |       |       |   589.29
4.333    3.87    0.51      0.591  |O      |  I    |       |       |   589.44
4.417    4.07    0.51      0.615  |O      |  I    |       |       |   589.53
4.500    4.23    0.52      0.640  |O      |   I   |       |       |   589.58
4.583    4.34    0.53      0.666  |O      |   I   |       |       |   589.63
4.667    4.51    0.54      0.693  |O      |    I  |       |       |   589.68
4.750    4.70    0.55      0.721  |O      |    I  |       |       |   589.73
4.833    4.86    0.56      0.750  |O      |     I |       |       |   589.79
4.917    4.97    0.57      0.780  |O      |     I |       |       |   589.85
5.000    5.14    0.58      0.811  |O      |     I |       |       |   589.90
5.083    5.49    0.59      0.843  |O      |      I|       |       |   589.97
5.167    6.25    0.60      0.879  |O      |       | I     |       |   590.04
5.250    7.07    0.61      0.921  |O      |       |   I   |       |   590.12
5.333    7.79    0.63      0.968  |O      |       |     I |       |   590.21
5.417    8.84    0.65      1.021  |O      |       |       |I      |   590.31
5.500   10.82    0.67      1.084  |O      |       |       |      I|   590.43
5.583   11.01    0.69      1.155  |O      |       |       |       I   590.56
5.667    6.17    0.70      1.209  | O     |       |I      |       |   590.65
5.750    3.73    0.70      1.238  | O     | I     |       |       |   590.70
5.833    2.52    0.71      1.255  | O    I|       |       |       |   590.73
5.917    1.81    0.71      1.265  | O  I  |       |       |       |   590.75
6.000    1.21    0.71      1.271  | OI    |       |       |       |   590.76
6.083    0.75    0.71      1.272  | O     |       |       |       |   590.76
6.167    0.33    0.71      1.271  I O     |       |       |       |   590.76
6.250    0.14    0.71      1.268  I O     |       |       |       |   590.76
6.333    0.07    0.71      1.264  I O     |       |       |       |   590.75
6.417    0.04    0.71      1.259  I O     |       |       |       |   590.74
6.500    0.02    0.71      1.255  I O     |       |       |       |   590.73
6.583    0.01    0.70      1.250  I O     |       |       |       |   590.72
6.667    0.00    0.70      1.245  I O     |       |       |       |   590.72
6.750    0.00    0.70      1.240  I O     |       |       |       |   590.71
6.833    0.00    0.70      1.235  I O     |       |       |       |   590.70
6.917    0.00    0.70      1.231  I O     |       |       |       |   590.69
7.000    0.00    0.70      1.226  I O     |       |       |       |   590.68
7.083    0.00    0.70      1.221  I O     |       |       |       |   590.67
7.167    0.00    0.70      1.216  I O     |       |       |       |   590.67
7.250    0.00    0.70      1.211  I O     |       |       |       |   590.66
7.333    0.00    0.70      1.207  I O     |       |       |       |   590.65
7.417    0.00    0.70      1.202  I O     |       |       |       |   590.64
7.500    0.00    0.69      1.197  I O     |       |       |       |   590.63
7.583    0.00    0.69      1.192  I O     |       |       |       |   590.62
7.667    0.00    0.69      1.187  I O     |       |       |       |   590.62
7.750    0.00    0.69      1.183  I O     |       |       |       |   590.61
7.833    0.00    0.69      1.178  I O     |       |       |       |   590.60
7.917    0.00    0.69      1.173  I O     |       |       |       |   590.59
8.000    0.00    0.69      1.168  I O     |       |       |       |   590.58
8.083    0.00    0.69      1.164  IO      |       |       |       |   590.58
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  8.167    0.00    0.69      1.159  IO        |        |        |        |     590.57
  8.250    0.00    0.69      1.154  IO        |        |        |        |     590.56
  8.333    0.00    0.69      1.149  IO        |        |        |        |     590.55
  8.417    0.00    0.68      1.145  IO        |        |        |        |     590.54
  8.500    0.00    0.68      1.140  IO        |        |        |        |     590.53
  8.583    0.00    0.68      1.135  IO        |        |        |        |     590.53
  8.667    0.00    0.68      1.131  IO        |        |        |        |     590.52
  8.750    0.00    0.68      1.126  IO        |        |        |        |     590.51
  8.833    0.00    0.68      1.121  IO        |        |        |        |     590.50
  8.917    0.00    0.68      1.117  IO        |        |        |        |     590.49
  9.000    0.00    0.68      1.112  IO        |        |        |        |     590.48
  9.083    0.00    0.68      1.107  IO        |        |        |        |     590.48
  9.167    0.00    0.67      1.103  IO        |        |        |        |     590.47
  9.250    0.00    0.67      1.098  IO        |        |        |        |     590.46
  9.333    0.00    0.67      1.093  IO        |        |        |        |     590.45
  9.417    0.00    0.67      1.089  IO        |        |        |        |     590.44
  9.500    0.00    0.67      1.084  IO        |        |        |        |     590.43
  9.583    0.00    0.67      1.079  IO        |        |        |        |     590.42
  9.667    0.00    0.67      1.075  IO        |        |        |        |     590.41
  9.750    0.00    0.66      1.070  IO        |        |        |        |     590.40
  9.833    0.00    0.66      1.066  IO        |        |        |        |     590.40
  9.917    0.00    0.66      1.061  IO        |        |        |        |     590.39
 10.000    0.00    0.66      1.057  IO        |        |        |        |     590.38
 10.083    0.00    0.66      1.052  IO        |        |        |        |     590.37
 10.167    0.00    0.66      1.048  IO        |        |        |        |     590.36
 10.250    0.00    0.65      1.043  IO        |        |        |        |     590.35
 10.333    0.00    0.65      1.039  IO        |        |        |        |     590.34
 10.417    0.00    0.65      1.034  IO        |        |        |        |     590.33
 10.500    0.00    0.65      1.030  IO        |        |        |        |     590.33
 10.583    0.00    0.65      1.025  IO        |        |        |        |     590.32
 10.667    0.00    0.65      1.021  IO        |        |        |        |     590.31
 10.750    0.00    0.65      1.016  IO        |        |        |        |     590.30
 10.833    0.00    0.64      1.012  IO        |        |        |        |     590.29
 10.917    0.00    0.64      1.007  IO        |        |        |        |     590.28
 11.000    0.00    0.64      1.003  IO        |        |        |        |     590.27
 11.083    0.00    0.64      0.998  IO        |        |        |        |     590.27
 11.167    0.00    0.64      0.994  IO        |        |        |        |     590.26
 11.250    0.00    0.64      0.990  IO        |        |        |        |     590.25
 11.333    0.00    0.64      0.985  IO        |        |        |        |     590.24
 11.417    0.00    0.63      0.981  IO        |        |        |        |     590.23
 11.500    0.00    0.63      0.977  IO        |        |        |        |     590.22
 11.583    0.00    0.63      0.972  IO        |        |        |        |     590.22
 11.667    0.00    0.63      0.968  IO        |        |        |        |     590.21
 11.750    0.00    0.63      0.964  IO        |        |        |        |     590.20
 11.833    0.00    0.63      0.959  IO        |        |        |        |     590.19
 11.917    0.00    0.63      0.955  IO        |        |        |        |     590.18
 12.000    0.00    0.62      0.951  IO        |        |        |        |     590.17
 12.083    0.00    0.62      0.946  IO        |        |        |        |     590.17
 12.167    0.00    0.62      0.942  IO        |        |        |        |     590.16
 12.250    0.00    0.62      0.938  IO        |        |        |        |     590.15
 12.333    0.00    0.62      0.933  IO        |        |        |        |     590.14
 12.417    0.00    0.62      0.929  IO        |        |        |        |     590.13
 12.500    0.00    0.62      0.925  IO        |        |        |        |     590.12
 12.583    0.00    0.61      0.921  IO        |        |        |        |     590.12
 12.667    0.00    0.61      0.916  IO        |        |        |        |     590.11
 12.750    0.00    0.61      0.912  IO        |        |        |        |     590.10
 12.833    0.00    0.61      0.908  IO        |        |        |        |     590.09
```

```
 12.917     0.00     0.61       0.904  IO        |         |         |         |   590.08
 13.000     0.00     0.61       0.900  IO        |         |         |         |   590.08
 13.083     0.00     0.61       0.895  IO        |         |         |         |   590.07
 13.167     0.00     0.61       0.891  IO        |         |         |         |   590.06
 13.250     0.00     0.60       0.887  IO        |         |         |         |   590.05
 13.333     0.00     0.60       0.883  IO        |         |         |         |   590.04
 13.417     0.00     0.60       0.879  IO        |         |         |         |   590.04
 13.500     0.00     0.60       0.875  IO        |         |         |         |   590.03
 13.583     0.00     0.60       0.871  IO        |         |         |         |   590.02
 13.667     0.00     0.60       0.866  IO        |         |         |         |   590.01
 13.750     0.00     0.60       0.862  IO        |         |         |         |   590.00
 13.833     0.00     0.59       0.858  IO        |         |         |         |   590.00
 13.917     0.00     0.59       0.854  IO        |         |         |         |   589.99
 14.000     0.00     0.59       0.850  IO        |         |         |         |   589.98
 14.083     0.00     0.59       0.846  IO        |         |         |         |   589.97
 14.167     0.00     0.59       0.842  IO        |         |         |         |   589.97
 14.250     0.00     0.59       0.838  IO        |         |         |         |   589.96
 14.333     0.00     0.59       0.834  IO        |         |         |         |   589.95
 14.417     0.00     0.59       0.830  IO        |         |         |         |   589.94
 14.500     0.00     0.58       0.826  IO        |         |         |         |   589.93
 14.583     0.00     0.58       0.822  IO        |         |         |         |   589.93
 14.667     0.00     0.58       0.818  IO        |         |         |         |   589.92
 14.750     0.00     0.58       0.814  IO        |         |         |         |   589.91
 14.833     0.00     0.58       0.810  IO        |         |         |         |   589.90
 14.917     0.00     0.58       0.806  IO        |         |         |         |   589.90
 15.000     0.00     0.58       0.802  IO        |         |         |         |   589.89
 15.083     0.00     0.57       0.798  IO        |         |         |         |   589.88
 15.167     0.00     0.57       0.794  IO        |         |         |         |   589.87
 15.250     0.00     0.57       0.790  IO        |         |         |         |   589.87
 15.333     0.00     0.57       0.786  IO        |         |         |         |   589.86
 15.417     0.00     0.57       0.782  IO        |         |         |         |   589.85
 15.500     0.00     0.57       0.778  IO        |         |         |         |   589.84
 15.583     0.00     0.57       0.774  IO        |         |         |         |   589.84
 15.667     0.00     0.57       0.770  IO        |         |         |         |   589.83
 15.750     0.00     0.56       0.766  IO        |         |         |         |   589.82
 15.833     0.00     0.56       0.763  IO        |         |         |         |   589.81
 15.917     0.00     0.56       0.759  IO        |         |         |         |   589.81
 16.000     0.00     0.56       0.755  IO        |         |         |         |   589.80
 16.083     0.00     0.56       0.751  IO        |         |         |         |   589.79
 16.167     0.00     0.56       0.747  IO        |         |         |         |   589.78
 16.250     0.00     0.56       0.743  IO        |         |         |         |   589.78
 16.333     0.00     0.56       0.739  IO        |         |         |         |   589.77
 16.417     0.00     0.55       0.736  IO        |         |         |         |   589.76
 16.500     0.00     0.55       0.732  IO        |         |         |         |   589.75
 16.583     0.00     0.55       0.728  IO        |         |         |         |   589.75
 16.667     0.00     0.55       0.724  IO        |         |         |         |   589.74
 16.750     0.00     0.55       0.720  IO        |         |         |         |   589.73
 16.833     0.00     0.55       0.717  IO        |         |         |         |   589.72
 16.917     0.00     0.55       0.713  IO        |         |         |         |   589.72
 17.000     0.00     0.55       0.709  IO        |         |         |         |   589.71
 17.083     0.00     0.54       0.705  IO        |         |         |         |   589.70
 17.167     0.00     0.54       0.702  IO        |         |         |         |   589.70
 17.250     0.00     0.54       0.698  IO        |         |         |         |   589.69
 17.333     0.00     0.54       0.694  IO        |         |         |         |   589.68
 17.417     0.00     0.54       0.690  IO        |         |         |         |   589.67
 17.500     0.00     0.54       0.687  IO        |         |         |         |   589.67
 17.583     0.00     0.54       0.683  IO        |         |         |         |   589.66
```

```
 17.667    0.00    0.54     0.679  IO       |       |       |       |    589.65
 17.750    0.00    0.53     0.676  IO       |       |       |       |    589.65
 17.833    0.00    0.53     0.672  IO       |       |       |       |    589.64
 17.917    0.00    0.53     0.668  IO       |       |       |       |    589.63
 18.000    0.00    0.53     0.665  IO       |       |       |       |    589.62
 18.083    0.00    0.53     0.661  IO       |       |       |       |    589.62
 18.167    0.00    0.53     0.657  IO       |       |       |       |    589.61
 18.250    0.00    0.53     0.654  IO       |       |       |       |    589.60
 18.333    0.00    0.53     0.650  IO       |       |       |       |    589.60
 18.417    0.00    0.53     0.646  IO       |       |       |       |    589.59
 18.500    0.00    0.52     0.643  IO       |       |       |       |    589.58
 18.583    0.00    0.52     0.639  IO       |       |       |       |    589.58
 18.667    0.00    0.52     0.636  IO       |       |       |       |    589.57
 18.750    0.00    0.52     0.632  IO       |       |       |       |    589.56
 18.833    0.00    0.52     0.628  IO       |       |       |       |    589.55
 18.917    0.00    0.52     0.625  IO       |       |       |       |    589.55
 19.000    0.00    0.52     0.621  IO       |       |       |       |    589.54
 19.083    0.00    0.52     0.618  IO       |       |       |       |    589.53
 19.167    0.00    0.51     0.614  IO       |       |       |       |    589.53
 19.250    0.00    0.51     0.611  IO       |       |       |       |    589.52
 19.333    0.00    0.51     0.607  IO       |       |       |       |    589.51
 19.417    0.00    0.51     0.604  IO       |       |       |       |    589.51
 19.500    0.00    0.51     0.600  IO       |       |       |       |    589.50
 19.583    0.00    0.51     0.597  IO       |       |       |       |    589.48
 19.667    0.00    0.51     0.593  IO       |       |       |       |    589.45
 19.750    0.00    0.51     0.590  IO       |       |       |       |    589.43
 19.833    0.00    0.50     0.586  IO       |       |       |       |    589.41
 19.917    0.00    0.50     0.583  IO       |       |       |       |    589.38
 20.000    0.00    0.50     0.579  IO       |       |       |       |    589.36
 20.083    0.00    0.50     0.576  IO       |       |       |       |    589.34
 20.167    0.00    0.50     0.572  IO       |       |       |       |    589.32
 20.250    0.00    0.50     0.569  IO       |       |       |       |    589.29
 20.333    0.00    0.49     0.566  IO       |       |       |       |    589.27
 20.417    0.00    0.49     0.562  IO       |       |       |       |    589.25
 20.500    0.00    0.49     0.559  IO       |       |       |       |    589.23
 20.583    0.00    0.49     0.555  IO       |       |       |       |    589.20
 20.667    0.00    0.49     0.552  IO       |       |       |       |    589.18
 20.750    0.00    0.49     0.549  IO       |       |       |       |    589.16
 20.833    0.00    0.48     0.545  IO       |       |       |       |    589.14
 20.917    0.00    0.48     0.542  IO       |       |       |       |    589.11
 21.000    0.00    0.48     0.539  IO       |       |       |       |    589.09
 21.083    0.00    0.48     0.535  IO       |       |       |       |    589.07
 21.167    0.00    0.48     0.532  IO       |       |       |       |    589.05
 21.250    0.00    0.48     0.529  IO       |       |       |       |    589.03
 21.333    0.00    0.48     0.526  IO       |       |       |       |    589.00
 21.417    0.00    0.47     0.522  IO       |       |       |       |    588.98
 21.500    0.00    0.47     0.519  IO       |       |       |       |    588.96
 21.583    0.00    0.47     0.516  IO       |       |       |       |    588.94
 21.667    0.00    0.47     0.512  IO       |       |       |       |    588.92
 21.750    0.00    0.47     0.509  IO       |       |       |       |    588.90
 21.833    0.00    0.47     0.506  IO       |       |       |       |    588.87
 21.917    0.00    0.46     0.503  IO       |       |       |       |    588.85
 22.000    0.00    0.46     0.500  IO       |       |       |       |    588.83
 22.083    0.00    0.46     0.496  IO       |       |       |       |    588.81
 22.167    0.00    0.46     0.493  IO       |       |       |       |    588.79
 22.250    0.00    0.46     0.490  IO       |       |       |       |    588.77
 22.333    0.00    0.46     0.487  IO       |       |       |       |    588.75
```

```
 22.417     0.00     0.46       0.484  IO       |        |        |        |    588.73
 22.500     0.00     0.45       0.481  IO       |        |        |        |    588.70
 22.583     0.00     0.45       0.478  IO       |        |        |        |    588.68
 22.667     0.00     0.45       0.474  IO       |        |        |        |    588.66
 22.750     0.00     0.45       0.471  IO       |        |        |        |    588.64
 22.833     0.00     0.45       0.468  IO       |        |        |        |    588.62
 22.917     0.00     0.45       0.465  IO       |        |        |        |    588.60
 23.000     0.00     0.45       0.462  IO       |        |        |        |    588.58
 23.083     0.00     0.44       0.459  IO       |        |        |        |    588.56
 23.167     0.00     0.44       0.456  IO       |        |        |        |    588.54
 23.250     0.00     0.44       0.453  IO       |        |        |        |    588.52
 23.333     0.00     0.44       0.450  IO       |        |        |        |    588.50
 23.417     0.00     0.44       0.447  IO       |        |        |        |    588.48
 23.500     0.00     0.44       0.444  IO       |        |        |        |    588.46
 23.583     0.00     0.44       0.441  IO       |        |        |        |    588.44
 23.667     0.00     0.43       0.438  IO       |        |        |        |    588.42
 23.750     0.00     0.43       0.435  IO       |        |        |        |    588.40
 23.833     0.00     0.43       0.432  IO       |        |        |        |    588.38
 23.917     0.00     0.43       0.429  IO       |        |        |        |    588.36
 24.000     0.00     0.43       0.426  IO       |        |        |        |    588.34
 24.083     0.00     0.43       0.423  IO       |        |        |        |    588.32
 24.167     0.00     0.42       0.420  IO       |        |        |        |    588.30
 24.250     0.00     0.42       0.417  IO       |        |        |        |    588.28
 24.333     0.00     0.42       0.414  IO       |        |        |        |    588.26
 24.417     0.00     0.42       0.411  IO       |        |        |        |    588.24
 24.500     0.00     0.42       0.409  IO       |        |        |        |    588.22
 24.583     0.00     0.42       0.406  IO       |        |        |        |    588.20
 24.667     0.00     0.41       0.403  IO       |        |        |        |    588.19
 24.750     0.00     0.41       0.400  IO       |        |        |        |    588.17
 24.833     0.00     0.41       0.397  IO       |        |        |        |    588.15
 24.917     0.00     0.41       0.394  IO       |        |        |        |    588.13
 25.000     0.00     0.41       0.391  IO       |        |        |        |    588.11
 25.083     0.00     0.41       0.389  IO       |        |        |        |    588.09
 25.167     0.00     0.41       0.386  IO       |        |        |        |    588.07
 25.250     0.00     0.40       0.383  IO       |        |        |        |    588.05
 25.333     0.00     0.40       0.380  IO       |        |        |        |    588.04
 25.417     0.00     0.40       0.378  IO       |        |        |        |    588.02
 25.500     0.00     0.40       0.375  IO       |        |        |        |    588.00
 25.583     0.00     0.40       0.372  IO       |        |        |        |    587.98
 25.667     0.00     0.40       0.369  IO       |        |        |        |    587.96
 25.750     0.00     0.40       0.367  IO       |        |        |        |    587.94
 25.833     0.00     0.39       0.364  IO       |        |        |        |    587.93
 25.917     0.00     0.39       0.361  IO       |        |        |        |    587.91
 26.000     0.00     0.39       0.358  IO       |        |        |        |    587.89
 26.083     0.00     0.39       0.356  IO       |        |        |        |    587.87
 26.167     0.00     0.39       0.353  IO       |        |        |        |    587.85
 26.250     0.00     0.39       0.350  IO       |        |        |        |    587.84
 26.333     0.00     0.39       0.348  IO       |        |        |        |    587.82
 26.417     0.00     0.38       0.345  IO       |        |        |        |    587.80
 26.500     0.00     0.38       0.342  IO       |        |        |        |    587.78
 26.583     0.00     0.38       0.340  IO       |        |        |        |    587.77
 26.667     0.00     0.38       0.337  IO       |        |        |        |    587.75
 26.750     0.00     0.38       0.335  IO       |        |        |        |    587.73
 26.833     0.00     0.38       0.332  IO       |        |        |        |    587.71
 26.917     0.00     0.38       0.329  IO       |        |        |        |    587.70
 27.000     0.00     0.37       0.327  IO       |        |        |        |    587.68
 27.083     0.00     0.37       0.324  IO       |        |        |        |    587.66
```

```
 27.167     0.00     0.37       0.322  IO       |         |         |         |    587.64
 27.250     0.00     0.37       0.319  IO       |         |         |         |    587.63
 27.333     0.00     0.37       0.317  IO       |         |         |         |    587.61
 27.417     0.00     0.37       0.314  IO       |         |         |         |    587.59
 27.500     0.00     0.37       0.312  IO       |         |         |         |    587.58
 27.583     0.00     0.36       0.309  IO       |         |         |         |    587.56
 27.667     0.00     0.36       0.306  IO       |         |         |         |    587.54
 27.750     0.00     0.36       0.304  IO       |         |         |         |    587.53
 27.833     0.00     0.36       0.301  IO       |         |         |         |    587.51
 27.917     0.00     0.36       0.299  IO       |         |         |         |    587.49
 28.000     0.00     0.36       0.297  IO       |         |         |         |    587.48
 28.083     0.00     0.36       0.294  IO       |         |         |         |    587.46
 28.167     0.00     0.35       0.292  IO       |         |         |         |    587.44
 28.250     0.00     0.35       0.289  IO       |         |         |         |    587.43
 28.333     0.00     0.35       0.287  IO       |         |         |         |    587.41
 28.417     0.00     0.35       0.284  IO       |         |         |         |    587.40
 28.500     0.00     0.35       0.282  IO       |         |         |         |    587.38
 28.583     0.00     0.34       0.280  O        |         |         |         |    587.36
 28.667     0.00     0.34       0.277  O        |         |         |         |    587.35
 28.750     0.00     0.34       0.275  O        |         |         |         |    587.33
 28.833     0.00     0.34       0.273  O        |         |         |         |    587.32
 28.917     0.00     0.34       0.270  O        |         |         |         |    587.30
 29.000     0.00     0.33       0.268  O        |         |         |         |    587.29
 29.083     0.00     0.33       0.266  O        |         |         |         |    587.27
 29.167     0.00     0.33       0.263  O        |         |         |         |    587.26
 29.250     0.00     0.33       0.261  O        |         |         |         |    587.24
 29.333     0.00     0.33       0.259  O        |         |         |         |    587.23
 29.417     0.00     0.33       0.257  O        |         |         |         |    587.21
 29.500     0.00     0.32       0.254  O        |         |         |         |    587.20
 29.583     0.00     0.32       0.252  O        |         |         |         |    587.18
 29.667     0.00     0.32       0.250  O        |         |         |         |    587.17
 29.750     0.00     0.32       0.248  O        |         |         |         |    587.15
 29.833     0.00     0.32       0.246  O        |         |         |         |    587.14
 29.917     0.00     0.31       0.243  O        |         |         |         |    587.12
 30.000     0.00     0.31       0.241  O        |         |         |         |    587.11
 30.083     0.00     0.31       0.239  O        |         |         |         |    587.09
 30.167     0.00     0.31       0.237  O        |         |         |         |    587.08
 30.250     0.00     0.31       0.235  O        |         |         |         |    587.07
 30.333     0.00     0.31       0.233  O        |         |         |         |    587.05
 30.417     0.00     0.30       0.231  O        |         |         |         |    587.04
 30.500     0.00     0.30       0.229  O        |         |         |         |    587.02
 30.583     0.00     0.30       0.226  O        |         |         |         |    587.01
 30.667     0.00     0.30       0.224  O        |         |         |         |    587.00
 30.750     0.00     0.30       0.222  O        |         |         |         |    586.98
 30.833     0.00     0.30       0.220  O        |         |         |         |    586.97
 30.917     0.00     0.29       0.218  O        |         |         |         |    586.95
 31.000     0.00     0.29       0.216  O        |         |         |         |    586.94
 31.083     0.00     0.29       0.214  O        |         |         |         |    586.93
 31.167     0.00     0.29       0.212  O        |         |         |         |    586.91
 31.250     0.00     0.29       0.210  O        |         |         |         |    586.90
 31.333     0.00     0.29       0.208  O        |         |         |         |    586.89
 31.417     0.00     0.29       0.206  O        |         |         |         |    586.88
 31.500     0.00     0.28       0.204  O        |         |         |         |    586.86
 31.583     0.00     0.28       0.202  O        |         |         |         |    586.85
 31.667     0.00     0.28       0.200  O        |         |         |         |    586.84
 31.750     0.00     0.28       0.198  O        |         |         |         |    586.82
 31.833     0.00     0.28       0.197  O        |         |         |         |    586.81
```

```
  31.917     0.00     0.28       0.195  O        |        |        |        |    586.80
  32.000     0.00     0.27       0.193  O        |        |        |        |    586.79
  32.083     0.00     0.27       0.191  O        |        |        |        |    586.77
  32.167     0.00     0.27       0.189  O        |        |        |        |    586.76
  32.250     0.00     0.27       0.187  O        |        |        |        |    586.75
  32.333     0.00     0.27       0.185  O        |        |        |        |    586.74
  32.417     0.00     0.27       0.183  O        |        |        |        |    586.72
  32.500     0.00     0.27       0.182  O        |        |        |        |    586.71
  32.583     0.00     0.26       0.180  O        |        |        |        |    586.70
  32.667     0.00     0.26       0.178  O        |        |        |        |    586.69
  32.750     0.00     0.26       0.176  O        |        |        |        |    586.67
  32.833     0.00     0.26       0.174  O        |        |        |        |    586.66
  32.917     0.00     0.26       0.173  O        |        |        |        |    586.65
  33.000     0.00     0.26       0.171  O        |        |        |        |    586.64
  33.083     0.00     0.26       0.169  O        |        |        |        |    586.63
  33.167     0.00     0.25       0.167  O        |        |        |        |    586.62
  33.250     0.00     0.25       0.166  O        |        |        |        |    586.60
  33.333     0.00     0.25       0.164  O        |        |        |        |    586.59
  33.417     0.00     0.25       0.162  O        |        |        |        |    586.58
  33.500     0.00     0.25       0.160  O        |        |        |        |    586.57
  33.583     0.00     0.25       0.159  O        |        |        |        |    586.56
  33.667     0.00     0.25       0.157  O        |        |        |        |    586.55
  33.750     0.00     0.24       0.155  O        |        |        |        |    586.54
  33.833     0.00     0.24       0.154  O        |        |        |        |    586.52
  33.917     0.00     0.24       0.152  O        |        |        |        |    586.51
  34.000     0.00     0.24       0.150  O        |        |        |        |    586.50
  34.083     0.00     0.24       0.149  O        |        |        |        |    586.49
  34.167     0.00     0.24       0.147  O        |        |        |        |    586.48
  34.250     0.00     0.23       0.145  O        |        |        |        |    586.47
  34.333     0.00     0.23       0.144  O        |        |        |        |    586.46
  34.417     0.00     0.23       0.142  O        |        |        |        |    586.45
  34.500     0.00     0.23       0.141  O        |        |        |        |    586.44
  34.583     0.00     0.22       0.139  O        |        |        |        |    586.43
  34.667     0.00     0.22       0.138  O        |        |        |        |    586.42
  34.750     0.00     0.22       0.136  O        |        |        |        |    586.41
  34.833     0.00     0.22       0.135  O        |        |        |        |    586.40
  34.917     0.00     0.21       0.133  O        |        |        |        |    586.39
  35.000     0.00     0.21       0.132  O        |        |        |        |    586.38
  35.083     0.00     0.21       0.130  O        |        |        |        |    586.37
  35.167     0.00     0.21       0.129  O        |        |        |        |    586.36
  35.250     0.00     0.20       0.127  O        |        |        |        |    586.35
  35.333     0.00     0.20       0.126  O        |        |        |        |    586.34
  35.417     0.00     0.20       0.125  O        |        |        |        |    586.33
  35.500     0.00     0.20       0.123  O        |        |        |        |    586.32
  35.583     0.00     0.19       0.122  O        |        |        |        |    586.31
  35.667     0.00     0.19       0.121  O        |        |        |        |    586.30
  35.750     0.00     0.19       0.119  O        |        |        |        |    586.29
  35.833     0.00     0.19       0.118  O        |        |        |        |    586.29
  35.917     0.00     0.19       0.117  O        |        |        |        |    586.28
  36.000     0.00     0.18       0.115  O        |        |        |        |    586.27
  36.083     0.00     0.18       0.114  O        |        |        |        |    586.26
  36.167     0.00     0.18       0.113  O        |        |        |        |    586.25
  36.250     0.00     0.18       0.112  O        |        |        |        |    586.24
  36.333     0.00     0.18       0.110  O        |        |        |        |    586.23
  36.417     0.00     0.17       0.109  O        |        |        |        |    586.23
  36.500     0.00     0.17       0.108  O        |        |        |        |    586.22
  36.583     0.00     0.17       0.107  O        |        |        |        |    586.21
```

```
 36.667     0.00     0.17      0.106  O        |        |        |        |    586.20
 36.750     0.00     0.17      0.105  O        |        |        |        |    586.19
 36.833     0.00     0.17      0.103  O        |        |        |        |    586.19
 36.917     0.00     0.16      0.102  O        |        |        |        |    586.18
 37.000     0.00     0.16      0.101  O        |        |        |        |    586.17
 37.083     0.00     0.16      0.100  O        |        |        |        |    586.16
 37.167     0.00     0.16      0.099  O        |        |        |        |    586.16
 37.250     0.00     0.16      0.098  O        |        |        |        |    586.15
 37.333     0.00     0.15      0.097  O        |        |        |        |    586.14
 37.417     0.00     0.15      0.096  O        |        |        |        |    586.14
 37.500     0.00     0.15      0.095  O        |        |        |        |    586.13
 37.583     0.00     0.15      0.094  O        |        |        |        |    586.12
 37.667     0.00     0.15      0.093  O        |        |        |        |    586.11
 37.750     0.00     0.15      0.092  O        |        |        |        |    586.11
 37.833     0.00     0.14      0.091  O        |        |        |        |    586.10
 37.917     0.00     0.14      0.090  O        |        |        |        |    586.09
 38.000     0.00     0.14      0.089  O        |        |        |        |    586.09
 38.083     0.00     0.14      0.088  O        |        |        |        |    586.08
 38.167     0.00     0.14      0.087  O        |        |        |        |    586.08
 38.250     0.00     0.14      0.086  O        |        |        |        |    586.07
 38.333     0.00     0.14      0.085  O        |        |        |        |    586.06
 38.417     0.00     0.13      0.084  O        |        |        |        |    586.06
 38.500     0.00     0.13      0.083  O        |        |        |        |    586.05
 38.583     0.00     0.13      0.082  O        |        |        |        |    586.04
 38.667     0.00     0.13      0.081  O        |        |        |        |    586.04
 38.750     0.00     0.13      0.080  O        |        |        |        |    586.03
 38.833     0.00     0.13      0.079  O        |        |        |        |    586.03
 38.917     0.00     0.13      0.079  O        |        |        |        |    586.02
 39.000     0.00     0.12      0.078  O        |        |        |        |    586.01
 39.083     0.00     0.12      0.077  O        |        |        |        |    586.01
 39.167     0.00     0.12      0.076  O        |        |        |        |    586.00
 39.250     0.00     0.12      0.075  O        |        |        |        |    586.00
 39.333     0.00     0.12      0.074  O        |        |        |        |    585.99
 39.417     0.00     0.12      0.074  O        |        |        |        |    585.99
 39.500     0.00     0.12      0.073  O        |        |        |        |    585.98
 39.583     0.00     0.11      0.072  O        |        |        |        |    585.98
 39.667     0.00     0.11      0.071  O        |        |        |        |    585.97
 39.750     0.00     0.11      0.070  O        |        |        |        |    585.97
 39.833     0.00     0.11      0.070  O        |        |        |        |    585.96
 39.917     0.00     0.11      0.069  O        |        |        |        |    585.96
 40.000     0.00     0.11      0.068  O        |        |        |        |    585.95
 40.083     0.00     0.11      0.067  O        |        |        |        |    585.95
 40.167     0.00     0.11      0.067  O        |        |        |        |    585.94
 40.250     0.00     0.11      0.066  O        |        |        |        |    585.94
 40.333     0.00     0.10      0.065  O        |        |        |        |    585.93
 40.417     0.00     0.10      0.064  O        |        |        |        |    585.93
 40.500     0.00     0.10      0.064  O        |        |        |        |    585.92
 40.583     0.00     0.10      0.063  O        |        |        |        |    585.92
 40.667     0.00     0.10      0.062  O        |        |        |        |    585.91
 40.750     0.00     0.10      0.062  O        |        |        |        |    585.91
 40.833     0.00     0.10      0.061  O        |        |        |        |    585.90
 40.917     0.00     0.10      0.060  O        |        |        |        |    585.90
 41.000     0.00     0.10      0.060  O        |        |        |        |    585.89
 41.083     0.00     0.09      0.059  O        |        |        |        |    585.89
 41.167     0.00     0.09      0.058  O        |        |        |        |    585.88
 41.250     0.00     0.09      0.058  O        |        |        |        |    585.88
 41.333     0.00     0.09      0.057  O        |        |        |        |    585.88
```

```
  41.417    0.00    0.09     0.056  O        |        |        |        |    585.87
  41.500    0.00    0.09     0.056  O        |        |        |        |    585.87
  41.583    0.00    0.09     0.055  O        |        |        |        |    585.86
  41.667    0.00    0.09     0.055  O        |        |        |        |    585.86
  41.750    0.00    0.09     0.054  O        |        |        |        |    585.86
  41.833    0.00    0.09     0.053  O        |        |        |        |    585.85
  41.917    0.00    0.08     0.053  O        |        |        |        |    585.85
  42.000    0.00    0.08     0.052  O        |        |        |        |    585.84
  42.083    0.00    0.08     0.052  O        |        |        |        |    585.84
  42.167    0.00    0.08     0.051  O        |        |        |        |    585.84
  42.250    0.00    0.08     0.051  O        |        |        |        |    585.83
  42.333    0.00    0.08     0.050  O        |        |        |        |    585.83
  42.417    0.00    0.08     0.050  O        |        |        |        |    585.83
  42.500    0.00    0.08     0.049  O        |        |        |        |    585.82
  42.583    0.00    0.08     0.048  O        |        |        |        |    585.82
  42.667    0.00    0.08     0.048  O        |        |        |        |    585.81
  42.750    0.00    0.08     0.047  O        |        |        |        |    585.81
  42.833    0.00    0.07     0.047  O        |        |        |        |    585.81
  42.917    0.00    0.07     0.046  O        |        |        |        |    585.80
  43.000    0.00    0.07     0.046  O        |        |        |        |    585.80
  43.083    0.00    0.07     0.045  O        |        |        |        |    585.80
  43.167    0.00    0.07     0.045  O        |        |        |        |    585.79
  43.250    0.00    0.07     0.044  O        |        |        |        |    585.79
  43.333    0.00    0.07     0.044  O        |        |        |        |    585.79
  43.417    0.00    0.07     0.043  O        |        |        |        |    585.78
  43.500    0.00    0.07     0.043  O        |        |        |        |    585.78
  43.583    0.00    0.07     0.042  O        |        |        |        |    585.78
  43.667    0.00    0.07     0.042  O        |        |        |        |    585.78
  43.750    0.00    0.07     0.042  O        |        |        |        |    585.77
  43.833    0.00    0.07     0.041  O        |        |        |        |    585.77
  43.917    0.00    0.06     0.041  O        |        |        |        |    585.77
  44.000    0.00    0.06     0.040  O        |        |        |        |    585.76
  44.083    0.00    0.06     0.040  O        |        |        |        |    585.76
  44.167    0.00    0.06     0.039  O        |        |        |        |    585.76
  44.250    0.00    0.06     0.039  O        |        |        |        |    585.75
  44.333    0.00    0.06     0.038  O        |        |        |        |    585.75
  44.417    0.00    0.06     0.038  O        |        |        |        |    585.75
  44.500    0.00    0.06     0.038  O        |        |        |        |    585.75
  44.583    0.00    0.06     0.037  O        |        |        |        |    585.74
  44.667    0.00    0.06     0.037  O        |        |        |        |    585.74
  44.750    0.00    0.06     0.036  O        |        |        |        |    585.74
  44.833    0.00    0.06     0.036  O        |        |        |        |    585.74
  44.917    0.00    0.06     0.036  O        |        |        |        |    585.73
  45.000    0.00    0.06     0.035  O        |        |        |        |    585.73
  45.083    0.00    0.06     0.035  O        |        |        |        |    585.73
  45.167    0.00    0.05     0.034  O        |        |        |        |    585.72
  45.250    0.00    0.05     0.034  O        |        |        |        |    585.72
  45.333    0.00    0.05     0.034  O        |        |        |        |    585.72
  45.417    0.00    0.05     0.033  O        |        |        |        |    585.72
  45.500    0.00    0.05     0.033  O        |        |        |        |    585.71
  45.583    0.00    0.05     0.033  O        |        |        |        |    585.71
  45.667    0.00    0.05     0.032  O        |        |        |        |    585.71
  45.750    0.00    0.05     0.032  O        |        |        |        |    585.71
  45.833    0.00    0.05     0.032  O        |        |        |        |    585.71
  45.917    0.00    0.05     0.031  O        |        |        |        |    585.70
  46.000    0.00    0.05     0.031  O        |        |        |        |    585.70
  46.083    0.00    0.05     0.031  O        |        |        |        |    585.70
```

```
46.167    0.00    0.05      0.030  O       |       |       |       |   585.70
46.250    0.00    0.05      0.030  O       |       |       |       |   585.69
46.333    0.00    0.05      0.030  O       |       |       |       |   585.69
46.417    0.00    0.05      0.029  O       |       |       |       |   585.69
46.500    0.00    0.05      0.029  O       |       |       |       |   585.69
46.583    0.00    0.05      0.029  O       |       |       |       |   585.69
46.667    0.00    0.04      0.028  O       |       |       |       |   585.68
46.750    0.00    0.04      0.028  O       |       |       |       |   585.68
46.833    0.00    0.04      0.028  O       |       |       |       |   585.68
46.917    0.00    0.04      0.027  O       |       |       |       |   585.68
47.000    0.00    0.04      0.027  O       |       |       |       |   585.68
47.083    0.00    0.04      0.027  O       |       |       |       |   585.67
47.167    0.00    0.04      0.027  O       |       |       |       |   585.67
47.250    0.00    0.04      0.026  O       |       |       |       |   585.67
47.333    0.00    0.04      0.026  O       |       |       |       |   585.67
47.417    0.00    0.04      0.026  O       |       |       |       |   585.67
47.500    0.00    0.04      0.025  O       |       |       |       |   585.66
47.583    0.00    0.04      0.025  O       |       |       |       |   585.66
47.667    0.00    0.04      0.025  O       |       |       |       |   585.66
47.750    0.00    0.04      0.025  O       |       |       |       |   585.66
47.833    0.00    0.04      0.024  O       |       |       |       |   585.66
47.917    0.00    0.04      0.024  O       |       |       |       |   585.65
48.000    0.00    0.04      0.024  O       |       |       |       |   585.65
48.083    0.00    0.04      0.024  O       |       |       |       |   585.65
48.167    0.00    0.04      0.023  O       |       |       |       |   585.65
48.250    0.00    0.04      0.023  O       |       |       |       |   585.65
48.333    0.00    0.04      0.023  O       |       |       |       |   585.65
48.417    0.00    0.04      0.023  O       |       |       |       |   585.64
48.500    0.00    0.04      0.022  O       |       |       |       |   585.64
48.583    0.00    0.03      0.022  O       |       |       |       |   585.64
48.667    0.00    0.03      0.022  O       |       |       |       |   585.64
48.750    0.00    0.03      0.022  O       |       |       |       |   585.64
48.833    0.00    0.03      0.021  O       |       |       |       |   585.64
48.917    0.00    0.03      0.021  O       |       |       |       |   585.64
49.000    0.00    0.03      0.021  O       |       |       |       |   585.63
49.083    0.00    0.03      0.021  O       |       |       |       |   585.63
49.167    0.00    0.03      0.020  O       |       |       |       |   585.63
49.250    0.00    0.03      0.020  O       |       |       |       |   585.63
49.333    0.00    0.03      0.020  O       |       |       |       |   585.63
49.417    0.00    0.03      0.020  O       |       |       |       |   585.63
49.500    0.00    0.03      0.020  O       |       |       |       |   585.62
49.583    0.00    0.03      0.019  O       |       |       |       |   585.62
49.667    0.00    0.03      0.019  O       |       |       |       |   585.62
49.750    0.00    0.03      0.019  O       |       |       |       |   585.62
49.833    0.00    0.03      0.019  O       |       |       |       |   585.62
49.917    0.00    0.03      0.019  O       |       |       |       |   585.62
50.000    0.00    0.03      0.018  O       |       |       |       |   585.62
50.083    0.00    0.03      0.018  O       |       |       |       |   585.62
50.167    0.00    0.03      0.018  O       |       |       |       |   585.61
50.250    0.00    0.03      0.018  O       |       |       |       |   585.61
50.333    0.00    0.03      0.018  O       |       |       |       |   585.61
50.417    0.00    0.03      0.017  O       |       |       |       |   585.61
50.500    0.00    0.03      0.017  O       |       |       |       |   585.61
50.583    0.00    0.03      0.017  O       |       |       |       |   585.61
50.667    0.00    0.03      0.017  O       |       |       |       |   585.61
50.750    0.00    0.03      0.017  O       |       |       |       |   585.61
50.833    0.00    0.03      0.016  O       |       |       |       |   585.60
```

```
50.917    0.00    0.03     0.016  O       |        |        |        |    585.60
51.000    0.00    0.03     0.016  O       |        |        |        |    585.60
51.083    0.00    0.02     0.016  O       |        |        |        |    585.60
51.167    0.00    0.02     0.016  O       |        |        |        |    585.60
51.250    0.00    0.02     0.016  O       |        |        |        |    585.60
51.333    0.00    0.02     0.015  O       |        |        |        |    585.60
51.417    0.00    0.02     0.015  O       |        |        |        |    585.60
51.500    0.00    0.02     0.015  O       |        |        |        |    585.59
51.583    0.00    0.02     0.015  O       |        |        |        |    585.59
51.667    0.00    0.02     0.015  O       |        |        |        |    585.59
51.750    0.00    0.02     0.015  O       |        |        |        |    585.59
51.833    0.00    0.02     0.014  O       |        |        |        |    585.59
51.917    0.00    0.02     0.014  O       |        |        |        |    585.59
52.000    0.00    0.02     0.014  O       |        |        |        |    585.59
52.083    0.00    0.02     0.014  O       |        |        |        |    585.59
52.167    0.00    0.02     0.014  O       |        |        |        |    585.59
52.250    0.00    0.02     0.014  O       |        |        |        |    585.59
52.333    0.00    0.02     0.014  O       |        |        |        |    585.58
52.417    0.00    0.02     0.013  O       |        |        |        |    585.58
52.500    0.00    0.02     0.013  O       |        |        |        |    585.58
52.583    0.00    0.02     0.013  O       |        |        |        |    585.58
52.667    0.00    0.02     0.013  O       |        |        |        |    585.58
52.750    0.00    0.02     0.013  O       |        |        |        |    585.58
52.833    0.00    0.02     0.013  O       |        |        |        |    585.58
52.917    0.00    0.02     0.013  O       |        |        |        |    585.58
53.000    0.00    0.02     0.012  O       |        |        |        |    585.58
53.083    0.00    0.02     0.012  O       |        |        |        |    585.58
53.167    0.00    0.02     0.012  O       |        |        |        |    585.58
53.250    0.00    0.02     0.012  O       |        |        |        |    585.57
53.333    0.00    0.02     0.012  O       |        |        |        |    585.57
53.417    0.00    0.02     0.012  O       |        |        |        |    585.57
53.500    0.00    0.02     0.012  O       |        |        |        |    585.57
53.583    0.00    0.02     0.012  O       |        |        |        |    585.57
53.667    0.00    0.02     0.011  O       |        |        |        |    585.57
53.750    0.00    0.02     0.011  O       |        |        |        |    585.57
53.833    0.00    0.02     0.011  O       |        |        |        |    585.57
53.917    0.00    0.02     0.011  O       |        |        |        |    585.57
54.000    0.00    0.02     0.011  O       |        |        |        |    585.57
54.083    0.00    0.02     0.011  O       |        |        |        |    585.57
54.167    0.00    0.02     0.011  O       |        |        |        |    585.57
54.250    0.00    0.02     0.011  O       |        |        |        |    585.56
54.333    0.00    0.02     0.010  O       |        |        |        |    585.56
54.417    0.00    0.02     0.010  O       |        |        |        |    585.56
54.500    0.00    0.02     0.010  O       |        |        |        |    585.56
54.583    0.00    0.02     0.010  O       |        |        |        |    585.56
54.667    0.00    0.02     0.010  O       |        |        |        |    585.56
54.750    0.00    0.02     0.010  O       |        |        |        |    585.56
54.833    0.00    0.02     0.010  O       |        |        |        |    585.56
54.917    0.00    0.02     0.010  O       |        |        |        |    585.56
55.000    0.00    0.01     0.010  O       |        |        |        |    585.56
55.083    0.00    0.01     0.010  O       |        |        |        |    585.56
55.167    0.00    0.01     0.009  O       |        |        |        |    585.56
55.250    0.00    0.01     0.009  O       |        |        |        |    585.56
55.333    0.00    0.01     0.009  O       |        |        |        |    585.56
55.417    0.00    0.01     0.009  O       |        |        |        |    585.55
55.500    0.00    0.01     0.009  O       |        |        |        |    585.55
55.583    0.00    0.01     0.009  O       |        |        |        |    585.55
```

```
55.667    0.00    0.01      0.009  O       |       |       |       |   585.55
55.750    0.00    0.01      0.009  O       |       |       |       |   585.55
55.833    0.00    0.01      0.009  O       |       |       |       |   585.55
55.917    0.00    0.01      0.009  O       |       |       |       |   585.55
56.000    0.00    0.01      0.008  O       |       |       |       |   585.55
56.083    0.00    0.01      0.008  O       |       |       |       |   585.55
56.167    0.00    0.01      0.008  O       |       |       |       |   585.55
56.250    0.00    0.01      0.008  O       |       |       |       |   585.55
56.333    0.00    0.01      0.008  O       |       |       |       |   585.55
56.417    0.00    0.01      0.008  O       |       |       |       |   585.55
56.500    0.00    0.01      0.008  O       |       |       |       |   585.55
56.583    0.00    0.01      0.008  O       |       |       |       |   585.55
56.667    0.00    0.01      0.008  O       |       |       |       |   585.55
56.750    0.00    0.01      0.008  O       |       |       |       |   585.55
56.833    0.00    0.01      0.008  O       |       |       |       |   585.54
56.917    0.00    0.01      0.008  O       |       |       |       |   585.54
57.000    0.00    0.01      0.007  O       |       |       |       |   585.54
57.083    0.00    0.01      0.007  O       |       |       |       |   585.54
57.167    0.00    0.01      0.007  O       |       |       |       |   585.54
57.250    0.00    0.01      0.007  O       |       |       |       |   585.54
57.333    0.00    0.01      0.007  O       |       |       |       |   585.54
57.417    0.00    0.01      0.007  O       |       |       |       |   585.54
57.500    0.00    0.01      0.007  O       |       |       |       |   585.54
57.583    0.00    0.01      0.007  O       |       |       |       |   585.54
57.667    0.00    0.01      0.007  O       |       |       |       |   585.54
57.750    0.00    0.01      0.007  O       |       |       |       |   585.54
57.833    0.00    0.01      0.007  O       |       |       |       |   585.54
57.917    0.00    0.01      0.007  O       |       |       |       |   585.54
58.000    0.00    0.01      0.007  O       |       |       |       |   585.54
58.083    0.00    0.01      0.007  O       |       |       |       |   585.54
58.167    0.00    0.01      0.006  O       |       |       |       |   585.54
58.250    0.00    0.01      0.006  O       |       |       |       |   585.54
58.333    0.00    0.01      0.006  O       |       |       |       |   585.54
58.417    0.00    0.01      0.006  O       |       |       |       |   585.54
58.500    0.00    0.01      0.006  O       |       |       |       |   585.53
58.583    0.00    0.01      0.006  O       |       |       |       |   585.53
58.667    0.00    0.01      0.006  O       |       |       |       |   585.53
58.750    0.00    0.01      0.006  O       |       |       |       |   585.53
58.833    0.00    0.01      0.006  O       |       |       |       |   585.53
58.917    0.00    0.01      0.006  O       |       |       |       |   585.53
59.000    0.00    0.01      0.006  O       |       |       |       |   585.53
59.083    0.00    0.01      0.006  O       |       |       |       |   585.53
59.167    0.00    0.01      0.006  O       |       |       |       |   585.53
59.250    0.00    0.01      0.006  O       |       |       |       |   585.53
59.333    0.00    0.01      0.006  O       |       |       |       |   585.53
59.417    0.00    0.01      0.006  O       |       |       |       |   585.53
59.500    0.00    0.01      0.005  O       |       |       |       |   585.53
59.583    0.00    0.01      0.005  O       |       |       |       |   585.53
59.667    0.00    0.01      0.005  O       |       |       |       |   585.53
59.750    0.00    0.01      0.005  O       |       |       |       |   585.53
59.833    0.00    0.01      0.005  O       |       |       |       |   585.53
59.917    0.00    0.01      0.005  O       |       |       |       |   585.53
60.000    0.00    0.01      0.005  O       |       |       |       |   585.53
60.083    0.00    0.01      0.005  O       |       |       |       |   585.53
60.167    0.00    0.01      0.005  O       |       |       |       |   585.53
60.250    0.00    0.01      0.005  O       |       |       |       |   585.53
60.333    0.00    0.01      0.005  O       |       |       |       |   585.53
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  60.417     0.00     0.01       0.005  O        |        |        |        |     585.53
  60.500     0.00     0.01       0.005  O        |        |        |        |     585.53
  60.583     0.00     0.01       0.005  O        |        |        |        |     585.53
  60.667     0.00     0.01       0.005  O        |        |        |        |     585.53
  60.750     0.00     0.01       0.005  O        |        |        |        |     585.52
  60.833     0.00     0.01       0.005  O        |        |        |        |     585.52
  60.917     0.00     0.01       0.005  O        |        |        |        |     585.52
  61.000     0.00     0.01       0.005  O        |        |        |        |     585.52
  61.083     0.00     0.01       0.005  O        |        |        |        |     585.52
  61.167     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.250     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.333     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.417     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.500     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.583     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.667     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.750     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.833     0.00     0.01       0.004  O        |        |        |        |     585.52
  61.917     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.000     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.083     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.167     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.250     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.333     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.417     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.500     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.583     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.667     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.750     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.833     0.00     0.01       0.004  O        |        |        |        |     585.52
  62.917     0.00     0.01       0.004  O        |        |        |        |     585.52
  63.000     0.00     0.01       0.004  O        |        |        |        |     585.52
  63.083     0.00     0.01       0.004  O        |        |        |        |     585.52
  63.167     0.00     0.01       0.004  O        |        |        |        |     585.52
  63.250     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.333     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.417     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.500     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.583     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.667     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.750     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.833     0.00     0.00       0.003  O        |        |        |        |     585.52
  63.917     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.000     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.083     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.167     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.250     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.333     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.417     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.500     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.583     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.667     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.750     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.833     0.00     0.00       0.003  O        |        |        |        |     585.51
  64.917     0.00     0.00       0.003  O        |        |        |        |     585.51
  65.000     0.00     0.00       0.003  O        |        |        |        |     585.51
  65.083     0.00     0.00       0.003  O        |        |        |        |     585.51
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
65.167    0.00    0.00      0.003  O       |       |       |       |   585.51
65.250    0.00    0.00      0.003  O       |       |       |       |   585.51
65.333    0.00    0.00      0.003  O       |       |       |       |   585.51
65.417    0.00    0.00      0.003  O       |       |       |       |   585.51
65.500    0.00    0.00      0.003  O       |       |       |       |   585.51
65.583    0.00    0.00      0.003  O       |       |       |       |   585.51
65.667    0.00    0.00      0.003  O       |       |       |       |   585.51
65.750    0.00    0.00      0.003  O       |       |       |       |   585.51
65.833    0.00    0.00      0.003  O       |       |       |       |   585.51
65.917    0.00    0.00      0.003  O       |       |       |       |   585.51
66.000    0.00    0.00      0.003  O       |       |       |       |   585.51
66.083    0.00    0.00      0.003  O       |       |       |       |   585.51
66.167    0.00    0.00      0.002  O       |       |       |       |   585.51
66.250    0.00    0.00      0.002  O       |       |       |       |   585.51
66.333    0.00    0.00      0.002  O       |       |       |       |   585.51
66.417    0.00    0.00      0.002  O       |       |       |       |   585.51
66.500    0.00    0.00      0.002  O       |       |       |       |   585.51
66.583    0.00    0.00      0.002  O       |       |       |       |   585.51
66.667    0.00    0.00      0.002  O       |       |       |       |   585.51
66.750    0.00    0.00      0.002  O       |       |       |       |   585.51
66.833    0.00    0.00      0.002  O       |       |       |       |   585.51
66.917    0.00    0.00      0.002  O       |       |       |       |   585.51
67.000    0.00    0.00      0.002  O       |       |       |       |   585.51
67.083    0.00    0.00      0.002  O       |       |       |       |   585.51
67.167    0.00    0.00      0.002  O       |       |       |       |   585.51
67.250    0.00    0.00      0.002  O       |       |       |       |   585.51
67.333    0.00    0.00      0.002  O       |       |       |       |   585.51
67.417    0.00    0.00      0.002  O       |       |       |       |   585.51
67.500    0.00    0.00      0.002  O       |       |       |       |   585.51
67.583    0.00    0.00      0.002  O       |       |       |       |   585.51
67.667    0.00    0.00      0.002  O       |       |       |       |   585.51
67.750    0.00    0.00      0.002  O       |       |       |       |   585.51
67.833    0.00    0.00      0.002  O       |       |       |       |   585.51
67.917    0.00    0.00      0.002  O       |       |       |       |   585.51
68.000    0.00    0.00      0.002  O       |       |       |       |   585.51
68.083    0.00    0.00      0.002  O       |       |       |       |   585.51
68.167    0.00    0.00      0.002  O       |       |       |       |   585.51
68.250    0.00    0.00      0.002  O       |       |       |       |   585.51
68.333    0.00    0.00      0.002  O       |       |       |       |   585.51
68.417    0.00    0.00      0.002  O       |       |       |       |   585.51
68.500    0.00    0.00      0.002  O       |       |       |       |   585.51
68.583    0.00    0.00      0.002  O       |       |       |       |   585.51
68.667    0.00    0.00      0.002  O       |       |       |       |   585.51
68.750    0.00    0.00      0.002  O       |       |       |       |   585.51
68.833    0.00    0.00      0.002  O       |       |       |       |   585.51
68.917    0.00    0.00      0.002  O       |       |       |       |   585.51
69.000    0.00    0.00      0.002  O       |       |       |       |   585.51
69.083    0.00    0.00      0.002  O       |       |       |       |   585.51
69.167    0.00    0.00      0.002  O       |       |       |       |   585.51
69.250    0.00    0.00      0.002  O       |       |       |       |   585.51
69.333    0.00    0.00      0.002  O       |       |       |       |   585.51
69.417    0.00    0.00      0.002  O       |       |       |       |   585.51
69.500    0.00    0.00      0.002  O       |       |       |       |   585.50
69.583    0.00    0.00      0.002  O       |       |       |       |   585.50
69.667    0.00    0.00      0.002  O       |       |       |       |   585.50
69.750    0.00    0.00      0.002  O       |       |       |       |   585.50
69.833    0.00    0.00      0.002  O       |       |       |       |   585.50
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 69.917     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.000     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.083     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.167     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.250     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.333     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.417     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.500     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.583     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.667     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.750     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.833     0.00     0.00      0.002  O           |         |         |         |    585.50
 70.917     0.00     0.00      0.002  O           |         |         |         |    585.50
 71.000     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.083     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.167     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.250     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.333     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.417     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.500     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.583     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.667     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.750     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.833     0.00     0.00      0.001  O           |         |         |         |    585.50
 71.917     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.000     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.083     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.167     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.250     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.333     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.417     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.500     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.583     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.667     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.750     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.833     0.00     0.00      0.001  O           |         |         |         |    585.50
 72.917     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.000     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.083     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.167     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.250     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.333     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.417     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.500     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.583     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.667     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.750     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.833     0.00     0.00      0.001  O           |         |         |         |    585.50
 73.917     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.000     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.083     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.167     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.250     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.333     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.417     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.500     0.00     0.00      0.001  O           |         |         |         |    585.50
 74.583     0.00     0.00      0.001  O           |         |         |         |    585.50
```

```
74.667    0.00    0.00      0.001  O       |       |       |       |   585.50
74.750    0.00    0.00      0.001  O       |       |       |       |   585.50
74.833    0.00    0.00      0.001  O       |       |       |       |   585.50
74.917    0.00    0.00      0.001  O       |       |       |       |   585.50
75.000    0.00    0.00      0.001  O       |       |       |       |   585.50
75.083    0.00    0.00      0.001  O       |       |       |       |   585.50
75.167    0.00    0.00      0.001  O       |       |       |       |   585.50
75.250    0.00    0.00      0.001  O       |       |       |       |   585.50
75.333    0.00    0.00      0.001  O       |       |       |       |   585.50
75.417    0.00    0.00      0.001  O       |       |       |       |   582.72

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   905
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.709 (CFS)
                 Total volume =       1.466 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

```
                       FLOOD HYDROGRAPH ROUTING PROGRAM
              Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                          Study date: 10/28/21

---------------------------------------------------------------------
```

TTM 31589
2-Year 24-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop242.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =   296
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =        3.631 (CFS)
            Total volume =       2.217 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 296
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

```
            585.500       0.001      0.001      0.001        0.001
            586.500       0.150      0.240      0.149        0.151
            587.500       0.300      0.356      0.299        0.301
            588.500       0.450      0.440      0.448        0.452
            589.500       0.600      0.510      0.598        0.602
            590.500       1.120      0.680      1.118        1.122
            591.500       1.700      0.790      1.697        1.703
            592.500       2.340      0.990      2.337        2.343
            593.500       3.040    101.020      2.692        3.388
          --------------------------------------------------------------------
                      Hydrograph Detention Basin Routing
          ---------------------------------------------------------------------

          Graph values: 'I'= unit inflow; 'O'=outflow at time shown
          ---------------------------------------------------------------------
     Time    Inflow  Outflow    Storage                                   Depth
    (Hours)   (CFS)   (CFS)     (Ac.Ft) .0        0.9     1.82     2.72     3.63 (Ft.)
     0.083    0.04    0.00      0.000  O        |        |        |        |     82.50
     0.167    0.14    0.00      0.001  OI       |        |        |        |    455.58
     0.250    0.18    0.00      0.002  OI       |        |        |        |    585.51
     0.333    0.21    0.00      0.003  OI       |        |        |        |    585.51
     0.417    0.27    0.01      0.005  O I      |        |        |        |    585.53
     0.500    0.30    0.01      0.007  O I      |        |        |        |    585.54
     0.583    0.31    0.01      0.009  O I      |        |        |        |    585.55
     0.667    0.31    0.02      0.011  O I      |        |        |        |    585.57
     0.750    0.32    0.02      0.013  O I      |        |        |        |    585.58
     0.833    0.34    0.02      0.015  O  I     |        |        |        |    585.59
     0.917    0.39    0.03      0.017  O  I     |        |        |        |    585.61
     1.000    0.41    0.03      0.020  O  I     |        |        |        |    585.63
     1.083    0.40    0.04      0.022  O  I     |        |        |        |    585.64
     1.167    0.35    0.04      0.025  O  I     |        |        |        |    585.66
     1.250    0.34    0.04      0.027  O I      |        |        |        |    585.67
     1.333    0.33    0.05      0.029  O I      |        |        |        |    585.69
     1.417    0.33    0.05      0.031  O I      |        |        |        |    585.70
     1.500    0.33    0.05      0.033  O I      |        |        |        |    585.71
     1.583    0.32    0.05      0.035  O I      |        |        |        |    585.73
     1.667    0.32    0.06      0.036  O I      |        |        |        |    585.74
     1.750    0.32    0.06      0.038  O I      |        |        |        |    585.75
     1.833    0.34    0.06      0.040  O  I     |        |        |        |    585.76
     1.917    0.39    0.07      0.042  O  I     |        |        |        |    585.78
     2.000    0.41    0.07      0.044  O  I     |        |        |        |    585.79
     2.083    0.42    0.07      0.047  O  I     |        |        |        |    585.81
     2.167    0.42    0.08      0.049  O  I     |        |        |        |    585.82
     2.250    0.43    0.08      0.052  O  I     |        |        |        |    585.84
     2.333    0.43    0.09      0.054  O  I     |        |        |        |    585.86
     2.417    0.43    0.09      0.056  O  I     |        |        |        |    585.87
     2.500    0.43    0.09      0.059  O  I     |        |        |        |    585.89
     2.583    0.45    0.10      0.061  O  I     |        |        |        |    585.90
     2.667    0.50    0.10      0.064  O   I    |        |        |        |    585.92
     2.750    0.52    0.11      0.066  O   I    |        |        |        |    585.94
     2.833    0.53    0.11      0.069  O   I    |        |        |        |    585.96
     2.917    0.53    0.11      0.072  |O  I    |        |        |        |    585.98
     3.000    0.53    0.12      0.075  |O  I    |        |        |        |    586.00
     3.083    0.53    0.12      0.078  |O  I    |        |        |        |    586.02
     3.167    0.54    0.13      0.081  |O  I    |        |        |        |    586.03
     3.250    0.54    0.13      0.083  |O  I    |        |        |        |    586.05
     3.333    0.54    0.14      0.086  |O  I    |        |        |        |    586.07
```

```
3.417    0.54    0.14      0.089  |O  I   |       |       |       |   586.09
3.500    0.54    0.15      0.092  |O  I   |       |       |       |   586.11
3.583    0.54    0.15      0.094  |O  I   |       |       |       |   586.13
3.667    0.54    0.15      0.097  |O  I   |       |       |       |   586.14
3.750    0.54    0.16      0.099  |O  I   |       |       |       |   586.16
3.833    0.56    0.16      0.102  |O  I   |       |       |       |   586.18
3.917    0.61    0.17      0.105  |O   I  |       |       |       |   586.20
4.000    0.63    0.17      0.108  |O   I  |       |       |       |   586.22
4.083    0.63    0.18      0.111  |O   I  |       |       |       |   586.24
4.167    0.64    0.18      0.114  |O   I  |       |       |       |   586.26
4.250    0.64    0.19      0.117  |O   I  |       |       |       |   586.28
4.333    0.66    0.19      0.121  |O   I  |       |       |       |   586.30
4.417    0.72    0.20      0.124  |O    I |       |       |       |   586.33
4.500    0.73    0.20      0.128  |O    I |       |       |       |   586.35
4.583    0.74    0.21      0.131  |O    I |       |       |       |   586.37
4.667    0.74    0.22      0.135  |O    I |       |       |       |   586.40
4.750    0.75    0.22      0.139  |O    I |       |       |       |   586.42
4.833    0.77    0.23      0.142  | O   I |       |       |       |   586.45
4.917    0.82    0.23      0.146  | O    I|       |       |       |   586.47
5.000    0.84    0.24      0.150  | O    I|       |       |       |   586.50
5.083    0.81    0.24      0.154  | O    I|       |       |       |   586.53
5.167    0.71    0.25      0.158  | O   I |       |       |       |   586.55
5.250    0.68    0.25      0.161  | O  I  |       |       |       |   586.57
5.333    0.68    0.25      0.164  | O   I |       |       |       |   586.59
5.417    0.73    0.25      0.167  | O   I |       |       |       |   586.61
5.500    0.74    0.26      0.170  | O   I |       |       |       |   586.64
5.583    0.76    0.26      0.174  | O   I |       |       |       |   586.66
5.667    0.82    0.26      0.177  | O    I|       |       |       |   586.68
5.750    0.84    0.26      0.181  | O    I|       |       |       |   586.71
5.833    0.85    0.27      0.185  | O    I|       |       |       |   586.73
5.917    0.85    0.27      0.189  | O    I|       |       |       |   586.76
6.000    0.85    0.27      0.193  | O    I|       |       |       |   586.79
6.083    0.88    0.28      0.197  | O    I|       |       |       |   586.82
6.167    0.93    0.28      0.202  | O     I       |       |       |   586.84
6.250    0.95    0.28      0.206  | O     I       |       |       |   586.87
6.333    0.96    0.29      0.211  | O     I       |       |       |   586.90
6.417    0.96    0.29      0.215  | O     I       |       |       |   586.94
6.500    0.96    0.29      0.220  | O     I       |       |       |   586.97
6.583    0.98    0.30      0.225  | O     I       |       |       |   587.00
6.667    1.04    0.30      0.229  | O     |I      |       |       |   587.03
6.750    1.05    0.31      0.235  | O     |I      |       |       |   587.06
6.833    1.06    0.31      0.240  | O     |I      |       |       |   587.10
6.917    1.07    0.31      0.245  | O     |I      |       |       |   587.13
7.000    1.07    0.32      0.250  | O     |I      |       |       |   587.17
7.083    1.07    0.32      0.255  | O     |I      |       |       |   587.20
7.167    1.07    0.33      0.260  | O     |I      |       |       |   587.24
7.250    1.07    0.33      0.266  | O     |I      |       |       |   587.27
7.333    1.09    0.33      0.271  | O     |I      |       |       |   587.31
7.417    1.15    0.34      0.276  | O     | I     |       |       |   587.34
7.500    1.16    0.34      0.282  |  O    | I     |       |       |   587.38
7.583    1.19    0.35      0.288  |  O    | I     |       |       |   587.42
7.667    1.25    0.35      0.293  |  O    | I     |       |       |   587.46
7.750    1.27    0.36      0.300  |  O    |  I    |       |       |   587.50
7.833    1.30    0.36      0.306  |  O    |  I    |       |       |   587.54
7.917    1.35    0.36      0.313  |  O    |  I    |       |       |   587.58
8.000    1.37    0.37      0.320  |  O    |   I   |       |       |   587.63
8.083    1.42    0.37      0.327  |  O    |   I   |       |       |   587.68
```

```
 8.167    1.53    0.38      0.334  |  O    |    I  |       |       |   587.73
 8.250    1.57    0.38      0.342  |  O    |    I  |       |       |   587.78
 8.333    1.59    0.38      0.351  |  O    |    I  |       |       |   587.84
 8.417    1.60    0.39      0.359  |  O    |     I |       |       |   587.89
 8.500    1.60    0.39      0.367  |  O    |     I |       |       |   587.95
 8.583    1.63    0.40      0.376  |  O    |     I |       |       |   588.00
 8.667    1.68    0.40      0.384  |  O    |     I |       |       |   588.06
 8.750    1.70    0.41      0.393  |  O    |     I |       |       |   588.12
 8.833    1.73    0.41      0.402  |  O    |      I|       |       |   588.18
 8.917    1.78    0.42      0.411  |  O    |      I|       |       |   588.24
 9.000    1.80    0.42      0.421  |  O    |      I|       |       |   588.30
 9.083    1.85    0.43      0.430  |  O    |       I       |       |   588.37
 9.167    1.96    0.43      0.441  |  O    |       |I      |       |   588.44
 9.250    2.00    0.44      0.451  |  O    |       |I      |       |   588.51
 9.333    2.04    0.45      0.462  |  O    |       |I      |       |   588.58
 9.417    2.10    0.45      0.473  |  O    |       | I     |       |   588.65
 9.500    2.12    0.46      0.485  |   O   |       | I     |       |   588.73
 9.583    2.15    0.46      0.496  |   O   |       | I     |       |   588.81
 9.667    2.21    0.47      0.508  |   O   |       |  I    |       |   588.89
 9.750    2.23    0.47      0.520  |   O   |       |  I    |       |   588.97
 9.833    2.26    0.48      0.532  |   O   |       |  I    |       |   589.05
 9.917    2.32    0.48      0.545  |   O   |       |   I   |       |   589.13
10.000    2.34    0.49      0.557  |   O   |       |   I   |       |   589.22
10.083    2.20    0.50      0.570  |   O   |       |  I    |       |   589.30
10.167    1.85    0.50      0.580  |   O   |       I       |       |   589.37
10.250    1.73    0.50      0.589  |   O   |      I|       |       |   589.43
10.333    1.68    0.51      0.597  |   O   |     I |       |       |   589.48
10.417    1.65    0.51      0.605  |   O   |     I |       |       |   589.51
10.500    1.63    0.51      0.613  |   O   |     I |       |       |   589.53
10.583    1.72    0.52      0.621  |   O   |      I|       |       |   589.54
10.667    1.98    0.52      0.630  |   O   |       |I      |       |   589.56
10.750    2.06    0.52      0.640  |   O   |       | I     |       |   589.58
10.833    2.09    0.53      0.651  |   O   |       | I     |       |   589.60
10.917    2.12    0.53      0.662  |   O   |       | I     |       |   589.62
11.000    2.13    0.53      0.673  |   O   |       | I     |       |   589.64
11.083    2.12    0.54      0.684  |   O   |       | I     |       |   589.66
11.167    2.07    0.54      0.695  |   O   |       | I     |       |   589.68
11.250    2.06    0.54      0.705  |   O   |       | I     |       |   589.70
11.333    2.05    0.55      0.715  |   O   |       | I     |       |   589.72
11.417    2.04    0.55      0.726  |   O   |       | I     |       |   589.74
11.500    2.04    0.55      0.736  |   O   |       |I      |       |   589.76
11.583    2.00    0.56      0.746  |   O   |       |I      |       |   589.78
11.667    1.89    0.56      0.756  |   O   |       I       |       |   589.80
11.750    1.86    0.56      0.765  |   O   |       I       |       |   589.82
11.833    1.87    0.57      0.774  |   O   |       I       |       |   589.83
11.917    1.91    0.57      0.783  |    O  |       I       |       |   589.85
12.000    1.92    0.57      0.792  |    O  |       I       |       |   589.87
12.083    2.07    0.58      0.802  |    O  |       | I     |       |   589.89
12.167    2.43    0.58      0.813  |    O  |       |    I  |       |   589.91
12.250    2.55    0.58      0.826  |    O  |       |     I |       |   589.94
12.333    2.63    0.59      0.840  |    O  |       |      I|       |   589.96
12.417    2.71    0.59      0.855  |    O  |       |      I|       |   589.99
12.500    2.75    0.60      0.869  |    O  |       |       I       |   590.02
12.583    2.81    0.60      0.884  |    O  |       |       I       |   590.05
12.667    2.92    0.61      0.900  |    O  |       |       |I      |   590.08
12.750    2.96    0.61      0.916  |    O  |       |       | I     |   590.11
12.833    3.00    0.62      0.932  |    O  |       |       | I     |   590.14
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
12.917    3.06    0.62      0.949 |    O  |       |       |  I    |   590.17
13.000    3.09    0.63      0.966 |    O  |       |       |  I    |   590.20
13.083    3.20    0.64      0.983 |    O  |       |       |   I   |   590.24
13.167    3.47    0.64      1.002 |    O  |       |       |     I |   590.27
13.250    3.55    0.65      1.021 |    O  |       |       |      I|   590.31
13.333    3.59    0.65      1.041 |    O  |       |       |      I|   590.35
13.417    3.62    0.66      1.062 |    O  |       |       |      I|   590.39
13.500    3.63    0.67      1.082 |    O  |       |       |       I   590.43
13.583    3.41    0.67      1.102 |    O  |       |       |     I |   590.46
13.667    2.85    0.68      1.119 |    O  |       |       |I      |   590.50
13.750    2.67    0.68      1.133 |     O |       |      I|       |   590.52
13.833    2.58    0.68      1.146 |     O |       |     I |       |   590.55
13.917    2.54    0.69      1.159 |     O |       |     I |       |   590.57
14.000    2.51    0.69      1.172 |     O |       |     I |       |   590.59
14.083    2.57    0.69      1.185 |     O |       |     I |       |   590.61
14.167    2.76    0.69      1.198 |     O |       |       I       |   590.63
14.250    2.82    0.70      1.213 |     O |       |       I       |   590.66
14.333    2.83    0.70      1.227 |     O |       |       I       |   590.68
14.417    2.80    0.70      1.242 |     O |       |       I       |   590.71
14.500    2.79    0.71      1.256 |     O |       |       I       |   590.73
14.583    2.79    0.71      1.271 |     O |       |       I       |   590.76
14.667    2.79    0.71      1.285 |     O |       |       I       |   590.78
14.750    2.79    0.71      1.299 |     O |       |       I       |   590.81
14.833    2.77    0.72      1.314 |     O |       |       I       |   590.83
14.917    2.72    0.72      1.328 |     O |       |      I|       |   590.86
15.000    2.70    0.72      1.341 |     O |       |      I|       |   590.88
15.083    2.67    0.72      1.355 |     O |       |      I|       |   590.90
15.167    2.62    0.73      1.368 |     O |       |      I|       |   590.93
15.250    2.60    0.73      1.381 |     O |       |     I |       |   590.95
15.333    2.57    0.73      1.394 |     O |       |     I |       |   590.97
15.417    2.51    0.73      1.406 |     O |       |     I |       |   590.99
15.500    2.49    0.74      1.418 |     O |       |    I  |       |   591.01
15.583    2.40    0.74      1.430 |     O |       |    I  |       |   591.03
15.667    2.18    0.74      1.441 |     O |       |  I    |       |   591.05
15.750    2.11    0.74      1.450 |     O |       | I     |       |   591.07
15.833    2.08    0.74      1.460 |     O |       | I     |       |   591.09
15.917    2.06    0.75      1.469 |     O |       | I     |       |   591.10
16.000    2.05    0.75      1.478 |     O |       | I     |       |   591.12
16.083    1.74    0.75      1.486 |     O |      I|       |       |   591.13
16.167    0.95    0.75      1.490 |     O I       |       |       |   591.14
16.250    0.70    0.75      1.490 |     O |       |       |       |   591.14
16.333    0.59    0.75      1.490 |    IO |       |       |       |   591.14
16.417    0.52    0.75      1.488 |   I O |       |       |       |   591.13
16.500    0.48    0.75      1.487 |   I O |       |       |       |   591.13
16.583    0.43    0.75      1.485 |  I  O |       |       |       |   591.13
16.667    0.37    0.75      1.482 |  I  O |       |       |       |   591.12
16.750    0.34    0.75      1.479 | I   O |       |       |       |   591.12
16.833    0.33    0.75      1.477 | I   O |       |       |       |   591.11
16.917    0.33    0.75      1.474 | I   O |       |       |       |   591.11
17.000    0.33    0.75      1.471 | I   O |       |       |       |   591.10
17.083    0.36    0.75      1.468 |  I  O |       |       |       |   591.10
17.167    0.47    0.75      1.466 |   I O |       |       |       |   591.10
17.250    0.50    0.75      1.464 |   I O |       |       |       |   591.09
17.333    0.52    0.74      1.462 |   I O |       |       |       |   591.09
17.417    0.52    0.74      1.461 |   I O |       |       |       |   591.09
17.500    0.53    0.74      1.459 |   I O |       |       |       |   591.09
17.583    0.53    0.74      1.458 |   I O |       |       |       |   591.08
```

```
17.667    0.54    0.74      1.456  |   I O |       |       |       |   591.08
17.750    0.54    0.74      1.455  |   I O |       |       |       |   591.08
17.833    0.52    0.74      1.453  |   I O |       |       |       |   591.07
17.917    0.46    0.74      1.452  |   I O |       |       |       |   591.07
18.000    0.45    0.74      1.450  |  I  O |       |       |       |   591.07
18.083    0.44    0.74      1.448  |  I  O |       |       |       |   591.06
18.167    0.44    0.74      1.446  |  I  O |       |       |       |   591.06
18.250    0.43    0.74      1.443  |  I  O |       |       |       |   591.06
18.333    0.43    0.74      1.441  |  I  O |       |       |       |   591.05
18.417    0.43    0.74      1.439  |  I  O |       |       |       |   591.05
18.500    0.43    0.74      1.437  |  I  O |       |       |       |   591.05
18.583    0.41    0.74      1.435  |  I  O |       |       |       |   591.04
18.667    0.36    0.74      1.432  |  I  O |       |       |       |   591.04
18.750    0.34    0.74      1.430  | I   O |       |       |       |   591.03
18.833    0.31    0.74      1.427  | I   O |       |       |       |   591.03
18.917    0.26    0.74      1.424  | I   O |       |       |       |   591.02
19.000    0.24    0.74      1.420  | I   O |       |       |       |   591.02
19.083    0.25    0.74      1.417  | I   O |       |       |       |   591.01
19.167    0.29    0.74      1.414  | I   O |       |       |       |   591.01
19.250    0.31    0.74      1.411  | I   O |       |       |       |   591.00
19.333    0.33    0.73      1.408  | I   O |       |       |       |   591.00
19.417    0.39    0.73      1.405  |  I  O |       |       |       |   590.99
19.500    0.41    0.73      1.403  |  I  O |       |       |       |   590.99
19.583    0.40    0.73      1.401  |  I  O |       |       |       |   590.98
19.667    0.35    0.73      1.398  |  I  O |       |       |       |   590.98
19.750    0.34    0.73      1.396  | I   O |       |       |       |   590.98
19.833    0.31    0.73      1.393  | I   O |       |       |       |   590.97
19.917    0.26    0.73      1.390  | I   O |       |       |       |   590.96
20.000    0.24    0.73      1.386  | I   O |       |       |       |   590.96
20.083    0.25    0.73      1.383  | I   O |       |       |       |   590.95
20.167    0.29    0.73      1.380  | I   O |       |       |       |   590.95
20.250    0.31    0.73      1.377  | I   O |       |       |       |   590.94
20.333    0.31    0.73      1.374  | I   O |       |       |       |   590.94
20.417    0.32    0.73      1.371  | I   O |       |       |       |   590.93
20.500    0.32    0.73      1.368  | I   O |       |       |       |   590.93
20.583    0.32    0.73      1.365  | I   O |       |       |       |   590.92
20.667    0.32    0.73      1.363  | I   O |       |       |       |   590.92
20.750    0.32    0.73      1.360  | I   O |       |       |       |   590.91
20.833    0.30    0.72      1.357  | I   O |       |       |       |   590.91
20.917    0.25    0.72      1.354  | I   O |       |       |       |   590.90
21.000    0.23    0.72      1.351  | I   O |       |       |       |   590.90
21.083    0.25    0.72      1.347  | I   O |       |       |       |   590.89
21.167    0.29    0.72      1.344  | I   O |       |       |       |   590.89
21.250    0.31    0.72      1.341  | I   O |       |       |       |   590.88
21.333    0.29    0.72      1.338  | I   O |       |       |       |   590.88
21.417    0.24    0.72      1.335  | I   O |       |       |       |   590.87
21.500    0.23    0.72      1.332  | I   O |       |       |       |   590.87
21.583    0.24    0.72      1.329  | I   O |       |       |       |   590.86
21.667    0.29    0.72      1.325  | I   O |       |       |       |   590.85
21.750    0.31    0.72      1.323  | I   O |       |       |       |   590.85
21.833    0.29    0.72      1.320  | I   O |       |       |       |   590.84
21.917    0.24    0.72      1.317  | I   O |       |       |       |   590.84
22.000    0.23    0.72      1.313  | I   O |       |       |       |   590.83
22.083    0.24    0.72      1.310  | I   O |       |       |       |   590.83
22.167    0.29    0.72      1.307  | I   O |       |       |       |   590.82
22.250    0.31    0.71      1.304  | I   O |       |       |       |   590.82
22.333    0.29    0.71      1.301  | I   O |       |       |       |   590.81
```

```
22.417     0.24     0.71       1.298   | I   O |       |       |       |   590.81
22.500     0.23     0.71       1.295   | I   O |       |       |       |   590.80
22.583     0.22     0.71       1.292   |I    O |       |       |       |   590.80
22.667     0.22     0.71       1.288   |I    O |       |       |       |   590.79
22.750     0.22     0.71       1.285   |I    O |       |       |       |   590.78
22.833     0.22     0.71       1.281   |I    O |       |       |       |   590.78
22.917     0.22     0.71       1.278   |I    O |       |       |       |   590.77
23.000     0.21     0.71       1.275   |I    O |       |       |       |   590.77
23.083     0.21     0.71       1.271   |I    O |       |       |       |   590.76
23.167     0.21     0.71       1.268   |I    O |       |       |       |   590.75
23.250     0.21     0.71       1.264   |I    O |       |       |       |   590.75
23.333     0.21     0.71       1.261   |I    O |       |       |       |   590.74
23.417     0.21     0.71       1.258   |I    O |       |       |       |   590.74
23.500     0.21     0.71       1.254   |I    O |       |       |       |   590.73
23.583     0.21     0.70       1.251   |I    O |       |       |       |   590.73
23.667     0.21     0.70       1.247   |I    O |       |       |       |   590.72
23.750     0.21     0.70       1.244   |I    O |       |       |       |   590.71
23.833     0.21     0.70       1.241   |I    O |       |       |       |   590.71
23.917     0.21     0.70       1.237   |I    O |       |       |       |   590.70
24.000     0.21     0.70       1.234   |I    O |       |       |       |   590.70
24.083     0.17     0.70       1.230   |I    O |       |       |       |   590.69
24.167     0.07     0.70       1.226   I     O |       |       |       |   590.68
24.250     0.04     0.70       1.222   I     O |       |       |       |   590.68
24.333     0.02     0.70       1.217   I     O |       |       |       |   590.67
24.417     0.01     0.70       1.213   I     O |       |       |       |   590.66
24.500     0.01     0.70       1.208   I     O |       |       |       |   590.65
24.583     0.00     0.70       1.203   I     O |       |       |       |   590.64
24.667     0.00     0.69       1.198   I     O |       |       |       |   590.64
24.750     0.00     0.69       1.194   I     O |       |       |       |   590.63
24.833     0.00     0.69       1.189   I     O |       |       |       |   590.62
24.917     0.00     0.69       1.184   I     O |       |       |       |   590.61
25.000     0.00     0.69       1.179   I     O |       |       |       |   590.60
25.083     0.00     0.69       1.175   I     O |       |       |       |   590.59
25.167     0.00     0.69       1.170   I     O |       |       |       |   590.59
25.250     0.00     0.69       1.165   I     O |       |       |       |   590.58
25.333     0.00     0.69       1.160   I     O |       |       |       |   590.57
25.417     0.00     0.69       1.156   I     O |       |       |       |   590.56
25.500     0.00     0.69       1.151   I     O |       |       |       |   590.55
25.583     0.00     0.68       1.146   I     O |       |       |       |   590.55
25.667     0.00     0.68       1.141   I     O |       |       |       |   590.54
25.750     0.00     0.68       1.137   I     O |       |       |       |   590.53
25.833     0.00     0.68       1.132   I     O |       |       |       |   590.52
25.917     0.00     0.68       1.127   I     O |       |       |       |   590.51
26.000     0.00     0.68       1.123   I    O  |       |       |       |   590.50
26.083     0.00     0.68       1.118   I    O  |       |       |       |   590.50
26.167     0.00     0.68       1.113   I    O  |       |       |       |   590.49
26.250     0.00     0.68       1.109   I    O  |       |       |       |   590.48
26.333     0.00     0.67       1.104   I    O  |       |       |       |   590.47
26.417     0.00     0.67       1.099   I    O  |       |       |       |   590.46
26.500     0.00     0.67       1.095   I    O  |       |       |       |   590.45
26.583     0.00     0.67       1.090   I    O  |       |       |       |   590.44
26.667     0.00     0.67       1.086   I    O  |       |       |       |   590.43
26.750     0.00     0.67       1.081   I    O  |       |       |       |   590.42
26.833     0.00     0.67       1.076   I    O  |       |       |       |   590.42
26.917     0.00     0.66       1.072   I    O  |       |       |       |   590.41
27.000     0.00     0.66       1.067   I    O  |       |       |       |   590.40
27.083     0.00     0.66       1.063   I    O  |       |       |       |   590.39
```

```
 27.167     0.00     0.66      1.058  I     O  |         |         |         |    590.38
 27.250     0.00     0.66      1.054  I     O  |         |         |         |    590.37
 27.333     0.00     0.66      1.049  I     O  |         |         |         |    590.36
 27.417     0.00     0.66      1.044  I     O  |         |         |         |    590.35
 27.500     0.00     0.65      1.040  I     O  |         |         |         |    590.35
 27.583     0.00     0.65      1.035  I     O  |         |         |         |    590.34
 27.667     0.00     0.65      1.031  I     O  |         |         |         |    590.33
 27.750     0.00     0.65      1.026  I     O  |         |         |         |    590.32
 27.833     0.00     0.65      1.022  I     O  |         |         |         |    590.31
 27.917     0.00     0.65      1.018  I     O  |         |         |         |    590.30
 28.000     0.00     0.65      1.013  I     O  |         |         |         |    590.29
 28.083     0.00     0.64      1.009  I     O  |         |         |         |    590.29
 28.167     0.00     0.64      1.004  I     O  |         |         |         |    590.28
 28.250     0.00     0.64      1.000  I     O  |         |         |         |    590.27
 28.333     0.00     0.64      0.995  I     O  |         |         |         |    590.26
 28.417     0.00     0.64      0.991  I     O  |         |         |         |    590.25
 28.500     0.00     0.64      0.987  I     O  |         |         |         |    590.24
 28.583     0.00     0.63      0.982  I     O  |         |         |         |    590.24
 28.667     0.00     0.63      0.978  I     O  |         |         |         |    590.23
 28.750     0.00     0.63      0.974  I     O  |         |         |         |    590.22
 28.833     0.00     0.63      0.969  I     O  |         |         |         |    590.21
 28.917     0.00     0.63      0.965  I     O  |         |         |         |    590.20
 29.000     0.00     0.63      0.961  I     O  |         |         |         |    590.19
 29.083     0.00     0.63      0.956  I     O  |         |         |         |    590.19
 29.167     0.00     0.63      0.952  I     O  |         |         |         |    590.18
 29.250     0.00     0.62      0.948  I     O  |         |         |         |    590.17
 29.333     0.00     0.62      0.943  I     O  |         |         |         |    590.16
 29.417     0.00     0.62      0.939  I     O  |         |         |         |    590.15
 29.500     0.00     0.62      0.935  I     O  |         |         |         |    590.14
 29.583     0.00     0.62      0.930  I     O  |         |         |         |    590.14
 29.667     0.00     0.62      0.926  I     O  |         |         |         |    590.13
 29.750     0.00     0.62      0.922  I     O  |         |         |         |    590.12
 29.833     0.00     0.61      0.918  I     O  |         |         |         |    590.11
 29.917     0.00     0.61      0.914  I     O  |         |         |         |    590.10
 30.000     0.00     0.61      0.909  I     O  |         |         |         |    590.09
 30.083     0.00     0.61      0.905  I     O  |         |         |         |    590.09
 30.167     0.00     0.61      0.901  I     O  |         |         |         |    590.08
 30.250     0.00     0.61      0.897  I     O  |         |         |         |    590.07
 30.333     0.00     0.61      0.893  I     O  |         |         |         |    590.06
 30.417     0.00     0.60      0.888  I     O  |         |         |         |    590.05
 30.500     0.00     0.60      0.884  I     O  |         |         |         |    590.05
 30.583     0.00     0.60      0.880  I     O  |         |         |         |    590.04
 30.667     0.00     0.60      0.876  I     O  |         |         |         |    590.03
 30.750     0.00     0.60      0.872  I     O  |         |         |         |    590.02
 30.833     0.00     0.60      0.868  I     O  |         |         |         |    590.01
 30.917     0.00     0.60      0.864  I     O  |         |         |         |    590.01
 31.000     0.00     0.59      0.860  I     O  |         |         |         |    590.00
 31.083     0.00     0.59      0.855  I     O  |         |         |         |    589.99
 31.167     0.00     0.59      0.851  I     O  |         |         |         |    589.98
 31.250     0.00     0.59      0.847  I     O  |         |         |         |    589.98
 31.333     0.00     0.59      0.843  I     O  |         |         |         |    589.97
 31.417     0.00     0.59      0.839  I     O  |         |         |         |    589.96
 31.500     0.00     0.59      0.835  I     O  |         |         |         |    589.95
 31.583     0.00     0.59      0.831  I     O  |         |         |         |    589.94
 31.667     0.00     0.58      0.827  I     O  |         |         |         |    589.94
 31.750     0.00     0.58      0.823  I     O  |         |         |         |    589.93
 31.833     0.00     0.58      0.819  I     O  |         |         |         |    589.92
```

```
31.917    0.00    0.58      0.815  I    O  |       |       |       |   589.91
32.000    0.00    0.58      0.811  I    O  |       |       |       |   589.91
32.083    0.00    0.58      0.807  I    O  |       |       |       |   589.90
32.167    0.00    0.58      0.803  I    O  |       |       |       |   589.89
32.250    0.00    0.58      0.799  I    O  |       |       |       |   589.88
32.333    0.00    0.57      0.795  I    O  |       |       |       |   589.88
32.417    0.00    0.57      0.791  I    O  |       |       |       |   589.87
32.500    0.00    0.57      0.787  I    O  |       |       |       |   589.86
32.583    0.00    0.57      0.783  I    O  |       |       |       |   589.85
32.667    0.00    0.57      0.779  I    O  |       |       |       |   589.84
32.750    0.00    0.57      0.775  I   O   |       |       |       |   589.84
32.833    0.00    0.57      0.772  I   O   |       |       |       |   589.83
32.917    0.00    0.56      0.768  I   O   |       |       |       |   589.82
33.000    0.00    0.56      0.764  I   O   |       |       |       |   589.81
33.083    0.00    0.56      0.760  I   O   |       |       |       |   589.81
33.167    0.00    0.56      0.756  I   O   |       |       |       |   589.80
33.250    0.00    0.56      0.752  I   O   |       |       |       |   589.79
33.333    0.00    0.56      0.748  I   O   |       |       |       |   589.79
33.417    0.00    0.56      0.744  I   O   |       |       |       |   589.78
33.500    0.00    0.56      0.741  I   O   |       |       |       |   589.77
33.583    0.00    0.55      0.737  I   O   |       |       |       |   589.76
33.667    0.00    0.55      0.733  I   O   |       |       |       |   589.76
33.750    0.00    0.55      0.729  I   O   |       |       |       |   589.75
33.833    0.00    0.55      0.725  I   O   |       |       |       |   589.74
33.917    0.00    0.55      0.722  I   O   |       |       |       |   589.73
34.000    0.00    0.55      0.718  I   O   |       |       |       |   589.73
34.083    0.00    0.55      0.714  I   O   |       |       |       |   589.72
34.167    0.00    0.55      0.710  I   O   |       |       |       |   589.71
34.250    0.00    0.54      0.707  I   O   |       |       |       |   589.70
34.333    0.00    0.54      0.703  I   O   |       |       |       |   589.70
34.417    0.00    0.54      0.699  I   O   |       |       |       |   589.69
34.500    0.00    0.54      0.695  I   O   |       |       |       |   589.68
34.583    0.00    0.54      0.692  I   O   |       |       |       |   589.68
34.667    0.00    0.54      0.688  I   O   |       |       |       |   589.67
34.750    0.00    0.54      0.684  I   O   |       |       |       |   589.66
34.833    0.00    0.54      0.680  I   O   |       |       |       |   589.65
34.917    0.00    0.54      0.677  I   O   |       |       |       |   589.65
35.000    0.00    0.53      0.673  I   O   |       |       |       |   589.64
35.083    0.00    0.53      0.669  I   O   |       |       |       |   589.63
35.167    0.00    0.53      0.666  I   O   |       |       |       |   589.63
35.250    0.00    0.53      0.662  I   O   |       |       |       |   589.62
35.333    0.00    0.53      0.658  I   O   |       |       |       |   589.61
35.417    0.00    0.53      0.655  I   O   |       |       |       |   589.61
35.500    0.00    0.53      0.651  I   O   |       |       |       |   589.60
35.583    0.00    0.53      0.648  I   O   |       |       |       |   589.59
35.667    0.00    0.52      0.644  I   O   |       |       |       |   589.58
35.750    0.00    0.52      0.640  I   O   |       |       |       |   589.58
35.833    0.00    0.52      0.637  I   O   |       |       |       |   589.57
35.917    0.00    0.52      0.633  I   O   |       |       |       |   589.56
36.000    0.00    0.52      0.630  I   O   |       |       |       |   589.56
36.083    0.00    0.52      0.626  I   O   |       |       |       |   589.55
36.167    0.00    0.52      0.622  I   O   |       |       |       |   589.54
36.250    0.00    0.52      0.619  I   O   |       |       |       |   589.54
36.333    0.00    0.52      0.615  I   O   |       |       |       |   589.53
36.417    0.00    0.51      0.612  I   O   |       |       |       |   589.52
36.500    0.00    0.51      0.608  I   O   |       |       |       |   589.52
36.583    0.00    0.51      0.605  I   O   |       |       |       |   589.51
```

```
36.667    0.00    0.51      0.601   I   O   |       |       |       |   589.50
36.750    0.00    0.51      0.598   I   O   |       |       |       |   589.48
36.833    0.00    0.51      0.594   I   O   |       |       |       |   589.46
36.917    0.00    0.51      0.591   I   O   |       |       |       |   589.44
37.000    0.00    0.50      0.587   I   O   |       |       |       |   589.41
37.083    0.00    0.50      0.584   I   O   |       |       |       |   589.39
37.167    0.00    0.50      0.580   I   O   |       |       |       |   589.37
37.250    0.00    0.50      0.577   I   O   |       |       |       |   589.35
37.333    0.00    0.50      0.573   I   O   |       |       |       |   589.32
37.417    0.00    0.50      0.570   I   O   |       |       |       |   589.30
37.500    0.00    0.49      0.567   I   O   |       |       |       |   589.28
37.583    0.00    0.49      0.563   I   O   |       |       |       |   589.25
37.667    0.00    0.49      0.560   I   O   |       |       |       |   589.23
37.750    0.00    0.49      0.556   I   O   |       |       |       |   589.21
37.833    0.00    0.49      0.553   I   O   |       |       |       |   589.19
37.917    0.00    0.49      0.550   I   O   |       |       |       |   589.16
38.000    0.00    0.48      0.546   I   O   |       |       |       |   589.14
38.083    0.00    0.48      0.543   I   O   |       |       |       |   589.12
38.167    0.00    0.48      0.540   I   O   |       |       |       |   589.10
38.250    0.00    0.48      0.536   I   O   |       |       |       |   589.08
38.333    0.00    0.48      0.533   I   O   |       |       |       |   589.05
38.417    0.00    0.48      0.530   I   O   |       |       |       |   589.03
38.500    0.00    0.48      0.527   I   O   |       |       |       |   589.01
38.583    0.00    0.47      0.523   I   O   |       |       |       |   588.99
38.667    0.00    0.47      0.520   I   O   |       |       |       |   588.97
38.750    0.00    0.47      0.517   I   O   |       |       |       |   588.94
38.833    0.00    0.47      0.514   I   O   |       |       |       |   588.92
38.917    0.00    0.47      0.510   I   O   |       |       |       |   588.90
39.000    0.00    0.47      0.507   I   O   |       |       |       |   588.88
39.083    0.00    0.47      0.504   I   O   |       |       |       |   588.86
39.167    0.00    0.46      0.501   I   O   |       |       |       |   588.84
39.250    0.00    0.46      0.497   I   O   |       |       |       |   588.82
39.333    0.00    0.46      0.494   I   O   |       |       |       |   588.80
39.417    0.00    0.46      0.491   I   O   |       |       |       |   588.77
39.500    0.00    0.46      0.488   I   O   |       |       |       |   588.75
39.583    0.00    0.46      0.485   I   O   |       |       |       |   588.73
39.667    0.00    0.45      0.482   I   O   |       |       |       |   588.71
39.750    0.00    0.45      0.479   I  O    |       |       |       |   588.69
39.833    0.00    0.45      0.475   I  O    |       |       |       |   588.67
39.917    0.00    0.45      0.472   I  O    |       |       |       |   588.65
40.000    0.00    0.45      0.469   I  O    |       |       |       |   588.63
40.083    0.00    0.45      0.466   I  O    |       |       |       |   588.61
40.167    0.00    0.45      0.463   I  O    |       |       |       |   588.59
40.250    0.00    0.44      0.460   I  O    |       |       |       |   588.57
40.333    0.00    0.44      0.457   I  O    |       |       |       |   588.55
40.417    0.00    0.44      0.454   I  O    |       |       |       |   588.53
40.500    0.00    0.44      0.451   I  O    |       |       |       |   588.51
40.583    0.00    0.44      0.448   I  O    |       |       |       |   588.49
40.667    0.00    0.44      0.445   I  O    |       |       |       |   588.47
40.750    0.00    0.44      0.442   I  O    |       |       |       |   588.45
40.833    0.00    0.43      0.439   I  O    |       |       |       |   588.43
40.917    0.00    0.43      0.436   I  O    |       |       |       |   588.41
41.000    0.00    0.43      0.433   I  O    |       |       |       |   588.39
41.083    0.00    0.43      0.430   I  O    |       |       |       |   588.37
41.167    0.00    0.43      0.427   I  O    |       |       |       |   588.35
41.250    0.00    0.43      0.424   I  O    |       |       |       |   588.33
41.333    0.00    0.42      0.421   I  O    |       |       |       |   588.31
```

```
41.417    0.00    0.42      0.418  I  O    |       |       |       |   588.29
41.500    0.00    0.42      0.415  I  O    |       |       |       |   588.27
41.583    0.00    0.42      0.412  I  O    |       |       |       |   588.25
41.667    0.00    0.42      0.410  I  O    |       |       |       |   588.23
41.750    0.00    0.42      0.407  I  O    |       |       |       |   588.21
41.833    0.00    0.41      0.404  I  O    |       |       |       |   588.19
41.917    0.00    0.41      0.401  I  O    |       |       |       |   588.17
42.000    0.00    0.41      0.398  I  O    |       |       |       |   588.15
42.083    0.00    0.41      0.395  I  O    |       |       |       |   588.14
42.167    0.00    0.41      0.392  I  O    |       |       |       |   588.12
42.250    0.00    0.41      0.390  I  O    |       |       |       |   588.10
42.333    0.00    0.40      0.387  I  O    |       |       |       |   588.08
42.417    0.00    0.40      0.384  I  O    |       |       |       |   588.06
42.500    0.00    0.40      0.381  I  O    |       |       |       |   588.04
42.583    0.00    0.40      0.379  I  O    |       |       |       |   588.02
42.667    0.00    0.40      0.376  I  O    |       |       |       |   588.01
42.750    0.00    0.40      0.373  I  O    |       |       |       |   587.99
42.833    0.00    0.40      0.370  I  O    |       |       |       |   587.97
42.917    0.00    0.39      0.368  I  O    |       |       |       |   587.95
43.000    0.00    0.39      0.365  I  O    |       |       |       |   587.93
43.083    0.00    0.39      0.362  I  O    |       |       |       |   587.91
43.167    0.00    0.39      0.360  I  O    |       |       |       |   587.90
43.250    0.00    0.39      0.357  I  O    |       |       |       |   587.88
43.333    0.00    0.39      0.354  I  O    |       |       |       |   587.86
43.417    0.00    0.38      0.352  I  O    |       |       |       |   587.84
43.500    0.00    0.38      0.349  I  O    |       |       |       |   587.83
43.583    0.00    0.38      0.346  I  O    |       |       |       |   587.81
43.667    0.00    0.38      0.344  I  O    |       |       |       |   587.79
43.750    0.00    0.38      0.341  I  O    |       |       |       |   587.77
43.833    0.00    0.38      0.338  I  O    |       |       |       |   587.76
43.917    0.00    0.38      0.336  I  O    |       |       |       |   587.74
44.000    0.00    0.37      0.333  I  O    |       |       |       |   587.72
44.083    0.00    0.37      0.331  I  O    |       |       |       |   587.70
44.167    0.00    0.37      0.328  I  O    |       |       |       |   587.69
44.250    0.00    0.37      0.326  I  O    |       |       |       |   587.67
44.333    0.00    0.37      0.323  I  O    |       |       |       |   587.65
44.417    0.00    0.37      0.320  I  O    |       |       |       |   587.64
44.500    0.00    0.37      0.318  I  O    |       |       |       |   587.62
44.583    0.00    0.36      0.315  I  O    |       |       |       |   587.60
44.667    0.00    0.36      0.313  I  O    |       |       |       |   587.59
44.750    0.00    0.36      0.310  I  O    |       |       |       |   587.57
44.833    0.00    0.36      0.308  I  O    |       |       |       |   587.55
44.917    0.00    0.36      0.305  I  O    |       |       |       |   587.54
45.000    0.00    0.36      0.303  I  O    |       |       |       |   587.52
45.083    0.00    0.36      0.301  I  O    |       |       |       |   587.50
45.167    0.00    0.35      0.298  I  O    |       |       |       |   587.49
45.250    0.00    0.35      0.296  I  O    |       |       |       |   587.47
45.333    0.00    0.35      0.293  I  O    |       |       |       |   587.45
45.417    0.00    0.35      0.291  I  O    |       |       |       |   587.44
45.500    0.00    0.35      0.288  I  O    |       |       |       |   587.42
45.583    0.00    0.35      0.286  I  O    |       |       |       |   587.41
45.667    0.00    0.34      0.284  I  O    |       |       |       |   587.39
45.750    0.00    0.34      0.281  I  O    |       |       |       |   587.38
45.833    0.00    0.34      0.279  I O     |       |       |       |   587.36
45.917    0.00    0.34      0.277  I O     |       |       |       |   587.34
46.000    0.00    0.34      0.274  I O     |       |       |       |   587.33
46.083    0.00    0.33      0.272  I O     |       |       |       |   587.31
```

```
  46.167     0.00     0.33       0.270  I O       |         |         |         |    587.30
  46.250     0.00     0.33       0.267  I O       |         |         |         |    587.28
  46.333     0.00     0.33       0.265  I O       |         |         |         |    587.27
  46.417     0.00     0.33       0.263  I O       |         |         |         |    587.25
  46.500     0.00     0.33       0.261  I O       |         |         |         |    587.24
  46.583     0.00     0.32       0.258  I O       |         |         |         |    587.22
  46.667     0.00     0.32       0.256  I O       |         |         |         |    587.21
  46.750     0.00     0.32       0.254  I O       |         |         |         |    587.19
  46.833     0.00     0.32       0.252  I O       |         |         |         |    587.18
  46.917     0.00     0.32       0.250  I O       |         |         |         |    587.16
  47.000     0.00     0.32       0.247  I O       |         |         |         |    587.15
  47.083     0.00     0.31       0.245  I O       |         |         |         |    587.13
  47.167     0.00     0.31       0.243  I O       |         |         |         |    587.12
  47.250     0.00     0.31       0.241  I O       |         |         |         |    587.11
  47.333     0.00     0.31       0.239  I O       |         |         |         |    587.09
  47.417     0.00     0.31       0.237  I O       |         |         |         |    587.08
  47.500     0.00     0.31       0.235  I O       |         |         |         |    587.06
  47.583     0.00     0.30       0.232  I O       |         |         |         |    587.05
  47.667     0.00     0.30       0.230  I O       |         |         |         |    587.04
  47.750     0.00     0.30       0.228  I O       |         |         |         |    587.02
  47.833     0.00     0.30       0.226  I O       |         |         |         |    587.01
  47.917     0.00     0.30       0.224  I O       |         |         |         |    586.99
  48.000     0.00     0.30       0.222  I O       |         |         |         |    586.98
  48.083     0.00     0.29       0.220  I O       |         |         |         |    586.97
  48.167     0.00     0.29       0.218  I O       |         |         |         |    586.95
  48.250     0.00     0.29       0.216  I O       |         |         |         |    586.94
  48.333     0.00     0.29       0.214  I O       |         |         |         |    586.93
  48.417     0.00     0.29       0.212  I O       |         |         |         |    586.91
  48.500     0.00     0.29       0.210  I O       |         |         |         |    586.90
  48.583     0.00     0.28       0.208  I O       |         |         |         |    586.89
  48.667     0.00     0.28       0.206  I O       |         |         |         |    586.87
  48.750     0.00     0.28       0.204  I O       |         |         |         |    586.86
  48.833     0.00     0.28       0.202  I O       |         |         |         |    586.85
  48.917     0.00     0.28       0.200  I O       |         |         |         |    586.84
  49.000     0.00     0.28       0.198  I O       |         |         |         |    586.82
  49.083     0.00     0.28       0.197  I O       |         |         |         |    586.81
  49.167     0.00     0.27       0.195  I O       |         |         |         |    586.80
  49.250     0.00     0.27       0.193  I O       |         |         |         |    586.79
  49.333     0.00     0.27       0.191  I O       |         |         |         |    586.77
  49.417     0.00     0.27       0.189  I O       |         |         |         |    586.76
  49.500     0.00     0.27       0.187  I O       |         |         |         |    586.75
  49.583     0.00     0.27       0.185  I O       |         |         |         |    586.74
  49.667     0.00     0.27       0.183  I O       |         |         |         |    586.72
  49.750     0.00     0.26       0.182  I O       |         |         |         |    586.71
  49.833     0.00     0.26       0.180  I O       |         |         |         |    586.70
  49.917     0.00     0.26       0.178  I O       |         |         |         |    586.69
  50.000     0.00     0.26       0.176  I O       |         |         |         |    586.67
  50.083     0.00     0.26       0.174  I O       |         |         |         |    586.66
  50.167     0.00     0.26       0.173  I O       |         |         |         |    586.65
  50.250     0.00     0.26       0.171  I O       |         |         |         |    586.64
  50.333     0.00     0.25       0.169  I O       |         |         |         |    586.63
  50.417     0.00     0.25       0.167  I O       |         |         |         |    586.62
  50.500     0.00     0.25       0.166  I O       |         |         |         |    586.60
  50.583     0.00     0.25       0.164  I O       |         |         |         |    586.59
  50.667     0.00     0.25       0.162  I O       |         |         |         |    586.58
  50.750     0.00     0.25       0.160  I O       |         |         |         |    586.57
  50.833     0.00     0.25       0.159  I O       |         |         |         |    586.56
```

```
   50.917     0.00     0.25      0.157  I O      |       |       |       |    586.55
   51.000     0.00     0.24      0.155  I O      |       |       |       |    586.54
   51.083     0.00     0.24      0.154  I O      |       |       |       |    586.52
   51.167     0.00     0.24      0.152  I O      |       |       |       |    586.51
   51.250     0.00     0.24      0.150  I O      |       |       |       |    586.50
   51.333     0.00     0.24      0.149  I O      |       |       |       |    586.49
   51.417     0.00     0.24      0.147  I O      |       |       |       |    586.48
   51.500     0.00     0.23      0.146  I O      |       |       |       |    586.47
   51.583     0.00     0.23      0.144  I O      |       |       |       |    586.46
   51.667     0.00     0.23      0.142  I O      |       |       |       |    586.45
   51.750     0.00     0.23      0.141  IO       |       |       |       |    586.44
   51.833     0.00     0.22      0.139  IO       |       |       |       |    586.43
   51.917     0.00     0.22      0.138  IO       |       |       |       |    586.42
   52.000     0.00     0.22      0.136  IO       |       |       |       |    586.41
   52.083     0.00     0.22      0.135  IO       |       |       |       |    586.40
   52.167     0.00     0.21      0.133  IO       |       |       |       |    586.39
   52.250     0.00     0.21      0.132  IO       |       |       |       |    586.38
   52.333     0.00     0.21      0.130  IO       |       |       |       |    586.37
   52.417     0.00     0.21      0.129  IO       |       |       |       |    586.36
   52.500     0.00     0.20      0.127  IO       |       |       |       |    586.35
   52.583     0.00     0.20      0.126  IO       |       |       |       |    586.34
   52.667     0.00     0.20      0.125  IO       |       |       |       |    586.33
   52.750     0.00     0.20      0.123  IO       |       |       |       |    586.32
   52.833     0.00     0.20      0.122  IO       |       |       |       |    586.31
   52.917     0.00     0.19      0.121  IO       |       |       |       |    586.30
   53.000     0.00     0.19      0.119  IO       |       |       |       |    586.29
   53.083     0.00     0.19      0.118  IO       |       |       |       |    586.29
   53.167     0.00     0.19      0.117  IO       |       |       |       |    586.28
   53.250     0.00     0.18      0.115  IO       |       |       |       |    586.27
   53.333     0.00     0.18      0.114  IO       |       |       |       |    586.26
   53.417     0.00     0.18      0.113  IO       |       |       |       |    586.25
   53.500     0.00     0.18      0.112  IO       |       |       |       |    586.24
   53.583     0.00     0.18      0.110  IO       |       |       |       |    586.23
   53.667     0.00     0.17      0.109  IO       |       |       |       |    586.23
   53.750     0.00     0.17      0.108  IO       |       |       |       |    586.22
   53.833     0.00     0.17      0.107  IO       |       |       |       |    586.21
   53.917     0.00     0.17      0.106  IO       |       |       |       |    586.20
   54.000     0.00     0.17      0.105  IO       |       |       |       |    586.20
   54.083     0.00     0.17      0.103  IO       |       |       |       |    586.19
   54.167     0.00     0.16      0.102  IO       |       |       |       |    586.18
   54.250     0.00     0.16      0.101  IO       |       |       |       |    586.17
   54.333     0.00     0.16      0.100  IO       |       |       |       |    586.16
   54.417     0.00     0.16      0.099  IO       |       |       |       |    586.16
   54.500     0.00     0.16      0.098  IO       |       |       |       |    586.15
   54.583     0.00     0.15      0.097  IO       |       |       |       |    586.14
   54.667     0.00     0.15      0.096  IO       |       |       |       |    586.14
   54.750     0.00     0.15      0.095  IO       |       |       |       |    586.13
   54.833     0.00     0.15      0.094  IO       |       |       |       |    586.12
   54.917     0.00     0.15      0.093  IO       |       |       |       |    586.12
   55.000     0.00     0.15      0.092  IO       |       |       |       |    586.11
   55.083     0.00     0.14      0.091  IO       |       |       |       |    586.10
   55.167     0.00     0.14      0.090  IO       |       |       |       |    586.09
   55.250     0.00     0.14      0.089  IO       |       |       |       |    586.09
   55.333     0.00     0.14      0.088  IO       |       |       |       |    586.08
   55.417     0.00     0.14      0.087  IO       |       |       |       |    586.08
   55.500     0.00     0.14      0.086  IO       |       |       |       |    586.07
   55.583     0.00     0.14      0.085  IO       |       |       |       |    586.06
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  55.667     0.00     0.13       0.084  IO       |        |        |        |     586.06
  55.750     0.00     0.13       0.083  IO       |        |        |        |     586.05
  55.833     0.00     0.13       0.082  IO       |        |        |        |     586.04
  55.917     0.00     0.13       0.081  IO       |        |        |        |     586.04
  56.000     0.00     0.13       0.080  IO       |        |        |        |     586.03
  56.083     0.00     0.13       0.079  IO       |        |        |        |     586.03
  56.167     0.00     0.13       0.079  IO       |        |        |        |     586.02
  56.250     0.00     0.12       0.078  IO       |        |        |        |     586.01
  56.333     0.00     0.12       0.077  IO       |        |        |        |     586.01
  56.417     0.00     0.12       0.076  IO       |        |        |        |     586.00
  56.500     0.00     0.12       0.075  IO       |        |        |        |     586.00
  56.583     0.00     0.12       0.074  IO       |        |        |        |     585.99
  56.667     0.00     0.12       0.074  IO       |        |        |        |     585.99
  56.750     0.00     0.12       0.073  IO       |        |        |        |     585.98
  56.833     0.00     0.11       0.072  IO       |        |        |        |     585.98
  56.917     0.00     0.11       0.071  IO       |        |        |        |     585.97
  57.000     0.00     0.11       0.070  O        |        |        |        |     585.97
  57.083     0.00     0.11       0.070  O        |        |        |        |     585.96
  57.167     0.00     0.11       0.069  O        |        |        |        |     585.96
  57.250     0.00     0.11       0.068  O        |        |        |        |     585.95
  57.333     0.00     0.11       0.067  O        |        |        |        |     585.95
  57.417     0.00     0.11       0.067  O        |        |        |        |     585.94
  57.500     0.00     0.11       0.066  O        |        |        |        |     585.94
  57.583     0.00     0.10       0.065  O        |        |        |        |     585.93
  57.667     0.00     0.10       0.064  O        |        |        |        |     585.93
  57.750     0.00     0.10       0.064  O        |        |        |        |     585.92
  57.833     0.00     0.10       0.063  O        |        |        |        |     585.92
  57.917     0.00     0.10       0.062  O        |        |        |        |     585.91
  58.000     0.00     0.10       0.062  O        |        |        |        |     585.91
  58.083     0.00     0.10       0.061  O        |        |        |        |     585.90
  58.167     0.00     0.10       0.060  O        |        |        |        |     585.90
  58.250     0.00     0.10       0.060  O        |        |        |        |     585.89
  58.333     0.00     0.09       0.059  O        |        |        |        |     585.89
  58.417     0.00     0.09       0.058  O        |        |        |        |     585.89
  58.500     0.00     0.09       0.058  O        |        |        |        |     585.88
  58.583     0.00     0.09       0.057  O        |        |        |        |     585.88
  58.667     0.00     0.09       0.057  O        |        |        |        |     585.87
  58.750     0.00     0.09       0.056  O        |        |        |        |     585.87
  58.833     0.00     0.09       0.055  O        |        |        |        |     585.86
  58.917     0.00     0.09       0.055  O        |        |        |        |     585.86
  59.000     0.00     0.09       0.054  O        |        |        |        |     585.86
  59.083     0.00     0.09       0.053  O        |        |        |        |     585.85
  59.167     0.00     0.08       0.053  O        |        |        |        |     585.85
  59.250     0.00     0.08       0.052  O        |        |        |        |     585.84
  59.333     0.00     0.08       0.052  O        |        |        |        |     585.84
  59.417     0.00     0.08       0.051  O        |        |        |        |     585.84
  59.500     0.00     0.08       0.051  O        |        |        |        |     585.83
  59.583     0.00     0.08       0.050  O        |        |        |        |     585.83
  59.667     0.00     0.08       0.050  O        |        |        |        |     585.83
  59.750     0.00     0.08       0.049  O        |        |        |        |     585.82
  59.833     0.00     0.08       0.048  O        |        |        |        |     585.82
  59.917     0.00     0.08       0.048  O        |        |        |        |     585.81
  60.000     0.00     0.08       0.047  O        |        |        |        |     585.81
  60.083     0.00     0.07       0.047  O        |        |        |        |     585.81
  60.167     0.00     0.07       0.046  O        |        |        |        |     585.80
  60.250     0.00     0.07       0.046  O        |        |        |        |     585.80
  60.333     0.00     0.07       0.045  O        |        |        |        |     585.80
```

```
60.417     0.00     0.07       0.045  O        |         |         |         |    585.79
60.500     0.00     0.07       0.044  O        |         |         |         |    585.79
60.583     0.00     0.07       0.044  O        |         |         |         |    585.79
60.667     0.00     0.07       0.043  O        |         |         |         |    585.78
60.750     0.00     0.07       0.043  O        |         |         |         |    585.78
60.833     0.00     0.07       0.042  O        |         |         |         |    585.78
60.917     0.00     0.07       0.042  O        |         |         |         |    585.78
61.000     0.00     0.07       0.042  O        |         |         |         |    585.77
61.083     0.00     0.07       0.041  O        |         |         |         |    585.77
61.167     0.00     0.06       0.041  O        |         |         |         |    585.77
61.250     0.00     0.06       0.040  O        |         |         |         |    585.76
61.333     0.00     0.06       0.040  O        |         |         |         |    585.76
61.417     0.00     0.06       0.039  O        |         |         |         |    585.76
61.500     0.00     0.06       0.039  O        |         |         |         |    585.75
61.583     0.00     0.06       0.039  O        |         |         |         |    585.75
61.667     0.00     0.06       0.038  O        |         |         |         |    585.75
61.750     0.00     0.06       0.038  O        |         |         |         |    585.75
61.833     0.00     0.06       0.037  O        |         |         |         |    585.74
61.917     0.00     0.06       0.037  O        |         |         |         |    585.74
62.000     0.00     0.06       0.036  O        |         |         |         |    585.74
62.083     0.00     0.06       0.036  O        |         |         |         |    585.74
62.167     0.00     0.06       0.036  O        |         |         |         |    585.73
62.250     0.00     0.06       0.035  O        |         |         |         |    585.73
62.333     0.00     0.06       0.035  O        |         |         |         |    585.73
62.417     0.00     0.05       0.035  O        |         |         |         |    585.72
62.500     0.00     0.05       0.034  O        |         |         |         |    585.72
62.583     0.00     0.05       0.034  O        |         |         |         |    585.72
62.667     0.00     0.05       0.033  O        |         |         |         |    585.72
62.750     0.00     0.05       0.033  O        |         |         |         |    585.72
62.833     0.00     0.05       0.033  O        |         |         |         |    585.71
62.917     0.00     0.05       0.032  O        |         |         |         |    585.71
63.000     0.00     0.05       0.032  O        |         |         |         |    585.71
63.083     0.00     0.05       0.032  O        |         |         |         |    585.71
63.167     0.00     0.05       0.031  O        |         |         |         |    585.70
63.250     0.00     0.05       0.031  O        |         |         |         |    585.70
63.333     0.00     0.05       0.031  O        |         |         |         |    585.70
63.417     0.00     0.05       0.030  O        |         |         |         |    585.70
63.500     0.00     0.05       0.030  O        |         |         |         |    585.69
63.583     0.00     0.05       0.030  O        |         |         |         |    585.69
63.667     0.00     0.05       0.029  O        |         |         |         |    585.69
63.750     0.00     0.05       0.029  O        |         |         |         |    585.69
63.833     0.00     0.05       0.029  O        |         |         |         |    585.69
63.917     0.00     0.04       0.028  O        |         |         |         |    585.68
64.000     0.00     0.04       0.028  O        |         |         |         |    585.68
64.083     0.00     0.04       0.028  O        |         |         |         |    585.68
64.167     0.00     0.04       0.027  O        |         |         |         |    585.68
64.250     0.00     0.04       0.027  O        |         |         |         |    585.68
64.333     0.00     0.04       0.027  O        |         |         |         |    585.67
64.417     0.00     0.04       0.027  O        |         |         |         |    585.67
64.500     0.00     0.04       0.026  O        |         |         |         |    585.67
64.583     0.00     0.04       0.026  O        |         |         |         |    585.67
64.667     0.00     0.04       0.026  O        |         |         |         |    585.67
64.750     0.00     0.04       0.025  O        |         |         |         |    585.66
64.833     0.00     0.04       0.025  O        |         |         |         |    585.66
64.917     0.00     0.04       0.025  O        |         |         |         |    585.66
65.000     0.00     0.04       0.025  O        |         |         |         |    585.66
65.083     0.00     0.04       0.024  O        |         |         |         |    585.66
```

```
 65.167     0.00     0.04       0.024  O         |         |         |         |      585.65
 65.250     0.00     0.04       0.024  O         |         |         |         |      585.65
 65.333     0.00     0.04       0.024  O         |         |         |         |      585.65
 65.417     0.00     0.04       0.023  O         |         |         |         |      585.65
 65.500     0.00     0.04       0.023  O         |         |         |         |      585.65
 65.583     0.00     0.04       0.023  O         |         |         |         |      585.65
 65.667     0.00     0.04       0.023  O         |         |         |         |      585.64
 65.750     0.00     0.04       0.022  O         |         |         |         |      585.64
 65.833     0.00     0.03       0.022  O         |         |         |         |      585.64
 65.917     0.00     0.03       0.022  O         |         |         |         |      585.64
 66.000     0.00     0.03       0.022  O         |         |         |         |      585.64
 66.083     0.00     0.03       0.021  O         |         |         |         |      585.64
 66.167     0.00     0.03       0.021  O         |         |         |         |      585.64
 66.250     0.00     0.03       0.021  O         |         |         |         |      585.63
 66.333     0.00     0.03       0.021  O         |         |         |         |      585.63
 66.417     0.00     0.03       0.020  O         |         |         |         |      585.63
 66.500     0.00     0.03       0.020  O         |         |         |         |      585.63
 66.583     0.00     0.03       0.020  O         |         |         |         |      585.63
 66.667     0.00     0.03       0.020  O         |         |         |         |      585.63
 66.750     0.00     0.03       0.020  O         |         |         |         |      585.62
 66.833     0.00     0.03       0.019  O         |         |         |         |      585.62
 66.917     0.00     0.03       0.019  O         |         |         |         |      585.62
 67.000     0.00     0.03       0.019  O         |         |         |         |      585.62
 67.083     0.00     0.03       0.019  O         |         |         |         |      585.62
 67.167     0.00     0.03       0.019  O         |         |         |         |      585.62
 67.250     0.00     0.03       0.018  O         |         |         |         |      585.62
 67.333     0.00     0.03       0.018  O         |         |         |         |      585.62
 67.417     0.00     0.03       0.018  O         |         |         |         |      585.61
 67.500     0.00     0.03       0.018  O         |         |         |         |      585.61
 67.583     0.00     0.03       0.018  O         |         |         |         |      585.61
 67.667     0.00     0.03       0.017  O         |         |         |         |      585.61
 67.750     0.00     0.03       0.017  O         |         |         |         |      585.61
 67.833     0.00     0.03       0.017  O         |         |         |         |      585.61
 67.917     0.00     0.03       0.017  O         |         |         |         |      585.61
 68.000     0.00     0.03       0.017  O         |         |         |         |      585.61
 68.083     0.00     0.03       0.016  O         |         |         |         |      585.60
 68.167     0.00     0.03       0.016  O         |         |         |         |      585.60
 68.250     0.00     0.03       0.016  O         |         |         |         |      585.60
 68.333     0.00     0.02       0.016  O         |         |         |         |      585.60
 68.417     0.00     0.02       0.016  O         |         |         |         |      585.60
 68.500     0.00     0.02       0.016  O         |         |         |         |      585.60
 68.583     0.00     0.02       0.015  O         |         |         |         |      585.60
 68.667     0.00     0.02       0.015  O         |         |         |         |      585.60
 68.750     0.00     0.02       0.015  O         |         |         |         |      585.59
 68.833     0.00     0.02       0.015  O         |         |         |         |      585.59
 68.917     0.00     0.02       0.015  O         |         |         |         |      585.59
 69.000     0.00     0.02       0.015  O         |         |         |         |      585.59
 69.083     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.167     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.250     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.333     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.417     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.500     0.00     0.02       0.014  O         |         |         |         |      585.59
 69.583     0.00     0.02       0.014  O         |         |         |         |      585.58
 69.667     0.00     0.02       0.013  O         |         |         |         |      585.58
 69.750     0.00     0.02       0.013  O         |         |         |         |      585.58
 69.833     0.00     0.02       0.013  O         |         |         |         |      585.58
```

```
  69.917     0.00     0.02       0.013  O        |        |        |        |   585.58
  70.000     0.00     0.02       0.013  O        |        |        |        |   585.58
  70.083     0.00     0.02       0.013  O        |        |        |        |   585.58
  70.167     0.00     0.02       0.013  O        |        |        |        |   585.58
  70.250     0.00     0.02       0.012  O        |        |        |        |   585.58
  70.333     0.00     0.02       0.012  O        |        |        |        |   585.58
  70.417     0.00     0.02       0.012  O        |        |        |        |   585.58
  70.500     0.00     0.02       0.012  O        |        |        |        |   585.57
  70.583     0.00     0.02       0.012  O        |        |        |        |   585.57
  70.667     0.00     0.02       0.012  O        |        |        |        |   585.57
  70.750     0.00     0.02       0.012  O        |        |        |        |   585.57
  70.833     0.00     0.02       0.012  O        |        |        |        |   585.57
  70.917     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.000     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.083     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.167     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.250     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.333     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.417     0.00     0.02       0.011  O        |        |        |        |   585.57
  71.500     0.00     0.02       0.011  O        |        |        |        |   585.56
  71.583     0.00     0.02       0.011  O        |        |        |        |   585.56
  71.667     0.00     0.02       0.010  O        |        |        |        |   585.56
  71.750     0.00     0.02       0.010  O        |        |        |        |   585.56
  71.833     0.00     0.02       0.010  O        |        |        |        |   585.56
  71.917     0.00     0.02       0.010  O        |        |        |        |   585.56
  72.000     0.00     0.02       0.010  O        |        |        |        |   585.56
  72.083     0.00     0.02       0.010  O        |        |        |        |   585.56
  72.167     0.00     0.02       0.010  O        |        |        |        |   585.56
  72.250     0.00     0.01       0.010  O        |        |        |        |   585.56
  72.333     0.00     0.01       0.010  O        |        |        |        |   585.56
  72.417     0.00     0.01       0.009  O        |        |        |        |   585.56
  72.500     0.00     0.01       0.009  O        |        |        |        |   585.56
  72.583     0.00     0.01       0.009  O        |        |        |        |   585.56
  72.667     0.00     0.01       0.009  O        |        |        |        |   585.55
  72.750     0.00     0.01       0.009  O        |        |        |        |   585.55
  72.833     0.00     0.01       0.009  O        |        |        |        |   585.55
  72.917     0.00     0.01       0.009  O        |        |        |        |   585.55
  73.000     0.00     0.01       0.009  O        |        |        |        |   585.55
  73.083     0.00     0.01       0.009  O        |        |        |        |   585.55
  73.167     0.00     0.01       0.009  O        |        |        |        |   585.55
  73.250     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.333     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.417     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.500     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.583     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.667     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.750     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.833     0.00     0.01       0.008  O        |        |        |        |   585.55
  73.917     0.00     0.01       0.008  O        |        |        |        |   585.55
  74.000     0.00     0.01       0.008  O        |        |        |        |   585.55
  74.083     0.00     0.01       0.008  O        |        |        |        |   585.54
  74.167     0.00     0.01       0.008  O        |        |        |        |   585.54
  74.250     0.00     0.01       0.007  O        |        |        |        |   585.54
  74.333     0.00     0.01       0.007  O        |        |        |        |   585.54
  74.417     0.00     0.01       0.007  O        |        |        |        |   585.54
  74.500     0.00     0.01       0.007  O        |        |        |        |   585.54
  74.583     0.00     0.01       0.007  O        |        |        |        |   585.54
```

```
74.667     0.00      0.01        0.007  O        |        |        |        |    585.54
74.750     0.00      0.01        0.007  O        |        |        |        |    585.54
74.833     0.00      0.01        0.007  O        |        |        |        |    585.54
74.917     0.00      0.01        0.007  O        |        |        |        |    585.54
75.000     0.00      0.01        0.007  O        |        |        |        |    585.54
75.083     0.00      0.01        0.007  O        |        |        |        |    585.54
75.167     0.00      0.01        0.007  O        |        |        |        |    585.54
75.250     0.00      0.01        0.007  O        |        |        |        |    585.54
75.333     0.00      0.01        0.007  O        |        |        |        |    585.54
75.417     0.00      0.01        0.006  O        |        |        |        |    585.54
75.500     0.00      0.01        0.006  O        |        |        |        |    585.54
75.583     0.00      0.01        0.006  O        |        |        |        |    585.54
75.667     0.00      0.01        0.006  O        |        |        |        |    585.54
75.750     0.00      0.01        0.006  O        |        |        |        |    585.53
75.833     0.00      0.01        0.006  O        |        |        |        |    585.53
75.917     0.00      0.01        0.006  O        |        |        |        |    585.53
76.000     0.00      0.01        0.006  O        |        |        |        |    585.53
76.083     0.00      0.01        0.006  O        |        |        |        |    585.53
76.167     0.00      0.01        0.006  O        |        |        |        |    585.53
76.250     0.00      0.01        0.006  O        |        |        |        |    585.53
76.333     0.00      0.01        0.006  O        |        |        |        |    585.53
76.417     0.00      0.01        0.006  O        |        |        |        |    585.53
76.500     0.00      0.01        0.006  O        |        |        |        |    585.53
76.583     0.00      0.01        0.006  O        |        |        |        |    585.53
76.667     0.00      0.01        0.006  O        |        |        |        |    585.53
76.750     0.00      0.01        0.005  O        |        |        |        |    585.53
76.833     0.00      0.01        0.005  O        |        |        |        |    585.53
76.917     0.00      0.01        0.005  O        |        |        |        |    585.53
77.000     0.00      0.01        0.005  O        |        |        |        |    585.53
77.083     0.00      0.01        0.005  O        |        |        |        |    585.53
77.167     0.00      0.01        0.005  O        |        |        |        |    585.53
77.250     0.00      0.01        0.005  O        |        |        |        |    585.53
77.333     0.00      0.01        0.005  O        |        |        |        |    585.53
77.417     0.00      0.01        0.005  O        |        |        |        |    585.53
77.500     0.00      0.01        0.005  O        |        |        |        |    585.53
77.583     0.00      0.01        0.005  O        |        |        |        |    585.53
77.667     0.00      0.01        0.005  O        |        |        |        |    585.53
77.750     0.00      0.01        0.005  O        |        |        |        |    585.53
77.833     0.00      0.01        0.005  O        |        |        |        |    585.53
77.917     0.00      0.01        0.005  O        |        |        |        |    585.53
78.000     0.00      0.01        0.005  O        |        |        |        |    585.52
78.083     0.00      0.01        0.005  O        |        |        |        |    585.52
78.167     0.00      0.01        0.005  O        |        |        |        |    585.52
78.250     0.00      0.01        0.005  O        |        |        |        |    585.52
78.333     0.00      0.01        0.005  O        |        |        |        |    585.52
78.417     0.00      0.01        0.004  O        |        |        |        |    585.52
78.500     0.00      0.01        0.004  O        |        |        |        |    585.52
78.583     0.00      0.01        0.004  O        |        |        |        |    585.52
78.667     0.00      0.01        0.004  O        |        |        |        |    585.52
78.750     0.00      0.01        0.004  O        |        |        |        |    585.52
78.833     0.00      0.01        0.004  O        |        |        |        |    585.52
78.917     0.00      0.01        0.004  O        |        |        |        |    585.52
79.000     0.00      0.01        0.004  O        |        |        |        |    585.52
79.083     0.00      0.01        0.004  O        |        |        |        |    585.52
79.167     0.00      0.01        0.004  O        |        |        |        |    585.52
79.250     0.00      0.01        0.004  O        |        |        |        |    585.52
79.333     0.00      0.01        0.004  O        |        |        |        |    585.52
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 79.417    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.500    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.583    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.667    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.750    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.833    0.00    0.01      0.004  O         |         |         |         |    585.52
 79.917    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.000    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.083    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.167    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.250    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.333    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.417    0.00    0.01      0.004  O         |         |         |         |    585.52
 80.500    0.00    0.00      0.003  O         |         |         |         |    585.52
 80.583    0.00    0.00      0.003  O         |         |         |         |    585.52
 80.667    0.00    0.00      0.003  O         |         |         |         |    585.52
 80.750    0.00    0.00      0.003  O         |         |         |         |    585.52
 80.833    0.00    0.00      0.003  O         |         |         |         |    585.52
 80.917    0.00    0.00      0.003  O         |         |         |         |    585.52
 81.000    0.00    0.00      0.003  O         |         |         |         |    585.52
 81.083    0.00    0.00      0.003  O         |         |         |         |    585.52
 81.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.250    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.333    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.417    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.500    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.583    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.667    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.750    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.833    0.00    0.00      0.003  O         |         |         |         |    585.51
 81.917    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.000    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.083    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.250    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.333    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.417    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.500    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.583    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.667    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.750    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.833    0.00    0.00      0.003  O         |         |         |         |    585.51
 82.917    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.000    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.083    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.250    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.333    0.00    0.00      0.003  O         |         |         |         |    585.51
 83.417    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.500    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.583    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.667    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.750    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.833    0.00    0.00      0.002  O         |         |         |         |    585.51
 83.917    0.00    0.00      0.002  O         |         |         |         |    585.51
 84.000    0.00    0.00      0.002  O         |         |         |         |    585.51
 84.083    0.00    0.00      0.002  O         |         |         |         |    585.51
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
84.167    0.00    0.00      0.002  O       |       |       |       |   585.51
84.250    0.00    0.00      0.002  O       |       |       |       |   585.51
84.333    0.00    0.00      0.002  O       |       |       |       |   585.51
84.417    0.00    0.00      0.002  O       |       |       |       |   585.51
84.500    0.00    0.00      0.002  O       |       |       |       |   585.51
84.583    0.00    0.00      0.002  O       |       |       |       |   585.51
84.667    0.00    0.00      0.002  O       |       |       |       |   585.51
84.750    0.00    0.00      0.002  O       |       |       |       |   585.51
84.833    0.00    0.00      0.002  O       |       |       |       |   585.51
84.917    0.00    0.00      0.002  O       |       |       |       |   585.51
85.000    0.00    0.00      0.002  O       |       |       |       |   585.51
85.083    0.00    0.00      0.002  O       |       |       |       |   585.51
85.167    0.00    0.00      0.002  O       |       |       |       |   585.51
85.250    0.00    0.00      0.002  O       |       |       |       |   585.51
85.333    0.00    0.00      0.002  O       |       |       |       |   585.51
85.417    0.00    0.00      0.002  O       |       |       |       |   585.51
85.500    0.00    0.00      0.002  O       |       |       |       |   585.51
85.583    0.00    0.00      0.002  O       |       |       |       |   585.51
85.667    0.00    0.00      0.002  O       |       |       |       |   585.51
85.750    0.00    0.00      0.002  O       |       |       |       |   585.51
85.833    0.00    0.00      0.002  O       |       |       |       |   585.51
85.917    0.00    0.00      0.002  O       |       |       |       |   585.51
86.000    0.00    0.00      0.002  O       |       |       |       |   585.51
86.083    0.00    0.00      0.002  O       |       |       |       |   585.51
86.167    0.00    0.00      0.002  O       |       |       |       |   585.51
86.250    0.00    0.00      0.002  O       |       |       |       |   585.51
86.333    0.00    0.00      0.002  O       |       |       |       |   585.51
86.417    0.00    0.00      0.002  O       |       |       |       |   585.51
86.500    0.00    0.00      0.002  O       |       |       |       |   585.51
86.583    0.00    0.00      0.002  O       |       |       |       |   585.51
86.667    0.00    0.00      0.002  O       |       |       |       |   585.51
86.750    0.00    0.00      0.002  O       |       |       |       |   585.50
86.833    0.00    0.00      0.002  O       |       |       |       |   585.50
86.917    0.00    0.00      0.002  O       |       |       |       |   585.50
87.000    0.00    0.00      0.002  O       |       |       |       |   585.50
87.083    0.00    0.00      0.002  O       |       |       |       |   585.50
87.167    0.00    0.00      0.002  O       |       |       |       |   585.50
87.250    0.00    0.00      0.002  O       |       |       |       |   585.50
87.333    0.00    0.00      0.002  O       |       |       |       |   585.50
87.417    0.00    0.00      0.002  O       |       |       |       |   585.50
87.500    0.00    0.00      0.002  O       |       |       |       |   585.50
87.583    0.00    0.00      0.002  O       |       |       |       |   585.50
87.667    0.00    0.00      0.002  O       |       |       |       |   585.50
87.750    0.00    0.00      0.002  O       |       |       |       |   585.50
87.833    0.00    0.00      0.002  O       |       |       |       |   585.50
87.917    0.00    0.00      0.002  O       |       |       |       |   585.50
88.000    0.00    0.00      0.002  O       |       |       |       |   585.50
88.083    0.00    0.00      0.002  O       |       |       |       |   585.50
88.167    0.00    0.00      0.002  O       |       |       |       |   585.50
88.250    0.00    0.00      0.001  O       |       |       |       |   585.50
88.333    0.00    0.00      0.001  O       |       |       |       |   585.50
88.417    0.00    0.00      0.001  O       |       |       |       |   585.50
88.500    0.00    0.00      0.001  O       |       |       |       |   585.50
88.583    0.00    0.00      0.001  O       |       |       |       |   585.50
88.667    0.00    0.00      0.001  O       |       |       |       |   585.50
88.750    0.00    0.00      0.001  O       |       |       |       |   585.50
88.833    0.00    0.00      0.001  O       |       |       |       |   585.50
```

```
88.917    0.00    0.00      0.001  O       |       |       |       |   585.50
89.000    0.00    0.00      0.001  O       |       |       |       |   585.50
89.083    0.00    0.00      0.001  O       |       |       |       |   585.50
89.167    0.00    0.00      0.001  O       |       |       |       |   585.50
89.250    0.00    0.00      0.001  O       |       |       |       |   585.50
89.333    0.00    0.00      0.001  O       |       |       |       |   585.50
89.417    0.00    0.00      0.001  O       |       |       |       |   585.50
89.500    0.00    0.00      0.001  O       |       |       |       |   585.50
89.583    0.00    0.00      0.001  O       |       |       |       |   585.50
89.667    0.00    0.00      0.001  O       |       |       |       |   585.50
89.750    0.00    0.00      0.001  O       |       |       |       |   585.50
89.833    0.00    0.00      0.001  O       |       |       |       |   585.50
89.917    0.00    0.00      0.001  O       |       |       |       |   585.50
90.000    0.00    0.00      0.001  O       |       |       |       |   585.50
90.083    0.00    0.00      0.001  O       |       |       |       |   585.50
90.167    0.00    0.00      0.001  O       |       |       |       |   585.50
90.250    0.00    0.00      0.001  O       |       |       |       |   585.50
90.333    0.00    0.00      0.001  O       |       |       |       |   585.50
90.417    0.00    0.00      0.001  O       |       |       |       |   585.50
90.500    0.00    0.00      0.001  O       |       |       |       |   585.50
90.583    0.00    0.00      0.001  O       |       |       |       |   585.50
90.667    0.00    0.00      0.001  O       |       |       |       |   585.50
90.750    0.00    0.00      0.001  O       |       |       |       |   585.50
90.833    0.00    0.00      0.001  O       |       |       |       |   585.50
90.917    0.00    0.00      0.001  O       |       |       |       |   585.50
91.000    0.00    0.00      0.001  O       |       |       |       |   585.50
91.083    0.00    0.00      0.001  O       |       |       |       |   585.50
91.167    0.00    0.00      0.001  O       |       |       |       |   585.50
91.250    0.00    0.00      0.001  O       |       |       |       |   585.50
91.333    0.00    0.00      0.001  O       |       |       |       |   585.50
91.417    0.00    0.00      0.001  O       |       |       |       |   585.50
91.500    0.00    0.00      0.001  O       |       |       |       |   585.50
91.583    0.00    0.00      0.001  O       |       |       |       |   585.50
91.667    0.00    0.00      0.001  O       |       |       |       |   585.50
91.750    0.00    0.00      0.001  O       |       |       |       |   585.50
91.833    0.00    0.00      0.001  O       |       |       |       |   585.50
91.917    0.00    0.00      0.001  O       |       |       |       |   585.50
92.000    0.00    0.00      0.001  O       |       |       |       |   585.50
92.083    0.00    0.00      0.001  O       |       |       |       |   585.50
92.167    0.00    0.00      0.001  O       |       |       |       |   585.50
92.250    0.00    0.00      0.001  O       |       |       |       |   585.50
92.333    0.00    0.00      0.001  O       |       |       |       |   585.50
92.417    0.00    0.00      0.001  O       |       |       |       |   585.50
92.500    0.00    0.00      0.001  O       |       |       |       |   585.50
92.583    0.00    0.00      0.001  O       |       |       |       |   585.50
92.667    0.00    0.00      0.001  O       |       |       |       |   582.90

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =  1112
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.750 (CFS)
                 Total volume =       2.216 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
                     FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                        Study date: 10/28/21


---------------------------------------------------------------------
```

TTM 31589
5-Year 1-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION *********************

            From study/file name: tr31589prop15.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    20
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       36.852 (CFS)
            Total volume =       1.088 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 20
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000       0.000
  585.500      0.001      0.001      0.001       0.001
  586.500      0.150      0.240      0.149       0.151
```

```
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     ----------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     -----------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     -----------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       9.2   18.43   27.64   36.85 (Ft.)
 0.083    0.98    0.00      0.003  O       |       |       |       |   585.52
 0.167    3.48    0.03      0.019  O  I    |       |       |       |   585.62
 0.250    4.50    0.07      0.046  O  I    |       |       |       |   585.80
 0.333    5.30    0.13      0.079  O   I   |       |       |       |   586.02
 0.417    5.83    0.19      0.116  O    I  |       |       |       |   586.27
 0.500    6.66    0.25      0.158  O    I  |       |       |       |   586.55
 0.583    7.66    0.28      0.205  O     I |       |       |       |   586.87
 0.667    9.29    0.33      0.261  O       I       |       |       |   587.24
 0.750   12.83    0.38      0.335  O       |  I    |       |       |   587.73
 0.833   25.67    0.45      0.465  O       |       |     I |       |   588.60
 0.917   36.85    0.54      0.677  O       |       |       |       I   589.65
 1.000   17.46    0.59      0.860  O       |      I|       |       |   590.00
 1.083   10.12    0.62      0.951  O       I       |       |       |   590.17
 1.167    4.93    0.64      0.998  O   I   |       |       |       |   590.27
 1.250    2.90    0.65      1.021  O I     |       |       |       |   590.31
 1.333    1.75    0.65      1.032  OI      |       |       |       |   590.33
 1.417    1.06    0.65      1.037  O       |       |       |       |   590.34
 1.500    0.51    0.65      1.038  O       |       |       |       |   590.34
 1.583    0.11    0.65      1.036  O       |       |       |       |   590.34
 1.667    0.03    0.65      1.032  O       |       |       |       |   590.33
 1.750    0.00    0.65      1.027  O       |       |       |       |   590.32
 1.833    0.00    0.65      1.023  O       |       |       |       |   590.31
 1.917    0.00    0.65      1.019  O       |       |       |       |   590.30
 2.000    0.00    0.65      1.014  O       |       |       |       |   590.30
 2.083    0.00    0.64      1.010  O       |       |       |       |   590.29
 2.167    0.00    0.64      1.005  O       |       |       |       |   590.28
 2.250    0.00    0.64      1.001  O       |       |       |       |   590.27
 2.333    0.00    0.64      0.996  O       |       |       |       |   590.26
 2.417    0.00    0.64      0.992  O       |       |       |       |   590.25
 2.500    0.00    0.64      0.988  O       |       |       |       |   590.25
 2.583    0.00    0.64      0.983  O       |       |       |       |   590.24
 2.667    0.00    0.63      0.979  O       |       |       |       |   590.23
 2.750    0.00    0.63      0.974  O       |       |       |       |   590.22
 2.833    0.00    0.63      0.970  O       |       |       |       |   590.21
 2.917    0.00    0.63      0.966  O       |       |       |       |   590.20
 3.000    0.00    0.63      0.961  O       |       |       |       |   590.20
 3.083    0.00    0.63      0.957  O       |       |       |       |   590.19
 3.167    0.00    0.63      0.953  O       |       |       |       |   590.18
 3.250    0.00    0.62      0.949  O       |       |       |       |   590.17
 3.333    0.00    0.62      0.944  O       |       |       |       |   590.16
 3.417    0.00    0.62      0.940  O       |       |       |       |   590.15
 3.500    0.00    0.62      0.936  O       |       |       |       |   590.15
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
   3.583    0.00    0.62      0.931  O        |       |       |       |    590.14
   3.667    0.00    0.62      0.927  O        |       |       |       |    590.13
   3.750    0.00    0.62      0.923  O        |       |       |       |    590.12
   3.833    0.00    0.61      0.919  O        |       |       |       |    590.11
   3.917    0.00    0.61      0.914  O        |       |       |       |    590.10
   4.000    0.00    0.61      0.910  O        |       |       |       |    590.10
   4.083    0.00    0.61      0.906  O        |       |       |       |    590.09
   4.167    0.00    0.61      0.902  O        |       |       |       |    590.08
   4.250    0.00    0.61      0.898  O        |       |       |       |    590.07
   4.333    0.00    0.61      0.893  O        |       |       |       |    590.06
   4.417    0.00    0.60      0.889  O        |       |       |       |    590.06
   4.500    0.00    0.60      0.885  O        |       |       |       |    590.05
   4.583    0.00    0.60      0.881  O        |       |       |       |    590.04
   4.667    0.00    0.60      0.877  O        |       |       |       |    590.03
   4.750    0.00    0.60      0.873  O        |       |       |       |    590.02
   4.833    0.00    0.60      0.869  O        |       |       |       |    590.02
   4.917    0.00    0.60      0.864  O        |       |       |       |    590.01
   5.000    0.00    0.60      0.860  O        |       |       |       |    590.00
   5.083    0.00    0.59      0.856  O        |       |       |       |    589.99
   5.167    0.00    0.59      0.852  O        |       |       |       |    589.98
   5.250    0.00    0.59      0.848  O        |       |       |       |    589.98
   5.333    0.00    0.59      0.844  O        |       |       |       |    589.97
   5.417    0.00    0.59      0.840  O        |       |       |       |    589.96
   5.500    0.00    0.59      0.836  O        |       |       |       |    589.95
   5.583    0.00    0.59      0.832  O        |       |       |       |    589.95
   5.667    0.00    0.58      0.828  O        |       |       |       |    589.94
   5.750    0.00    0.58      0.824  O        |       |       |       |    589.93
   5.833    0.00    0.58      0.820  O        |       |       |       |    589.92
   5.917    0.00    0.58      0.816  O        |       |       |       |    589.92
   6.000    0.00    0.58      0.812  O        |       |       |       |    589.91
   6.083    0.00    0.58      0.808  O        |       |       |       |    589.90
   6.167    0.00    0.58      0.804  O        |       |       |       |    589.89
   6.250    0.00    0.58      0.800  O        |       |       |       |    589.88
   6.333    0.00    0.57      0.796  O        |       |       |       |    589.88
   6.417    0.00    0.57      0.792  O        |       |       |       |    589.87
   6.500    0.00    0.57      0.788  O        |       |       |       |    589.86
   6.583    0.00    0.57      0.784  O        |       |       |       |    589.85
   6.667    0.00    0.57      0.780  O        |       |       |       |    589.85
   6.750    0.00    0.57      0.776  O        |       |       |       |    589.84
   6.833    0.00    0.57      0.772  O        |       |       |       |    589.83
   6.917    0.00    0.57      0.769  O        |       |       |       |    589.82
   7.000    0.00    0.56      0.765  O        |       |       |       |    589.82
   7.083    0.00    0.56      0.761  O        |       |       |       |    589.81
   7.167    0.00    0.56      0.757  O        |       |       |       |    589.80
   7.250    0.00    0.56      0.753  O        |       |       |       |    589.79
   7.333    0.00    0.56      0.749  O        |       |       |       |    589.79
   7.417    0.00    0.56      0.745  O        |       |       |       |    589.78
   7.500    0.00    0.56      0.741  O        |       |       |       |    589.77
   7.583    0.00    0.56      0.738  O        |       |       |       |    589.76
   7.667    0.00    0.55      0.734  O        |       |       |       |    589.76
   7.750    0.00    0.55      0.730  O        |       |       |       |    589.75
   7.833    0.00    0.55      0.726  O        |       |       |       |    589.74
   7.917    0.00    0.55      0.722  O        |       |       |       |    589.74
   8.000    0.00    0.55      0.719  O        |       |       |       |    589.73
   8.083    0.00    0.55      0.715  O        |       |       |       |    589.72
   8.167    0.00    0.55      0.711  O        |       |       |       |    589.71
   8.250    0.00    0.55      0.707  O        |       |       |       |    589.71
```

```
    8.333     0.00     0.54       0.704  O        |         |         |         |     589.70
    8.417     0.00     0.54       0.700  O        |         |         |         |     589.69
    8.500     0.00     0.54       0.696  O        |         |         |         |     589.68
    8.583     0.00     0.54       0.692  O        |         |         |         |     589.68
    8.667     0.00     0.54       0.689  O        |         |         |         |     589.67
    8.750     0.00     0.54       0.685  O        |         |         |         |     589.66
    8.833     0.00     0.54       0.681  O        |         |         |         |     589.66
    8.917     0.00     0.54       0.678  O        |         |         |         |     589.65
    9.000     0.00     0.53       0.674  O        |         |         |         |     589.64
    9.083     0.00     0.53       0.670  O        |         |         |         |     589.64
    9.167     0.00     0.53       0.667  O        |         |         |         |     589.63
    9.250     0.00     0.53       0.663  O        |         |         |         |     589.62
    9.333     0.00     0.53       0.659  O        |         |         |         |     589.61
    9.417     0.00     0.53       0.656  O        |         |         |         |     589.61
    9.500     0.00     0.53       0.652  O        |         |         |         |     589.60
    9.583     0.00     0.53       0.648  O        |         |         |         |     589.59
    9.667     0.00     0.52       0.645  O        |         |         |         |     589.59
    9.750     0.00     0.52       0.641  O        |         |         |         |     589.58
    9.833     0.00     0.52       0.638  O        |         |         |         |     589.57
    9.917     0.00     0.52       0.634  O        |         |         |         |     589.57
   10.000     0.00     0.52       0.630  O        |         |         |         |     589.56
   10.083     0.00     0.52       0.627  O        |         |         |         |     589.55
   10.167     0.00     0.52       0.623  O        |         |         |         |     589.54
   10.250     0.00     0.52       0.620  O        |         |         |         |     589.54
   10.333     0.00     0.52       0.616  O        |         |         |         |     589.53
   10.417     0.00     0.51       0.613  O        |         |         |         |     589.52
   10.500     0.00     0.51       0.609  O        |         |         |         |     589.52
   10.583     0.00     0.51       0.605  O        |         |         |         |     589.51
   10.667     0.00     0.51       0.602  O        |         |         |         |     589.50
   10.750     0.00     0.51       0.598  O        |         |         |         |     589.49
   10.833     0.00     0.51       0.595  O        |         |         |         |     589.47
   10.917     0.00     0.51       0.591  O        |         |         |         |     589.44
   11.000     0.00     0.50       0.588  O        |         |         |         |     589.42
   11.083     0.00     0.50       0.585  O        |         |         |         |     589.40
   11.167     0.00     0.50       0.581  O        |         |         |         |     589.37
   11.250     0.00     0.50       0.578  O        |         |         |         |     589.35
   11.333     0.00     0.50       0.574  O        |         |         |         |     589.33
   11.417     0.00     0.50       0.571  O        |         |         |         |     589.30
   11.500     0.00     0.49       0.567  O        |         |         |         |     589.28
   11.583     0.00     0.49       0.564  O        |         |         |         |     589.26
   11.667     0.00     0.49       0.561  O        |         |         |         |     589.24
   11.750     0.00     0.49       0.557  O        |         |         |         |     589.21
   11.833     0.00     0.49       0.554  O        |         |         |         |     589.19
   11.917     0.00     0.49       0.550  O        |         |         |         |     589.17
   12.000     0.00     0.49       0.547  O        |         |         |         |     589.15
   12.083     0.00     0.48       0.544  O        |         |         |         |     589.12
   12.167     0.00     0.48       0.540  O        |         |         |         |     589.10
   12.250     0.00     0.48       0.537  O        |         |         |         |     589.08
   12.333     0.00     0.48       0.534  O        |         |         |         |     589.06
   12.417     0.00     0.48       0.530  O        |         |         |         |     589.04
   12.500     0.00     0.48       0.527  O        |         |         |         |     589.01
   12.583     0.00     0.47       0.524  O        |         |         |         |     588.99
   12.667     0.00     0.47       0.521  O        |         |         |         |     588.97
   12.750     0.00     0.47       0.517  O        |         |         |         |     588.95
   12.833     0.00     0.47       0.514  O        |         |         |         |     588.93
   12.917     0.00     0.47       0.511  O        |         |         |         |     588.91
   13.000     0.00     0.47       0.508  O        |         |         |         |     588.88
```

```
13.083    0.00    0.47     0.505  O        |       |       |       |     588.86
13.167    0.00    0.46     0.501  O        |       |       |       |     588.84
13.250    0.00    0.46     0.498  O        |       |       |       |     588.82
13.333    0.00    0.46     0.495  O        |       |       |       |     588.80
13.417    0.00    0.46     0.492  O        |       |       |       |     588.78
13.500    0.00    0.46     0.489  O        |       |       |       |     588.76
13.583    0.00    0.46     0.485  O        |       |       |       |     588.74
13.667    0.00    0.46     0.482  O        |       |       |       |     588.72
13.750    0.00    0.45     0.479  O        |       |       |       |     588.69
13.833    0.00    0.45     0.476  O        |       |       |       |     588.67
13.917    0.00    0.45     0.473  O        |       |       |       |     588.65
14.000    0.00    0.45     0.470  O        |       |       |       |     588.63
14.083    0.00    0.45     0.467  O        |       |       |       |     588.61
14.167    0.00    0.45     0.464  O        |       |       |       |     588.59
14.250    0.00    0.44     0.461  O        |       |       |       |     588.57
14.333    0.00    0.44     0.458  O        |       |       |       |     588.55
14.417    0.00    0.44     0.455  O        |       |       |       |     588.53
14.500    0.00    0.44     0.451  O        |       |       |       |     588.51
14.583    0.00    0.44     0.448  O        |       |       |       |     588.49
14.667    0.00    0.44     0.445  O        |       |       |       |     588.47
14.750    0.00    0.44     0.442  O        |       |       |       |     588.45
14.833    0.00    0.43     0.439  O        |       |       |       |     588.43
14.917    0.00    0.43     0.436  O        |       |       |       |     588.41
15.000    0.00    0.43     0.433  O        |       |       |       |     588.39
15.083    0.00    0.43     0.431  O        |       |       |       |     588.37
15.167    0.00    0.43     0.428  O        |       |       |       |     588.35
15.250    0.00    0.43     0.425  O        |       |       |       |     588.33
15.333    0.00    0.42     0.422  O        |       |       |       |     588.31
15.417    0.00    0.42     0.419  O        |       |       |       |     588.29
15.500    0.00    0.42     0.416  O        |       |       |       |     588.27
15.583    0.00    0.42     0.413  O        |       |       |       |     588.25
15.667    0.00    0.42     0.410  O        |       |       |       |     588.23
15.750    0.00    0.42     0.407  O        |       |       |       |     588.21
15.833    0.00    0.42     0.404  O        |       |       |       |     588.20
15.917    0.00    0.41     0.401  O        |       |       |       |     588.18
16.000    0.00    0.41     0.399  O        |       |       |       |     588.16
16.083    0.00    0.41     0.396  O        |       |       |       |     588.14
16.167    0.00    0.41     0.393  O        |       |       |       |     588.12
16.250    0.00    0.41     0.390  O        |       |       |       |     588.10
16.333    0.00    0.41     0.387  O        |       |       |       |     588.08
16.417    0.00    0.41     0.385  O        |       |       |       |     588.06
16.500    0.00    0.40     0.382  O        |       |       |       |     588.05
16.583    0.00    0.40     0.379  O        |       |       |       |     588.03
16.667    0.00    0.40     0.376  O        |       |       |       |     588.01
16.750    0.00    0.40     0.373  O        |       |       |       |     587.99
16.833    0.00    0.40     0.371  O        |       |       |       |     587.97
16.917    0.00    0.40     0.368  O        |       |       |       |     587.95
17.000    0.00    0.39     0.365  O        |       |       |       |     587.94
17.083    0.00    0.39     0.363  O        |       |       |       |     587.92
17.167    0.00    0.39     0.360  O        |       |       |       |     587.90
17.250    0.00    0.39     0.357  O        |       |       |       |     587.88
17.333    0.00    0.39     0.354  O        |       |       |       |     587.86
17.417    0.00    0.39     0.352  O        |       |       |       |     587.85
17.500    0.00    0.39     0.349  O        |       |       |       |     587.83
17.583    0.00    0.38     0.346  O        |       |       |       |     587.81
17.667    0.00    0.38     0.344  O        |       |       |       |     587.79
17.750    0.00    0.38     0.341  O        |       |       |       |     587.77
```

```
 17.833    0.00    0.38      0.339  O        |        |        |        |    587.76
 17.917    0.00    0.38      0.336  O        |        |        |        |    587.74
 18.000    0.00    0.38      0.333  O        |        |        |        |    587.72
 18.083    0.00    0.38      0.331  O        |        |        |        |    587.70
 18.167    0.00    0.38      0.328  O        |        |        |        |    587.69
 18.250    0.00    0.37      0.326  O        |        |        |        |    587.67
 18.333    0.00    0.37      0.323  O        |        |        |        |    587.65
 18.417    0.00    0.37      0.320  O        |        |        |        |    587.64
 18.500    0.00    0.37      0.318  O        |        |        |        |    587.62
 18.583    0.00    0.37      0.315  O        |        |        |        |    587.60
 18.667    0.00    0.37      0.313  O        |        |        |        |    587.59
 18.750    0.00    0.37      0.310  O        |        |        |        |    587.57
 18.833    0.00    0.36      0.308  O        |        |        |        |    587.55
 18.917    0.00    0.36      0.305  O        |        |        |        |    587.54
 19.000    0.00    0.36      0.303  O        |        |        |        |    587.52
 19.083    0.00    0.36      0.300  O        |        |        |        |    587.50
 19.167    0.00    0.36      0.298  O        |        |        |        |    587.49
 19.250    0.00    0.36      0.295  O        |        |        |        |    587.47
 19.333    0.00    0.35      0.293  O        |        |        |        |    587.45
 19.417    0.00    0.35      0.290  O        |        |        |        |    587.44
 19.500    0.00    0.35      0.288  O        |        |        |        |    587.42
 19.583    0.00    0.35      0.286  O        |        |        |        |    587.40
 19.667    0.00    0.35      0.283  O        |        |        |        |    587.39
 19.750    0.00    0.34      0.281  O        |        |        |        |    587.37
 19.833    0.00    0.34      0.279  O        |        |        |        |    587.36
 19.917    0.00    0.34      0.276  O        |        |        |        |    587.34
 20.000    0.00    0.34      0.274  O        |        |        |        |    587.33
 20.083    0.00    0.34      0.271  O        |        |        |        |    587.31
 20.167    0.00    0.34      0.269  O        |        |        |        |    587.29
 20.250    0.00    0.33      0.267  O        |        |        |        |    587.28
 20.333    0.00    0.33      0.265  O        |        |        |        |    587.26
 20.417    0.00    0.33      0.262  O        |        |        |        |    587.25
 20.500    0.00    0.33      0.260  O        |        |        |        |    587.23
 20.583    0.00    0.33      0.258  O        |        |        |        |    587.22
 20.667    0.00    0.32      0.256  O        |        |        |        |    587.20
 20.750    0.00    0.32      0.253  O        |        |        |        |    587.19
 20.833    0.00    0.32      0.251  O        |        |        |        |    587.17
 20.917    0.00    0.32      0.249  O        |        |        |        |    587.16
 21.000    0.00    0.32      0.247  O        |        |        |        |    587.14
 21.083    0.00    0.32      0.245  O        |        |        |        |    587.13
 21.167    0.00    0.31      0.242  O        |        |        |        |    587.12
 21.250    0.00    0.31      0.240  O        |        |        |        |    587.10
 21.333    0.00    0.31      0.238  O        |        |        |        |    587.09
 21.417    0.00    0.31      0.236  O        |        |        |        |    587.07
 21.500    0.00    0.31      0.234  O        |        |        |        |    587.06
 21.583    0.00    0.31      0.232  O        |        |        |        |    587.04
 21.667    0.00    0.30      0.230  O        |        |        |        |    587.03
 21.750    0.00    0.30      0.228  O        |        |        |        |    587.02
 21.833    0.00    0.30      0.225  O        |        |        |        |    587.00
 21.917    0.00    0.30      0.223  O        |        |        |        |    586.99
 22.000    0.00    0.30      0.221  O        |        |        |        |    586.98
 22.083    0.00    0.30      0.219  O        |        |        |        |    586.96
 22.167    0.00    0.29      0.217  O        |        |        |        |    586.95
 22.250    0.00    0.29      0.215  O        |        |        |        |    586.93
 22.333    0.00    0.29      0.213  O        |        |        |        |    586.92
 22.417    0.00    0.29      0.211  O        |        |        |        |    586.91
 22.500    0.00    0.29      0.209  O        |        |        |        |    586.90
```

```
22.583    0.00    0.29      0.207  O       |       |       |       |   586.88
22.667    0.00    0.28      0.205  O       |       |       |       |   586.87
22.750    0.00    0.28      0.203  O       |       |       |       |   586.86
22.833    0.00    0.28      0.201  O       |       |       |       |   586.84
22.917    0.00    0.28      0.199  O       |       |       |       |   586.83
23.000    0.00    0.28      0.198  O       |       |       |       |   586.82
23.083    0.00    0.28      0.196  O       |       |       |       |   586.80
23.167    0.00    0.28      0.194  O       |       |       |       |   586.79
23.250    0.00    0.27      0.192  O       |       |       |       |   586.78
23.333    0.00    0.27      0.190  O       |       |       |       |   586.77
23.417    0.00    0.27      0.188  O       |       |       |       |   586.75
23.500    0.00    0.27      0.186  O       |       |       |       |   586.74
23.583    0.00    0.27      0.184  O       |       |       |       |   586.73
23.667    0.00    0.27      0.183  O       |       |       |       |   586.72
23.750    0.00    0.26      0.181  O       |       |       |       |   586.71
23.833    0.00    0.26      0.179  O       |       |       |       |   586.69
23.917    0.00    0.26      0.177  O       |       |       |       |   586.68
24.000    0.00    0.26      0.175  O       |       |       |       |   586.67
24.083    0.00    0.26      0.174  O       |       |       |       |   586.66
24.167    0.00    0.26      0.172  O       |       |       |       |   586.65
24.250    0.00    0.26      0.170  O       |       |       |       |   586.63
24.333    0.00    0.25      0.168  O       |       |       |       |   586.62
24.417    0.00    0.25      0.166  O       |       |       |       |   586.61
24.500    0.00    0.25      0.165  O       |       |       |       |   586.60
24.583    0.00    0.25      0.163  O       |       |       |       |   586.59
24.667    0.00    0.25      0.161  O       |       |       |       |   586.58
24.750    0.00    0.25      0.160  O       |       |       |       |   586.56
24.833    0.00    0.25      0.158  O       |       |       |       |   586.55
24.917    0.00    0.24      0.156  O       |       |       |       |   586.54
25.000    0.00    0.24      0.155  O       |       |       |       |   586.53
25.083    0.00    0.24      0.153  O       |       |       |       |   586.52
25.167    0.00    0.24      0.151  O       |       |       |       |   586.51
25.250    0.00    0.24      0.150  O       |       |       |       |   586.50
25.333    0.00    0.24      0.148  O       |       |       |       |   586.49
25.417    0.00    0.23      0.146  O       |       |       |       |   586.47
25.500    0.00    0.23      0.145  O       |       |       |       |   586.46
25.583    0.00    0.23      0.143  O       |       |       |       |   586.45
25.667    0.00    0.23      0.142  O       |       |       |       |   586.44
25.750    0.00    0.22      0.140  O       |       |       |       |   586.43
25.833    0.00    0.22      0.138  O       |       |       |       |   586.42
25.917    0.00    0.22      0.137  O       |       |       |       |   586.41
26.000    0.00    0.22      0.135  O       |       |       |       |   586.40
26.083    0.00    0.21      0.134  O       |       |       |       |   586.39
26.167    0.00    0.21      0.132  O       |       |       |       |   586.38
26.250    0.00    0.21      0.131  O       |       |       |       |   586.37
26.333    0.00    0.21      0.130  O       |       |       |       |   586.36
26.417    0.00    0.20      0.128  O       |       |       |       |   586.35
26.500    0.00    0.20      0.127  O       |       |       |       |   586.34
26.583    0.00    0.20      0.125  O       |       |       |       |   586.33
26.667    0.00    0.20      0.124  O       |       |       |       |   586.33
26.750    0.00    0.20      0.123  O       |       |       |       |   586.32
26.833    0.00    0.19      0.121  O       |       |       |       |   586.31
26.917    0.00    0.19      0.120  O       |       |       |       |   586.30
27.000    0.00    0.19      0.119  O       |       |       |       |   586.29
27.083    0.00    0.19      0.117  O       |       |       |       |   586.28
27.167    0.00    0.19      0.116  O       |       |       |       |   586.27
27.250    0.00    0.18      0.115  O       |       |       |       |   586.26
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 27.333    0.00    0.18     0.114  O        |        |        |        |    586.26
 27.417    0.00    0.18     0.112  O        |        |        |        |    586.25
 27.500    0.00    0.18     0.111  O        |        |        |        |    586.24
 27.583    0.00    0.18     0.110  O        |        |        |        |    586.23
 27.667    0.00    0.17     0.109  O        |        |        |        |    586.22
 27.750    0.00    0.17     0.107  O        |        |        |        |    586.21
 27.833    0.00    0.17     0.106  O        |        |        |        |    586.21
 27.917    0.00    0.17     0.105  O        |        |        |        |    586.20
 28.000    0.00    0.17     0.104  O        |        |        |        |    586.19
 28.083    0.00    0.16     0.103  O        |        |        |        |    586.18
 28.167    0.00    0.16     0.102  O        |        |        |        |    586.18
 28.250    0.00    0.16     0.101  O        |        |        |        |    586.17
 28.333    0.00    0.16     0.099  O        |        |        |        |    586.16
 28.417    0.00    0.16     0.098  O        |        |        |        |    586.15
 28.500    0.00    0.16     0.097  O        |        |        |        |    586.15
 28.583    0.00    0.15     0.096  O        |        |        |        |    586.14
 28.667    0.00    0.15     0.095  O        |        |        |        |    586.13
 28.750    0.00    0.15     0.094  O        |        |        |        |    586.13
 28.833    0.00    0.15     0.093  O        |        |        |        |    586.12
 28.917    0.00    0.15     0.092  O        |        |        |        |    586.11
 29.000    0.00    0.15     0.091  O        |        |        |        |    586.10
 29.083    0.00    0.14     0.090  O        |        |        |        |    586.10
 29.167    0.00    0.14     0.089  O        |        |        |        |    586.09
 29.250    0.00    0.14     0.088  O        |        |        |        |    586.08
 29.333    0.00    0.14     0.087  O        |        |        |        |    586.08
 29.417    0.00    0.14     0.086  O        |        |        |        |    586.07
 29.500    0.00    0.14     0.085  O        |        |        |        |    586.07
 29.583    0.00    0.13     0.084  O        |        |        |        |    586.06
 29.667    0.00    0.13     0.083  O        |        |        |        |    586.05
 29.750    0.00    0.13     0.083  O        |        |        |        |    586.05
 29.833    0.00    0.13     0.082  O        |        |        |        |    586.04
 29.917    0.00    0.13     0.081  O        |        |        |        |    586.04
 30.000    0.00    0.13     0.080  O        |        |        |        |    586.03
 30.083    0.00    0.13     0.079  O        |        |        |        |    586.02
 30.167    0.00    0.12     0.078  O        |        |        |        |    586.02
 30.250    0.00    0.12     0.077  O        |        |        |        |    586.01
 30.333    0.00    0.12     0.076  O        |        |        |        |    586.01
 30.417    0.00    0.12     0.076  O        |        |        |        |    586.00
 30.500    0.00    0.12     0.075  O        |        |        |        |    585.99
 30.583    0.00    0.12     0.074  O        |        |        |        |    585.99
 30.667    0.00    0.12     0.073  O        |        |        |        |    585.98
 30.750    0.00    0.12     0.072  O        |        |        |        |    585.98
 30.833    0.00    0.11     0.072  O        |        |        |        |    585.97
 30.917    0.00    0.11     0.071  O        |        |        |        |    585.97
 31.000    0.00    0.11     0.070  O        |        |        |        |    585.96
 31.083    0.00    0.11     0.069  O        |        |        |        |    585.96
 31.167    0.00    0.11     0.068  O        |        |        |        |    585.95
 31.250    0.00    0.11     0.068  O        |        |        |        |    585.95
 31.333    0.00    0.11     0.067  O        |        |        |        |    585.94
 31.417    0.00    0.11     0.066  O        |        |        |        |    585.94
 31.500    0.00    0.10     0.066  O        |        |        |        |    585.93
 31.583    0.00    0.10     0.065  O        |        |        |        |    585.93
 31.667    0.00    0.10     0.064  O        |        |        |        |    585.92
 31.750    0.00    0.10     0.063  O        |        |        |        |    585.92
 31.833    0.00    0.10     0.063  O        |        |        |        |    585.91
 31.917    0.00    0.10     0.062  O        |        |        |        |    585.91
 32.000    0.00    0.10     0.061  O        |        |        |        |    585.90
```

```
   32.083     0.00     0.10       0.061  O        |         |         |         |    585.90
   32.167     0.00     0.10       0.060  O        |         |         |         |    585.90
   32.250     0.00     0.09       0.059  O        |         |         |         |    585.89
   32.333     0.00     0.09       0.059  O        |         |         |         |    585.89
   32.417     0.00     0.09       0.058  O        |         |         |         |    585.88
   32.500     0.00     0.09       0.057  O        |         |         |         |    585.88
   32.583     0.00     0.09       0.057  O        |         |         |         |    585.87
   32.667     0.00     0.09       0.056  O        |         |         |         |    585.87
   32.750     0.00     0.09       0.056  O        |         |         |         |    585.87
   32.833     0.00     0.09       0.055  O        |         |         |         |    585.86
   32.917     0.00     0.09       0.054  O        |         |         |         |    585.86
   33.000     0.00     0.09       0.054  O        |         |         |         |    585.85
   33.083     0.00     0.08       0.053  O        |         |         |         |    585.85
   33.167     0.00     0.08       0.053  O        |         |         |         |    585.85
   33.250     0.00     0.08       0.052  O        |         |         |         |    585.84
   33.333     0.00     0.08       0.051  O        |         |         |         |    585.84
   33.417     0.00     0.08       0.051  O        |         |         |         |    585.83
   33.500     0.00     0.08       0.050  O        |         |         |         |    585.83
   33.583     0.00     0.08       0.050  O        |         |         |         |    585.83
   33.667     0.00     0.08       0.049  O        |         |         |         |    585.82
   33.750     0.00     0.08       0.049  O        |         |         |         |    585.82
   33.833     0.00     0.08       0.048  O        |         |         |         |    585.82
   33.917     0.00     0.08       0.048  O        |         |         |         |    585.81
   34.000     0.00     0.08       0.047  O        |         |         |         |    585.81
   34.083     0.00     0.07       0.047  O        |         |         |         |    585.81
   34.167     0.00     0.07       0.046  O        |         |         |         |    585.80
   34.250     0.00     0.07       0.046  O        |         |         |         |    585.80
   34.333     0.00     0.07       0.045  O        |         |         |         |    585.80
   34.417     0.00     0.07       0.045  O        |         |         |         |    585.79
   34.500     0.00     0.07       0.044  O        |         |         |         |    585.79
   34.583     0.00     0.07       0.044  O        |         |         |         |    585.79
   34.667     0.00     0.07       0.043  O        |         |         |         |    585.78
   34.750     0.00     0.07       0.043  O        |         |         |         |    585.78
   34.833     0.00     0.07       0.042  O        |         |         |         |    585.78
   34.917     0.00     0.07       0.042  O        |         |         |         |    585.77
   35.000     0.00     0.07       0.041  O        |         |         |         |    585.77
   35.083     0.00     0.06       0.041  O        |         |         |         |    585.77
   35.167     0.00     0.06       0.040  O        |         |         |         |    585.76
   35.250     0.00     0.06       0.040  O        |         |         |         |    585.76
   35.333     0.00     0.06       0.040  O        |         |         |         |    585.76
   35.417     0.00     0.06       0.039  O        |         |         |         |    585.76
   35.500     0.00     0.06       0.039  O        |         |         |         |    585.75
   35.583     0.00     0.06       0.038  O        |         |         |         |    585.75
   35.667     0.00     0.06       0.038  O        |         |         |         |    585.75
   35.750     0.00     0.06       0.037  O        |         |         |         |    585.74
   35.833     0.00     0.06       0.037  O        |         |         |         |    585.74
   35.917     0.00     0.06       0.037  O        |         |         |         |    585.74
   36.000     0.00     0.06       0.036  O        |         |         |         |    585.74
   36.083     0.00     0.06       0.036  O        |         |         |         |    585.73
   36.167     0.00     0.06       0.035  O        |         |         |         |    585.73
   36.250     0.00     0.06       0.035  O        |         |         |         |    585.73
   36.333     0.00     0.06       0.035  O        |         |         |         |    585.73
   36.417     0.00     0.05       0.034  O        |         |         |         |    585.72
   36.500     0.00     0.05       0.034  O        |         |         |         |    585.72
   36.583     0.00     0.05       0.034  O        |         |         |         |    585.72
   36.667     0.00     0.05       0.033  O        |         |         |         |    585.72
   36.750     0.00     0.05       0.033  O        |         |         |         |    585.71
```

```
  36.833     0.00     0.05       0.032  O         |         |         |         |      585.71
  36.917     0.00     0.05       0.032  O         |         |         |         |      585.71
  37.000     0.00     0.05       0.032  O         |         |         |         |      585.71
  37.083     0.00     0.05       0.031  O         |         |         |         |      585.70
  37.167     0.00     0.05       0.031  O         |         |         |         |      585.70
  37.250     0.00     0.05       0.031  O         |         |         |         |      585.70
  37.333     0.00     0.05       0.030  O         |         |         |         |      585.70
  37.417     0.00     0.05       0.030  O         |         |         |         |      585.70
  37.500     0.00     0.05       0.030  O         |         |         |         |      585.69
  37.583     0.00     0.05       0.029  O         |         |         |         |      585.69
  37.667     0.00     0.05       0.029  O         |         |         |         |      585.69
  37.750     0.00     0.05       0.029  O         |         |         |         |      585.69
  37.833     0.00     0.05       0.029  O         |         |         |         |      585.68
  37.917     0.00     0.04       0.028  O         |         |         |         |      585.68
  38.000     0.00     0.04       0.028  O         |         |         |         |      585.68
  38.083     0.00     0.04       0.028  O         |         |         |         |      585.68
  38.167     0.00     0.04       0.027  O         |         |         |         |      585.68
  38.250     0.00     0.04       0.027  O         |         |         |         |      585.67
  38.333     0.00     0.04       0.027  O         |         |         |         |      585.67
  38.417     0.00     0.04       0.026  O         |         |         |         |      585.67
  38.500     0.00     0.04       0.026  O         |         |         |         |      585.67
  38.583     0.00     0.04       0.026  O         |         |         |         |      585.67
  38.667     0.00     0.04       0.026  O         |         |         |         |      585.66
  38.750     0.00     0.04       0.025  O         |         |         |         |      585.66
  38.833     0.00     0.04       0.025  O         |         |         |         |      585.66
  38.917     0.00     0.04       0.025  O         |         |         |         |      585.66
  39.000     0.00     0.04       0.024  O         |         |         |         |      585.66
  39.083     0.00     0.04       0.024  O         |         |         |         |      585.66
  39.167     0.00     0.04       0.024  O         |         |         |         |      585.65
  39.250     0.00     0.04       0.024  O         |         |         |         |      585.65
  39.333     0.00     0.04       0.023  O         |         |         |         |      585.65
  39.417     0.00     0.04       0.023  O         |         |         |         |      585.65
  39.500     0.00     0.04       0.023  O         |         |         |         |      585.65
  39.583     0.00     0.04       0.023  O         |         |         |         |      585.65
  39.667     0.00     0.04       0.022  O         |         |         |         |      585.64
  39.750     0.00     0.03       0.022  O         |         |         |         |      585.64
  39.833     0.00     0.03       0.022  O         |         |         |         |      585.64
  39.917     0.00     0.03       0.022  O         |         |         |         |      585.64
  40.000     0.00     0.03       0.021  O         |         |         |         |      585.64
  40.083     0.00     0.03       0.021  O         |         |         |         |      585.64
  40.167     0.00     0.03       0.021  O         |         |         |         |      585.63
  40.250     0.00     0.03       0.021  O         |         |         |         |      585.63
  40.333     0.00     0.03       0.021  O         |         |         |         |      585.63
  40.417     0.00     0.03       0.020  O         |         |         |         |      585.63
  40.500     0.00     0.03       0.020  O         |         |         |         |      585.63
  40.583     0.00     0.03       0.020  O         |         |         |         |      585.63
  40.667     0.00     0.03       0.020  O         |         |         |         |      585.63
  40.750     0.00     0.03       0.019  O         |         |         |         |      585.62
  40.833     0.00     0.03       0.019  O         |         |         |         |      585.62
  40.917     0.00     0.03       0.019  O         |         |         |         |      585.62
  41.000     0.00     0.03       0.019  O         |         |         |         |      585.62
  41.083     0.00     0.03       0.019  O         |         |         |         |      585.62
  41.167     0.00     0.03       0.018  O         |         |         |         |      585.62
  41.250     0.00     0.03       0.018  O         |         |         |         |      585.62
  41.333     0.00     0.03       0.018  O         |         |         |         |      585.61
  41.417     0.00     0.03       0.018  O         |         |         |         |      585.61
  41.500     0.00     0.03       0.018  O         |         |         |         |      585.61
```

```
   41.583     0.00     0.03       0.017  O          |         |         |         |    585.61
   41.667     0.00     0.03       0.017  O          |         |         |         |    585.61
   41.750     0.00     0.03       0.017  O          |         |         |         |    585.61
   41.833     0.00     0.03       0.017  O          |         |         |         |    585.61
   41.917     0.00     0.03       0.017  O          |         |         |         |    585.61
   42.000     0.00     0.03       0.017  O          |         |         |         |    585.60
   42.083     0.00     0.03       0.016  O          |         |         |         |    585.60
   42.167     0.00     0.03       0.016  O          |         |         |         |    585.60
   42.250     0.00     0.03       0.016  O          |         |         |         |    585.60
   42.333     0.00     0.02       0.016  O          |         |         |         |    585.60
   42.417     0.00     0.02       0.016  O          |         |         |         |    585.60
   42.500     0.00     0.02       0.016  O          |         |         |         |    585.60
   42.583     0.00     0.02       0.015  O          |         |         |         |    585.60
   42.667     0.00     0.02       0.015  O          |         |         |         |    585.60
   42.750     0.00     0.02       0.015  O          |         |         |         |    585.59
   42.833     0.00     0.02       0.015  O          |         |         |         |    585.59
   42.917     0.00     0.02       0.015  O          |         |         |         |    585.59
   43.000     0.00     0.02       0.015  O          |         |         |         |    585.59
   43.083     0.00     0.02       0.014  O          |         |         |         |    585.59
   43.167     0.00     0.02       0.014  O          |         |         |         |    585.59
   43.250     0.00     0.02       0.014  O          |         |         |         |    585.59
   43.333     0.00     0.02       0.014  O          |         |         |         |    585.59
   43.417     0.00     0.02       0.014  O          |         |         |         |    585.59
   43.500     0.00     0.02       0.014  O          |         |         |         |    585.58
   43.583     0.00     0.02       0.014  O          |         |         |         |    585.58
   43.667     0.00     0.02       0.013  O          |         |         |         |    585.58
   43.750     0.00     0.02       0.013  O          |         |         |         |    585.58
   43.833     0.00     0.02       0.013  O          |         |         |         |    585.58
   43.917     0.00     0.02       0.013  O          |         |         |         |    585.58
   44.000     0.00     0.02       0.013  O          |         |         |         |    585.58
   44.083     0.00     0.02       0.013  O          |         |         |         |    585.58
   44.167     0.00     0.02       0.013  O          |         |         |         |    585.58
   44.250     0.00     0.02       0.012  O          |         |         |         |    585.58
   44.333     0.00     0.02       0.012  O          |         |         |         |    585.58
   44.417     0.00     0.02       0.012  O          |         |         |         |    585.57
   44.500     0.00     0.02       0.012  O          |         |         |         |    585.57
   44.583     0.00     0.02       0.012  O          |         |         |         |    585.57
   44.667     0.00     0.02       0.012  O          |         |         |         |    585.57
   44.750     0.00     0.02       0.012  O          |         |         |         |    585.57
   44.833     0.00     0.02       0.011  O          |         |         |         |    585.57
   44.917     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.000     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.083     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.167     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.250     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.333     0.00     0.02       0.011  O          |         |         |         |    585.57
   45.417     0.00     0.02       0.011  O          |         |         |         |    585.56
   45.500     0.00     0.02       0.011  O          |         |         |         |    585.56
   45.583     0.00     0.02       0.010  O          |         |         |         |    585.56
   45.667     0.00     0.02       0.010  O          |         |         |         |    585.56
   45.750     0.00     0.02       0.010  O          |         |         |         |    585.56
   45.833     0.00     0.02       0.010  O          |         |         |         |    585.56
   45.917     0.00     0.02       0.010  O          |         |         |         |    585.56
   46.000     0.00     0.02       0.010  O          |         |         |         |    585.56
   46.083     0.00     0.02       0.010  O          |         |         |         |    585.56
   46.167     0.00     0.01       0.010  O          |         |         |         |    585.56
   46.250     0.00     0.01       0.010  O          |         |         |         |    585.56
```

```
 46.333     0.00     0.01       0.009  O         |         |         |         |    585.56
 46.417     0.00     0.01       0.009  O         |         |         |         |    585.56
 46.500     0.00     0.01       0.009  O         |         |         |         |    585.56
 46.583     0.00     0.01       0.009  O         |         |         |         |    585.56
 46.667     0.00     0.01       0.009  O         |         |         |         |    585.55
 46.750     0.00     0.01       0.009  O         |         |         |         |    585.55
 46.833     0.00     0.01       0.009  O         |         |         |         |    585.55
 46.917     0.00     0.01       0.009  O         |         |         |         |    585.55
 47.000     0.00     0.01       0.009  O         |         |         |         |    585.55
 47.083     0.00     0.01       0.009  O         |         |         |         |    585.55
 47.167     0.00     0.01       0.009  O         |         |         |         |    585.55
 47.250     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.333     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.417     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.500     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.583     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.667     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.750     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.833     0.00     0.01       0.008  O         |         |         |         |    585.55
 47.917     0.00     0.01       0.008  O         |         |         |         |    585.55
 48.000     0.00     0.01       0.008  O         |         |         |         |    585.54
 48.083     0.00     0.01       0.008  O         |         |         |         |    585.54
 48.167     0.00     0.01       0.008  O         |         |         |         |    585.54
 48.250     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.333     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.417     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.500     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.583     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.667     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.750     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.833     0.00     0.01       0.007  O         |         |         |         |    585.54
 48.917     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.000     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.083     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.167     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.250     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.333     0.00     0.01       0.007  O         |         |         |         |    585.54
 49.417     0.00     0.01       0.006  O         |         |         |         |    585.54
 49.500     0.00     0.01       0.006  O         |         |         |         |    585.54
 49.583     0.00     0.01       0.006  O         |         |         |         |    585.54
 49.667     0.00     0.01       0.006  O         |         |         |         |    585.54
 49.750     0.00     0.01       0.006  O         |         |         |         |    585.53
 49.833     0.00     0.01       0.006  O         |         |         |         |    585.53
 49.917     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.000     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.083     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.167     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.250     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.333     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.417     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.500     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.583     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.667     0.00     0.01       0.006  O         |         |         |         |    585.53
 50.750     0.00     0.01       0.005  O         |         |         |         |    585.53
 50.833     0.00     0.01       0.005  O         |         |         |         |    585.53
 50.917     0.00     0.01       0.005  O         |         |         |         |    585.53
 51.000     0.00     0.01       0.005  O         |         |         |         |    585.53
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 51.083    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.167    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.250    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.333    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.417    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.500    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.583    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.667    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.750    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.833    0.00    0.01      0.005  O        |        |        |        |    585.53
 51.917    0.00    0.01      0.005  O        |        |        |        |    585.53
 52.000    0.00    0.01      0.005  O        |        |        |        |    585.52
 52.083    0.00    0.01      0.005  O        |        |        |        |    585.52
 52.167    0.00    0.01      0.005  O        |        |        |        |    585.52
 52.250    0.00    0.01      0.005  O        |        |        |        |    585.52
 52.333    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.417    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.500    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.583    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.667    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.750    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.833    0.00    0.01      0.004  O        |        |        |        |    585.52
 52.917    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.000    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.083    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.167    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.250    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.333    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.417    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.500    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.583    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.667    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.750    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.833    0.00    0.01      0.004  O        |        |        |        |    585.52
 53.917    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.000    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.083    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.167    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.250    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.333    0.00    0.01      0.004  O        |        |        |        |    585.52
 54.417    0.00    0.01      0.003  O        |        |        |        |    585.52
 54.500    0.00    0.00      0.003  O        |        |        |        |    585.52
 54.583    0.00    0.00      0.003  O        |        |        |        |    585.52
 54.667    0.00    0.00      0.003  O        |        |        |        |    585.52
 54.750    0.00    0.00      0.003  O        |        |        |        |    585.52
 54.833    0.00    0.00      0.003  O        |        |        |        |    585.52
 54.917    0.00    0.00      0.003  O        |        |        |        |    585.52
 55.000    0.00    0.00      0.003  O        |        |        |        |    585.52
 55.083    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.167    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.250    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.333    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.417    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.500    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.583    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.667    0.00    0.00      0.003  O        |        |        |        |    585.51
 55.750    0.00    0.00      0.003  O        |        |        |        |    585.51
```

```
 55.833     0.00     0.00       0.003  O         |         |         |         |     585.51
 55.917     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.000     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.083     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.167     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.250     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.333     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.417     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.500     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.583     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.667     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.750     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.833     0.00     0.00       0.003  O         |         |         |         |     585.51
 56.917     0.00     0.00       0.003  O         |         |         |         |     585.51
 57.000     0.00     0.00       0.003  O         |         |         |         |     585.51
 57.083     0.00     0.00       0.003  O         |         |         |         |     585.51
 57.167     0.00     0.00       0.003  O         |         |         |         |     585.51
 57.250     0.00     0.00       0.003  O         |         |         |         |     585.51
 57.333     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.417     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.500     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.583     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.667     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.750     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.833     0.00     0.00       0.002  O         |         |         |         |     585.51
 57.917     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.000     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.083     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.167     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.250     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.333     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.417     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.500     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.583     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.667     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.750     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.833     0.00     0.00       0.002  O         |         |         |         |     585.51
 58.917     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.000     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.083     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.167     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.250     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.333     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.417     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.500     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.583     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.667     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.750     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.833     0.00     0.00       0.002  O         |         |         |         |     585.51
 59.917     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.000     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.083     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.167     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.250     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.333     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.417     0.00     0.00       0.002  O         |         |         |         |     585.51
 60.500     0.00     0.00       0.002  O         |         |         |         |     585.51
```

```
 60.583    0.00    0.00      0.002  O         |         |         |         |    585.51
 60.667    0.00    0.00      0.002  O         |         |         |         |    585.50
 60.750    0.00    0.00      0.002  O         |         |         |         |    585.50
 60.833    0.00    0.00      0.002  O         |         |         |         |    585.50
 60.917    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.000    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.083    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.167    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.250    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.333    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.417    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.500    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.583    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.667    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.750    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.833    0.00    0.00      0.002  O         |         |         |         |    585.50
 61.917    0.00    0.00      0.002  O         |         |         |         |    585.50
 62.000    0.00    0.00      0.002  O         |         |         |         |    585.50
 62.083    0.00    0.00      0.002  O         |         |         |         |    585.50
 62.167    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.250    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.333    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.417    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.500    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.583    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.667    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.750    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.833    0.00    0.00      0.001  O         |         |         |         |    585.50
 62.917    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.000    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.083    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.167    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.250    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.333    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.417    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.500    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.583    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.667    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.750    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.833    0.00    0.00      0.001  O         |         |         |         |    585.50
 63.917    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.000    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.083    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.167    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.250    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.333    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.417    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.500    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.583    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.667    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.750    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.833    0.00    0.00      0.001  O         |         |         |         |    585.50
 64.917    0.00    0.00      0.001  O         |         |         |         |    585.50
 65.000    0.00    0.00      0.001  O         |         |         |         |    585.50
 65.083    0.00    0.00      0.001  O         |         |         |         |    585.50
 65.167    0.00    0.00      0.001  O         |         |         |         |    585.50
 65.250    0.00    0.00      0.001  O         |         |         |         |    585.50
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
65.333    0.00    0.00      0.001  O        |       |       |       |   585.50
65.417    0.00    0.00      0.001  O        |       |       |       |   585.50
65.500    0.00    0.00      0.001  O        |       |       |       |   585.50
65.583    0.00    0.00      0.001  O        |       |       |       |   585.50
65.667    0.00    0.00      0.001  O        |       |       |       |   585.50
65.750    0.00    0.00      0.001  O        |       |       |       |   585.50
65.833    0.00    0.00      0.001  O        |       |       |       |   585.50
65.917    0.00    0.00      0.001  O        |       |       |       |   585.50
66.000    0.00    0.00      0.001  O        |       |       |       |   585.50
66.083    0.00    0.00      0.001  O        |       |       |       |   585.50
66.167    0.00    0.00      0.001  O        |       |       |       |   585.50
66.250    0.00    0.00      0.001  O        |       |       |       |   585.50
66.333    0.00    0.00      0.001  O        |       |       |       |   585.50
66.417    0.00    0.00      0.001  O        |       |       |       |   585.50
66.500    0.00    0.00      0.001  O        |       |       |       |   585.50
66.583    0.00    0.00      0.001  O        |       |       |       |   584.82

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   799
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.653 (CFS)
                 Total volume =       1.087 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
                        FLOOD HYDROGRAPH ROUTING PROGRAM
              Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                          Study date: 10/28/21
```

TTM 31589
5-Year 3-Hour Flood Hydrograph Basin Routing
Developed Condition

```
Program License Serial Number 6194

---------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION *********************

            From study/file name: tr31589prop35.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    44
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       19.551 (CFS)
            Total volume =       1.511 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 44
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
  585.500      0.001      0.001      0.001        0.001
  586.500      0.150      0.240      0.149        0.151
```

```
       587.500      0.300      0.360      0.299       0.301
       588.500      0.450      0.440      0.448       0.452
       589.500      0.600      0.510      0.598       0.602
       590.500      1.120      0.680      1.118       1.122
       591.500      1.700      0.790      1.697       1.703
       592.500      2.340      0.990      2.337       2.343
       593.500      3.040    101.020      2.692       3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                  Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       4.9    9.78   14.66   19.55 (Ft.)
 0.083     0.49     0.00       0.002  O       |       |       |       |   585.50
 0.167     1.73     0.01       0.009  O I     |       |       |       |   585.56
 0.250     2.05     0.03       0.022  O  I    |       |       |       |   585.64
 0.333     2.19     0.06       0.036  O  I    |       |       |       |   585.74
 0.417     2.61     0.08       0.052  O   I   |       |       |       |   585.85
 0.500     2.89     0.11       0.071  O   I   |       |       |       |   585.97
 0.583     3.14     0.14       0.091  O    I  |       |       |       |   586.10
 0.667     3.11     0.18       0.111  O    I  |       |       |       |   586.24
 0.750     3.37     0.21       0.132  O    I  |       |       |       |   586.38
 0.833     3.34     0.24       0.153  O    I  |       |       |       |   586.52
 0.917     3.13     0.26       0.174  O    I  |       |       |       |   586.66
 1.000     3.23     0.28       0.194  O    I  |       |       |       |   586.79
 1.083     3.57     0.29       0.216  O    I  |       |       |       |   586.94
 1.167     4.01     0.31       0.240  O     I |       |       |       |   587.10
 1.250     4.16     0.33       0.266  O     I |       |       |       |   587.27
 1.333     4.15     0.35       0.292  O     I |       |       |       |   587.45
 1.417     4.23     0.37       0.318  O     I |       |       |       |   587.62
 1.500     4.80     0.38       0.347  O      I|       |       |       |   587.81
 1.583     4.96     0.40       0.378  O       I       |       |       |   588.02
 1.667     4.89     0.42       0.409  O       I       |       |       |   588.22
 1.750     5.37     0.44       0.441  O       I       |       |       |   588.44
 1.833     5.94     0.45       0.477  O       |I      |       |       |   588.68
 1.917     5.90     0.47       0.515  O       |I      |       |       |   588.93
 2.000     5.79     0.49       0.552  O       |I      |       |       |   589.18
 2.083     5.90     0.50       0.588  O       |I      |       |       |   589.42
 2.167     6.43     0.52       0.627  O       | I     |       |       |   589.55
 2.250     8.07     0.53       0.674  O       |    I  |       |       |   589.64
 2.333     9.02     0.55       0.729  O       |     I |       |       |   589.75
 2.417     9.74     0.57       0.789  O       |      I|       |       |   589.86
 2.500    15.23     0.60       0.871  O       |       |       I       |   590.02
 2.583    18.52     0.64       0.983  |O      |       |       |     I |   590.24
 2.667    19.55     0.68       1.110  |O      |       |       |       I   590.48
 2.750    14.22     0.70       1.221  |O      |       |      I|       |   590.67
 2.833     8.11     0.71       1.294  |O      |    I  |       |       |   590.80
 2.917     5.94     0.72       1.337  |O      |I      |       |       |   590.87
 3.000     4.52     0.73       1.368  |O     I|       |       |       |   590.93
 3.083     2.60     0.73       1.387  |O  I   |       |       |       |   590.96
 3.167     1.27     0.73       1.396  |OI     |       |       |       |   590.98
 3.250     0.66     0.73       1.397  |O      |       |       |       |   590.98
 3.333     0.31     0.73       1.396  IO      |       |       |       |   590.98
 3.417     0.14     0.73       1.392  IO      |       |       |       |   590.97
 3.500     0.07     0.73       1.388  IO      |       |       |       |   590.96
```

```
 3.583    0.03    0.73      1.383  IO       |        |        |        |      590.95
 3.667    0.01    0.73      1.378  IO       |        |        |        |      590.95
 3.750    0.00    0.73      1.373  IO       |        |        |        |      590.94
 3.833    0.00    0.73      1.368  IO       |        |        |        |      590.93
 3.917    0.00    0.73      1.363  IO       |        |        |        |      590.92
 4.000    0.00    0.73      1.358  IO       |        |        |        |      590.91
 4.083    0.00    0.72      1.353  IO       |        |        |        |      590.90
 4.167    0.00    0.72      1.348  IO       |        |        |        |      590.89
 4.250    0.00    0.72      1.343  IO       |        |        |        |      590.89
 4.333    0.00    0.72      1.338  IO       |        |        |        |      590.88
 4.417    0.00    0.72      1.333  IO       |        |        |        |      590.87
 4.500    0.00    0.72      1.328  IO       |        |        |        |      590.86
 4.583    0.00    0.72      1.323  IO       |        |        |        |      590.85
 4.667    0.00    0.72      1.319  IO       |        |        |        |      590.84
 4.750    0.00    0.72      1.314  IO       |        |        |        |      590.83
 4.833    0.00    0.72      1.309  IO       |        |        |        |      590.83
 4.917    0.00    0.71      1.304  IO       |        |        |        |      590.82
 5.000    0.00    0.71      1.299  IO       |        |        |        |      590.81
 5.083    0.00    0.71      1.294  IO       |        |        |        |      590.80
 5.167    0.00    0.71      1.289  IO       |        |        |        |      590.79
 5.250    0.00    0.71      1.284  IO       |        |        |        |      590.78
 5.333    0.00    0.71      1.279  IO       |        |        |        |      590.77
 5.417    0.00    0.71      1.274  IO       |        |        |        |      590.77
 5.500    0.00    0.71      1.269  IO       |        |        |        |      590.76
 5.583    0.00    0.71      1.265  IO       |        |        |        |      590.75
 5.667    0.00    0.71      1.260  IO       |        |        |        |      590.74
 5.750    0.00    0.71      1.255  IO       |        |        |        |      590.73
 5.833    0.00    0.70      1.250  IO       |        |        |        |      590.72
 5.917    0.00    0.70      1.245  IO       |        |        |        |      590.72
 6.000    0.00    0.70      1.240  IO       |        |        |        |      590.71
 6.083    0.00    0.70      1.235  IO       |        |        |        |      590.70
 6.167    0.00    0.70      1.231  IO       |        |        |        |      590.69
 6.250    0.00    0.70      1.226  IO       |        |        |        |      590.68
 6.333    0.00    0.70      1.221  IO       |        |        |        |      590.67
 6.417    0.00    0.70      1.216  IO       |        |        |        |      590.67
 6.500    0.00    0.70      1.211  IO       |        |        |        |      590.66
 6.583    0.00    0.70      1.207  IO       |        |        |        |      590.65
 6.667    0.00    0.70      1.202  IO       |        |        |        |      590.64
 6.750    0.00    0.69      1.197  IO       |        |        |        |      590.63
 6.833    0.00    0.69      1.192  IO       |        |        |        |      590.62
 6.917    0.00    0.69      1.187  IO       |        |        |        |      590.62
 7.000    0.00    0.69      1.183  IO       |        |        |        |      590.61
 7.083    0.00    0.69      1.178  IO       |        |        |        |      590.60
 7.167    0.00    0.69      1.173  IO       |        |        |        |      590.59
 7.250    0.00    0.69      1.168  IO       |        |        |        |      590.58
 7.333    0.00    0.69      1.164  IO       |        |        |        |      590.58
 7.417    0.00    0.69      1.159  IO       |        |        |        |      590.57
 7.500    0.00    0.69      1.154  IO       |        |        |        |      590.56
 7.583    0.00    0.69      1.149  IO       |        |        |        |      590.55
 7.667    0.00    0.68      1.145  IO       |        |        |        |      590.54
 7.750    0.00    0.68      1.140  IO       |        |        |        |      590.53
 7.833    0.00    0.68      1.135  IO       |        |        |        |      590.53
 7.917    0.00    0.68      1.131  IO       |        |        |        |      590.52
 8.000    0.00    0.68      1.126  IO       |        |        |        |      590.51
 8.083    0.00    0.68      1.121  IO       |        |        |        |      590.50
 8.167    0.00    0.68      1.117  IO       |        |        |        |      590.49
 8.250    0.00    0.68      1.112  IO       |        |        |        |      590.48
```

```
   8.333    0.00    0.68      1.107  IO       |       |       |       |   590.48
   8.417    0.00    0.67      1.103  IO       |       |       |       |   590.47
   8.500    0.00    0.67      1.098  IO       |       |       |       |   590.46
   8.583    0.00    0.67      1.093  IO       |       |       |       |   590.45
   8.667    0.00    0.67      1.089  IO       |       |       |       |   590.44
   8.750    0.00    0.67      1.084  IO       |       |       |       |   590.43
   8.833    0.00    0.67      1.079  IO       |       |       |       |   590.42
   8.917    0.00    0.67      1.075  IO       |       |       |       |   590.41
   9.000    0.00    0.66      1.070  IO       |       |       |       |   590.40
   9.083    0.00    0.66      1.066  IO       |       |       |       |   590.40
   9.167    0.00    0.66      1.061  IO       |       |       |       |   590.39
   9.250    0.00    0.66      1.057  IO       |       |       |       |   590.38
   9.333    0.00    0.66      1.052  IO       |       |       |       |   590.37
   9.417    0.00    0.66      1.048  IO       |       |       |       |   590.36
   9.500    0.00    0.65      1.043  IO       |       |       |       |   590.35
   9.583    0.00    0.65      1.039  IO       |       |       |       |   590.34
   9.667    0.00    0.65      1.034  IO       |       |       |       |   590.33
   9.750    0.00    0.65      1.030  IO       |       |       |       |   590.33
   9.833    0.00    0.65      1.025  IO       |       |       |       |   590.32
   9.917    0.00    0.65      1.021  IO       |       |       |       |   590.31
  10.000    0.00    0.65      1.016  IO       |       |       |       |   590.30
  10.083    0.00    0.64      1.012  IO       |       |       |       |   590.29
  10.167    0.00    0.64      1.007  IO       |       |       |       |   590.28
  10.250    0.00    0.64      1.003  IO       |       |       |       |   590.27
  10.333    0.00    0.64      0.998  IO       |       |       |       |   590.27
  10.417    0.00    0.64      0.994  IO       |       |       |       |   590.26
  10.500    0.00    0.64      0.990  IO       |       |       |       |   590.25
  10.583    0.00    0.64      0.985  IO       |       |       |       |   590.24
  10.667    0.00    0.63      0.981  IO       |       |       |       |   590.23
  10.750    0.00    0.63      0.977  IO       |       |       |       |   590.22
  10.833    0.00    0.63      0.972  IO       |       |       |       |   590.22
  10.917    0.00    0.63      0.968  IO       |       |       |       |   590.21
  11.000    0.00    0.63      0.964  IO       |       |       |       |   590.20
  11.083    0.00    0.63      0.959  IO       |       |       |       |   590.19
  11.167    0.00    0.63      0.955  IO       |       |       |       |   590.18
  11.250    0.00    0.62      0.951  IO       |       |       |       |   590.17
  11.333    0.00    0.62      0.946  IO       |       |       |       |   590.17
  11.417    0.00    0.62      0.942  IO       |       |       |       |   590.16
  11.500    0.00    0.62      0.938  IO       |       |       |       |   590.15
  11.583    0.00    0.62      0.933  IO       |       |       |       |   590.14
  11.667    0.00    0.62      0.929  IO       |       |       |       |   590.13
  11.750    0.00    0.62      0.925  IO       |       |       |       |   590.12
  11.833    0.00    0.61      0.921  IO       |       |       |       |   590.12
  11.917    0.00    0.61      0.916  IO       |       |       |       |   590.11
  12.000    0.00    0.61      0.912  IO       |       |       |       |   590.10
  12.083    0.00    0.61      0.908  O        |       |       |       |   590.09
  12.167    0.00    0.61      0.904  O        |       |       |       |   590.08
  12.250    0.00    0.61      0.900  O        |       |       |       |   590.08
  12.333    0.00    0.61      0.895  O        |       |       |       |   590.07
  12.417    0.00    0.61      0.891  O        |       |       |       |   590.06
  12.500    0.00    0.60      0.887  O        |       |       |       |   590.05
  12.583    0.00    0.60      0.883  O        |       |       |       |   590.04
  12.667    0.00    0.60      0.879  O        |       |       |       |   590.04
  12.750    0.00    0.60      0.875  O        |       |       |       |   590.03
  12.833    0.00    0.60      0.871  O        |       |       |       |   590.02
  12.917    0.00    0.60      0.866  O        |       |       |       |   590.01
  13.000    0.00    0.60      0.862  O        |       |       |       |   590.00
```

```
13.083    0.00    0.59      0.858  O        |        |        |        |    590.00
13.167    0.00    0.59      0.854  O        |        |        |        |    589.99
13.250    0.00    0.59      0.850  O        |        |        |        |    589.98
13.333    0.00    0.59      0.846  O        |        |        |        |    589.97
13.417    0.00    0.59      0.842  O        |        |        |        |    589.97
13.500    0.00    0.59      0.838  O        |        |        |        |    589.96
13.583    0.00    0.59      0.834  O        |        |        |        |    589.95
13.667    0.00    0.59      0.830  O        |        |        |        |    589.94
13.750    0.00    0.58      0.826  O        |        |        |        |    589.93
13.833    0.00    0.58      0.822  O        |        |        |        |    589.93
13.917    0.00    0.58      0.818  O        |        |        |        |    589.92
14.000    0.00    0.58      0.814  O        |        |        |        |    589.91
14.083    0.00    0.58      0.810  O        |        |        |        |    589.90
14.167    0.00    0.58      0.806  O        |        |        |        |    589.90
14.250    0.00    0.58      0.802  O        |        |        |        |    589.89
14.333    0.00    0.57      0.798  O        |        |        |        |    589.88
14.417    0.00    0.57      0.794  O        |        |        |        |    589.87
14.500    0.00    0.57      0.790  O        |        |        |        |    589.87
14.583    0.00    0.57      0.786  O        |        |        |        |    589.86
14.667    0.00    0.57      0.782  O        |        |        |        |    589.85
14.750    0.00    0.57      0.778  O        |        |        |        |    589.84
14.833    0.00    0.57      0.774  O        |        |        |        |    589.84
14.917    0.00    0.57      0.770  O        |        |        |        |    589.83
15.000    0.00    0.56      0.766  O        |        |        |        |    589.82
15.083    0.00    0.56      0.763  O        |        |        |        |    589.81
15.167    0.00    0.56      0.759  O        |        |        |        |    589.81
15.250    0.00    0.56      0.755  O        |        |        |        |    589.80
15.333    0.00    0.56      0.751  O        |        |        |        |    589.79
15.417    0.00    0.56      0.747  O        |        |        |        |    589.78
15.500    0.00    0.56      0.743  O        |        |        |        |    589.78
15.583    0.00    0.56      0.739  O        |        |        |        |    589.77
15.667    0.00    0.55      0.736  O        |        |        |        |    589.76
15.750    0.00    0.55      0.732  O        |        |        |        |    589.75
15.833    0.00    0.55      0.728  O        |        |        |        |    589.75
15.917    0.00    0.55      0.724  O        |        |        |        |    589.74
16.000    0.00    0.55      0.720  O        |        |        |        |    589.73
16.083    0.00    0.55      0.717  O        |        |        |        |    589.72
16.167    0.00    0.55      0.713  O        |        |        |        |    589.72
16.250    0.00    0.55      0.709  O        |        |        |        |    589.71
16.333    0.00    0.54      0.705  O        |        |        |        |    589.70
16.417    0.00    0.54      0.702  O        |        |        |        |    589.70
16.500    0.00    0.54      0.698  O        |        |        |        |    589.69
16.583    0.00    0.54      0.694  O        |        |        |        |    589.68
16.667    0.00    0.54      0.690  O        |        |        |        |    589.67
16.750    0.00    0.54      0.687  O        |        |        |        |    589.67
16.833    0.00    0.54      0.683  O        |        |        |        |    589.66
16.917    0.00    0.54      0.679  O        |        |        |        |    589.65
17.000    0.00    0.53      0.676  O        |        |        |        |    589.65
17.083    0.00    0.53      0.672  O        |        |        |        |    589.64
17.167    0.00    0.53      0.668  O        |        |        |        |    589.63
17.250    0.00    0.53      0.665  O        |        |        |        |    589.62
17.333    0.00    0.53      0.661  O        |        |        |        |    589.62
17.417    0.00    0.53      0.657  O        |        |        |        |    589.61
17.500    0.00    0.53      0.654  O        |        |        |        |    589.60
17.583    0.00    0.53      0.650  O        |        |        |        |    589.60
17.667    0.00    0.53      0.646  O        |        |        |        |    589.59
17.750    0.00    0.52      0.643  O        |        |        |        |    589.58
```

```
  17.833    0.00    0.52     0.639  O         |         |         |         |    589.58
  17.917    0.00    0.52     0.636  O         |         |         |         |    589.57
  18.000    0.00    0.52     0.632  O         |         |         |         |    589.56
  18.083    0.00    0.52     0.628  O         |         |         |         |    589.55
  18.167    0.00    0.52     0.625  O         |         |         |         |    589.55
  18.250    0.00    0.52     0.621  O         |         |         |         |    589.54
  18.333    0.00    0.52     0.618  O         |         |         |         |    589.53
  18.417    0.00    0.51     0.614  O         |         |         |         |    589.53
  18.500    0.00    0.51     0.611  O         |         |         |         |    589.52
  18.583    0.00    0.51     0.607  O         |         |         |         |    589.51
  18.667    0.00    0.51     0.604  O         |         |         |         |    589.51
  18.750    0.00    0.51     0.600  O         |         |         |         |    589.50
  18.833    0.00    0.51     0.597  O         |         |         |         |    589.48
  18.917    0.00    0.51     0.593  O         |         |         |         |    589.45
  19.000    0.00    0.51     0.590  O         |         |         |         |    589.43
  19.083    0.00    0.50     0.586  O         |         |         |         |    589.41
  19.167    0.00    0.50     0.583  O         |         |         |         |    589.38
  19.250    0.00    0.50     0.579  O         |         |         |         |    589.36
  19.333    0.00    0.50     0.576  O         |         |         |         |    589.34
  19.417    0.00    0.50     0.572  O         |         |         |         |    589.32
  19.500    0.00    0.50     0.569  O         |         |         |         |    589.29
  19.583    0.00    0.49     0.566  O         |         |         |         |    589.27
  19.667    0.00    0.49     0.562  O         |         |         |         |    589.25
  19.750    0.00    0.49     0.559  O         |         |         |         |    589.23
  19.833    0.00    0.49     0.555  O         |         |         |         |    589.20
  19.917    0.00    0.49     0.552  O         |         |         |         |    589.18
  20.000    0.00    0.49     0.549  O         |         |         |         |    589.16
  20.083    0.00    0.48     0.545  O         |         |         |         |    589.14
  20.167    0.00    0.48     0.542  O         |         |         |         |    589.11
  20.250    0.00    0.48     0.539  O         |         |         |         |    589.09
  20.333    0.00    0.48     0.535  O         |         |         |         |    589.07
  20.417    0.00    0.48     0.532  O         |         |         |         |    589.05
  20.500    0.00    0.48     0.529  O         |         |         |         |    589.03
  20.583    0.00    0.48     0.526  O         |         |         |         |    589.00
  20.667    0.00    0.47     0.522  O         |         |         |         |    588.98
  20.750    0.00    0.47     0.519  O         |         |         |         |    588.96
  20.833    0.00    0.47     0.516  O         |         |         |         |    588.94
  20.917    0.00    0.47     0.513  O         |         |         |         |    588.92
  21.000    0.00    0.47     0.509  O         |         |         |         |    588.90
  21.083    0.00    0.47     0.506  O         |         |         |         |    588.87
  21.167    0.00    0.46     0.503  O         |         |         |         |    588.85
  21.250    0.00    0.46     0.500  O         |         |         |         |    588.83
  21.333    0.00    0.46     0.496  O         |         |         |         |    588.81
  21.417    0.00    0.46     0.493  O         |         |         |         |    588.79
  21.500    0.00    0.46     0.490  O         |         |         |         |    588.77
  21.583    0.00    0.46     0.487  O         |         |         |         |    588.75
  21.667    0.00    0.46     0.484  O         |         |         |         |    588.73
  21.750    0.00    0.45     0.481  O         |         |         |         |    588.70
  21.833    0.00    0.45     0.478  O         |         |         |         |    588.68
  21.917    0.00    0.45     0.474  O         |         |         |         |    588.66
  22.000    0.00    0.45     0.471  O         |         |         |         |    588.64
  22.083    0.00    0.45     0.468  O         |         |         |         |    588.62
  22.167    0.00    0.45     0.465  O         |         |         |         |    588.60
  22.250    0.00    0.45     0.462  O         |         |         |         |    588.58
  22.333    0.00    0.44     0.459  O         |         |         |         |    588.56
  22.417    0.00    0.44     0.456  O         |         |         |         |    588.54
  22.500    0.00    0.44     0.453  O         |         |         |         |    588.52
```

```
22.583    0.00    0.44      0.450  O        |       |       |       |  588.50
22.667    0.00    0.44      0.447  O        |       |       |       |  588.48
22.750    0.00    0.44      0.444  O        |       |       |       |  588.46
22.833    0.00    0.44      0.441  O        |       |       |       |  588.44
22.917    0.00    0.43      0.438  O        |       |       |       |  588.42
23.000    0.00    0.43      0.435  O        |       |       |       |  588.40
23.083    0.00    0.43      0.432  O        |       |       |       |  588.38
23.167    0.00    0.43      0.429  O        |       |       |       |  588.36
23.250    0.00    0.43      0.426  O        |       |       |       |  588.34
23.333    0.00    0.43      0.423  O        |       |       |       |  588.32
23.417    0.00    0.42      0.420  O        |       |       |       |  588.30
23.500    0.00    0.42      0.417  O        |       |       |       |  588.28
23.583    0.00    0.42      0.414  O        |       |       |       |  588.26
23.667    0.00    0.42      0.411  O        |       |       |       |  588.24
23.750    0.00    0.42      0.409  O        |       |       |       |  588.22
23.833    0.00    0.42      0.406  O        |       |       |       |  588.20
23.917    0.00    0.41      0.403  O        |       |       |       |  588.19
24.000    0.00    0.41      0.400  O        |       |       |       |  588.17
24.083    0.00    0.41      0.397  O        |       |       |       |  588.15
24.167    0.00    0.41      0.394  O        |       |       |       |  588.13
24.250    0.00    0.41      0.391  O        |       |       |       |  588.11
24.333    0.00    0.41      0.389  O        |       |       |       |  588.09
24.417    0.00    0.41      0.386  O        |       |       |       |  588.07
24.500    0.00    0.40      0.383  O        |       |       |       |  588.05
24.583    0.00    0.40      0.380  O        |       |       |       |  588.04
24.667    0.00    0.40      0.378  O        |       |       |       |  588.02
24.750    0.00    0.40      0.375  O        |       |       |       |  588.00
24.833    0.00    0.40      0.372  O        |       |       |       |  587.98
24.917    0.00    0.40      0.369  O        |       |       |       |  587.96
25.000    0.00    0.40      0.367  O        |       |       |       |  587.94
25.083    0.00    0.39      0.364  O        |       |       |       |  587.93
25.167    0.00    0.39      0.361  O        |       |       |       |  587.91
25.250    0.00    0.39      0.358  O        |       |       |       |  587.89
25.333    0.00    0.39      0.356  O        |       |       |       |  587.87
25.417    0.00    0.39      0.353  O        |       |       |       |  587.85
25.500    0.00    0.39      0.350  O        |       |       |       |  587.84
25.583    0.00    0.39      0.348  O        |       |       |       |  587.82
25.667    0.00    0.38      0.345  O        |       |       |       |  587.80
25.750    0.00    0.38      0.342  O        |       |       |       |  587.78
25.833    0.00    0.38      0.340  O        |       |       |       |  587.77
25.917    0.00    0.38      0.337  O        |       |       |       |  587.75
26.000    0.00    0.38      0.335  O        |       |       |       |  587.73
26.083    0.00    0.38      0.332  O        |       |       |       |  587.71
26.167    0.00    0.38      0.329  O        |       |       |       |  587.70
26.250    0.00    0.37      0.327  O        |       |       |       |  587.68
26.333    0.00    0.37      0.324  O        |       |       |       |  587.66
26.417    0.00    0.37      0.322  O        |       |       |       |  587.64
26.500    0.00    0.37      0.319  O        |       |       |       |  587.63
26.583    0.00    0.37      0.317  O        |       |       |       |  587.61
26.667    0.00    0.37      0.314  O        |       |       |       |  587.59
26.750    0.00    0.37      0.312  O        |       |       |       |  587.58
26.833    0.00    0.36      0.309  O        |       |       |       |  587.56
26.917    0.00    0.36      0.306  O        |       |       |       |  587.54
27.000    0.00    0.36      0.304  O        |       |       |       |  587.53
27.083    0.00    0.36      0.301  O        |       |       |       |  587.51
27.167    0.00    0.36      0.299  O        |       |       |       |  587.49
27.250    0.00    0.36      0.297  O        |       |       |       |  587.48
```

```
27.333    0.00    0.36      0.294  O       |       |       |       |   587.46
27.417    0.00    0.35      0.292  O       |       |       |       |   587.44
27.500    0.00    0.35      0.289  O       |       |       |       |   587.43
27.583    0.00    0.35      0.287  O       |       |       |       |   587.41
27.667    0.00    0.35      0.284  O       |       |       |       |   587.40
27.750    0.00    0.35      0.282  O       |       |       |       |   587.38
27.833    0.00    0.34      0.280  O       |       |       |       |   587.36
27.917    0.00    0.34      0.277  O       |       |       |       |   587.35
28.000    0.00    0.34      0.275  O       |       |       |       |   587.33
28.083    0.00    0.34      0.273  O       |       |       |       |   587.32
28.167    0.00    0.34      0.270  O       |       |       |       |   587.30
28.250    0.00    0.33      0.268  O       |       |       |       |   587.29
28.333    0.00    0.33      0.266  O       |       |       |       |   587.27
28.417    0.00    0.33      0.263  O       |       |       |       |   587.26
28.500    0.00    0.33      0.261  O       |       |       |       |   587.24
28.583    0.00    0.33      0.259  O       |       |       |       |   587.23
28.667    0.00    0.33      0.257  O       |       |       |       |   587.21
28.750    0.00    0.32      0.254  O       |       |       |       |   587.20
28.833    0.00    0.32      0.252  O       |       |       |       |   587.18
28.917    0.00    0.32      0.250  O       |       |       |       |   587.17
29.000    0.00    0.32      0.248  O       |       |       |       |   587.15
29.083    0.00    0.32      0.246  O       |       |       |       |   587.14
29.167    0.00    0.31      0.243  O       |       |       |       |   587.12
29.250    0.00    0.31      0.241  O       |       |       |       |   587.11
29.333    0.00    0.31      0.239  O       |       |       |       |   587.09
29.417    0.00    0.31      0.237  O       |       |       |       |   587.08
29.500    0.00    0.31      0.235  O       |       |       |       |   587.07
29.583    0.00    0.31      0.233  O       |       |       |       |   587.05
29.667    0.00    0.30      0.231  O       |       |       |       |   587.04
29.750    0.00    0.30      0.229  O       |       |       |       |   587.02
29.833    0.00    0.30      0.226  O       |       |       |       |   587.01
29.917    0.00    0.30      0.224  O       |       |       |       |   587.00
30.000    0.00    0.30      0.222  O       |       |       |       |   586.98
30.083    0.00    0.30      0.220  O       |       |       |       |   586.97
30.167    0.00    0.29      0.218  O       |       |       |       |   586.95
30.250    0.00    0.29      0.216  O       |       |       |       |   586.94
30.333    0.00    0.29      0.214  O       |       |       |       |   586.93
30.417    0.00    0.29      0.212  O       |       |       |       |   586.91
30.500    0.00    0.29      0.210  O       |       |       |       |   586.90
30.583    0.00    0.29      0.208  O       |       |       |       |   586.89
30.667    0.00    0.29      0.206  O       |       |       |       |   586.88
30.750    0.00    0.28      0.204  O       |       |       |       |   586.86
30.833    0.00    0.28      0.202  O       |       |       |       |   586.85
30.917    0.00    0.28      0.200  O       |       |       |       |   586.84
31.000    0.00    0.28      0.198  O       |       |       |       |   586.82
31.083    0.00    0.28      0.197  O       |       |       |       |   586.81
31.167    0.00    0.28      0.195  O       |       |       |       |   586.80
31.250    0.00    0.27      0.193  O       |       |       |       |   586.79
31.333    0.00    0.27      0.191  O       |       |       |       |   586.77
31.417    0.00    0.27      0.189  O       |       |       |       |   586.76
31.500    0.00    0.27      0.187  O       |       |       |       |   586.75
31.583    0.00    0.27      0.185  O       |       |       |       |   586.74
31.667    0.00    0.27      0.183  O       |       |       |       |   586.72
31.750    0.00    0.27      0.182  O       |       |       |       |   586.71
31.833    0.00    0.26      0.180  O       |       |       |       |   586.70
31.917    0.00    0.26      0.178  O       |       |       |       |   586.69
32.000    0.00    0.26      0.176  O       |       |       |       |   586.67
```

```
32.083    0.00    0.26     0.174  O       |       |       |       |   586.66
32.167    0.00    0.26     0.173  O       |       |       |       |   586.65
32.250    0.00    0.26     0.171  O       |       |       |       |   586.64
32.333    0.00    0.26     0.169  O       |       |       |       |   586.63
32.417    0.00    0.25     0.167  O       |       |       |       |   586.62
32.500    0.00    0.25     0.166  O       |       |       |       |   586.60
32.583    0.00    0.25     0.164  O       |       |       |       |   586.59
32.667    0.00    0.25     0.162  O       |       |       |       |   586.58
32.750    0.00    0.25     0.160  O       |       |       |       |   586.57
32.833    0.00    0.25     0.159  O       |       |       |       |   586.56
32.917    0.00    0.25     0.157  O       |       |       |       |   586.55
33.000    0.00    0.24     0.155  O       |       |       |       |   586.54
33.083    0.00    0.24     0.154  O       |       |       |       |   586.52
33.167    0.00    0.24     0.152  O       |       |       |       |   586.51
33.250    0.00    0.24     0.150  O       |       |       |       |   586.50
33.333    0.00    0.24     0.149  O       |       |       |       |   586.49
33.417    0.00    0.24     0.147  O       |       |       |       |   586.48
33.500    0.00    0.23     0.145  O       |       |       |       |   586.47
33.583    0.00    0.23     0.144  O       |       |       |       |   586.46
33.667    0.00    0.23     0.142  O       |       |       |       |   586.45
33.750    0.00    0.23     0.141  O       |       |       |       |   586.44
33.833    0.00    0.22     0.139  O       |       |       |       |   586.43
33.917    0.00    0.22     0.138  O       |       |       |       |   586.42
34.000    0.00    0.22     0.136  O       |       |       |       |   586.41
34.083    0.00    0.22     0.135  O       |       |       |       |   586.40
34.167    0.00    0.21     0.133  O       |       |       |       |   586.39
34.250    0.00    0.21     0.132  O       |       |       |       |   586.38
34.333    0.00    0.21     0.130  O       |       |       |       |   586.37
34.417    0.00    0.21     0.129  O       |       |       |       |   586.36
34.500    0.00    0.20     0.127  O       |       |       |       |   586.35
34.583    0.00    0.20     0.126  O       |       |       |       |   586.34
34.667    0.00    0.20     0.125  O       |       |       |       |   586.33
34.750    0.00    0.20     0.123  O       |       |       |       |   586.32
34.833    0.00    0.19     0.122  O       |       |       |       |   586.31
34.917    0.00    0.19     0.121  O       |       |       |       |   586.30
35.000    0.00    0.19     0.119  O       |       |       |       |   586.29
35.083    0.00    0.19     0.118  O       |       |       |       |   586.29
35.167    0.00    0.19     0.117  O       |       |       |       |   586.28
35.250    0.00    0.18     0.115  O       |       |       |       |   586.27
35.333    0.00    0.18     0.114  O       |       |       |       |   586.26
35.417    0.00    0.18     0.113  O       |       |       |       |   586.25
35.500    0.00    0.18     0.112  O       |       |       |       |   586.24
35.583    0.00    0.18     0.110  O       |       |       |       |   586.23
35.667    0.00    0.17     0.109  O       |       |       |       |   586.23
35.750    0.00    0.17     0.108  O       |       |       |       |   586.22
35.833    0.00    0.17     0.107  O       |       |       |       |   586.21
35.917    0.00    0.17     0.106  O       |       |       |       |   586.20
36.000    0.00    0.17     0.105  O       |       |       |       |   586.19
36.083    0.00    0.17     0.103  O       |       |       |       |   586.19
36.167    0.00    0.16     0.102  O       |       |       |       |   586.18
36.250    0.00    0.16     0.101  O       |       |       |       |   586.17
36.333    0.00    0.16     0.100  O       |       |       |       |   586.16
36.417    0.00    0.16     0.099  O       |       |       |       |   586.16
36.500    0.00    0.16     0.098  O       |       |       |       |   586.15
36.583    0.00    0.15     0.097  O       |       |       |       |   586.14
36.667    0.00    0.15     0.096  O       |       |       |       |   586.14
36.750    0.00    0.15     0.095  O       |       |       |       |   586.13
```

```
   36.833    0.00    0.15      0.094  O        |        |        |        |    586.12
   36.917    0.00    0.15      0.093  O        |        |        |        |    586.11
   37.000    0.00    0.15      0.092  O        |        |        |        |    586.11
   37.083    0.00    0.14      0.091  O        |        |        |        |    586.10
   37.167    0.00    0.14      0.090  O        |        |        |        |    586.09
   37.250    0.00    0.14      0.089  O        |        |        |        |    586.09
   37.333    0.00    0.14      0.088  O        |        |        |        |    586.08
   37.417    0.00    0.14      0.087  O        |        |        |        |    586.08
   37.500    0.00    0.14      0.086  O        |        |        |        |    586.07
   37.583    0.00    0.14      0.085  O        |        |        |        |    586.06
   37.667    0.00    0.13      0.084  O        |        |        |        |    586.06
   37.750    0.00    0.13      0.083  O        |        |        |        |    586.05
   37.833    0.00    0.13      0.082  O        |        |        |        |    586.04
   37.917    0.00    0.13      0.081  O        |        |        |        |    586.04
   38.000    0.00    0.13      0.080  O        |        |        |        |    586.03
   38.083    0.00    0.13      0.079  O        |        |        |        |    586.03
   38.167    0.00    0.13      0.079  O        |        |        |        |    586.02
   38.250    0.00    0.12      0.078  O        |        |        |        |    586.01
   38.333    0.00    0.12      0.077  O        |        |        |        |    586.01
   38.417    0.00    0.12      0.076  O        |        |        |        |    586.00
   38.500    0.00    0.12      0.075  O        |        |        |        |    586.00
   38.583    0.00    0.12      0.074  O        |        |        |        |    585.99
   38.667    0.00    0.12      0.074  O        |        |        |        |    585.99
   38.750    0.00    0.12      0.073  O        |        |        |        |    585.98
   38.833    0.00    0.11      0.072  O        |        |        |        |    585.98
   38.917    0.00    0.11      0.071  O        |        |        |        |    585.97
   39.000    0.00    0.11      0.070  O        |        |        |        |    585.97
   39.083    0.00    0.11      0.070  O        |        |        |        |    585.96
   39.167    0.00    0.11      0.069  O        |        |        |        |    585.96
   39.250    0.00    0.11      0.068  O        |        |        |        |    585.95
   39.333    0.00    0.11      0.067  O        |        |        |        |    585.95
   39.417    0.00    0.11      0.067  O        |        |        |        |    585.94
   39.500    0.00    0.11      0.066  O        |        |        |        |    585.94
   39.583    0.00    0.10      0.065  O        |        |        |        |    585.93
   39.667    0.00    0.10      0.064  O        |        |        |        |    585.93
   39.750    0.00    0.10      0.064  O        |        |        |        |    585.92
   39.833    0.00    0.10      0.063  O        |        |        |        |    585.92
   39.917    0.00    0.10      0.062  O        |        |        |        |    585.91
   40.000    0.00    0.10      0.062  O        |        |        |        |    585.91
   40.083    0.00    0.10      0.061  O        |        |        |        |    585.90
   40.167    0.00    0.10      0.060  O        |        |        |        |    585.90
   40.250    0.00    0.10      0.060  O        |        |        |        |    585.89
   40.333    0.00    0.09      0.059  O        |        |        |        |    585.89
   40.417    0.00    0.09      0.058  O        |        |        |        |    585.88
   40.500    0.00    0.09      0.058  O        |        |        |        |    585.88
   40.583    0.00    0.09      0.057  O        |        |        |        |    585.88
   40.667    0.00    0.09      0.056  O        |        |        |        |    585.87
   40.750    0.00    0.09      0.056  O        |        |        |        |    585.87
   40.833    0.00    0.09      0.055  O        |        |        |        |    585.86
   40.917    0.00    0.09      0.055  O        |        |        |        |    585.86
   41.000    0.00    0.09      0.054  O        |        |        |        |    585.86
   41.083    0.00    0.09      0.053  O        |        |        |        |    585.85
   41.167    0.00    0.08      0.053  O        |        |        |        |    585.85
   41.250    0.00    0.08      0.052  O        |        |        |        |    585.84
   41.333    0.00    0.08      0.052  O        |        |        |        |    585.84
   41.417    0.00    0.08      0.051  O        |        |        |        |    585.84
   41.500    0.00    0.08      0.051  O        |        |        |        |    585.83
```

```
 41.583    0.00    0.08      0.050  O       |       |       |       |   585.83
 41.667    0.00    0.08      0.050  O       |       |       |       |   585.83
 41.750    0.00    0.08      0.049  O       |       |       |       |   585.82
 41.833    0.00    0.08      0.048  O       |       |       |       |   585.82
 41.917    0.00    0.08      0.048  O       |       |       |       |   585.81
 42.000    0.00    0.08      0.047  O       |       |       |       |   585.81
 42.083    0.00    0.07      0.047  O       |       |       |       |   585.81
 42.167    0.00    0.07      0.046  O       |       |       |       |   585.80
 42.250    0.00    0.07      0.046  O       |       |       |       |   585.80
 42.333    0.00    0.07      0.045  O       |       |       |       |   585.80
 42.417    0.00    0.07      0.045  O       |       |       |       |   585.79
 42.500    0.00    0.07      0.044  O       |       |       |       |   585.79
 42.583    0.00    0.07      0.044  O       |       |       |       |   585.79
 42.667    0.00    0.07      0.043  O       |       |       |       |   585.78
 42.750    0.00    0.07      0.043  O       |       |       |       |   585.78
 42.833    0.00    0.07      0.042  O       |       |       |       |   585.78
 42.917    0.00    0.07      0.042  O       |       |       |       |   585.78
 43.000    0.00    0.07      0.042  O       |       |       |       |   585.77
 43.083    0.00    0.07      0.041  O       |       |       |       |   585.77
 43.167    0.00    0.06      0.041  O       |       |       |       |   585.77
 43.250    0.00    0.06      0.040  O       |       |       |       |   585.76
 43.333    0.00    0.06      0.040  O       |       |       |       |   585.76
 43.417    0.00    0.06      0.039  O       |       |       |       |   585.76
 43.500    0.00    0.06      0.039  O       |       |       |       |   585.75
 43.583    0.00    0.06      0.038  O       |       |       |       |   585.75
 43.667    0.00    0.06      0.038  O       |       |       |       |   585.75
 43.750    0.00    0.06      0.038  O       |       |       |       |   585.75
 43.833    0.00    0.06      0.037  O       |       |       |       |   585.74
 43.917    0.00    0.06      0.037  O       |       |       |       |   585.74
 44.000    0.00    0.06      0.036  O       |       |       |       |   585.74
 44.083    0.00    0.06      0.036  O       |       |       |       |   585.74
 44.167    0.00    0.06      0.036  O       |       |       |       |   585.73
 44.250    0.00    0.06      0.035  O       |       |       |       |   585.73
 44.333    0.00    0.06      0.035  O       |       |       |       |   585.73
 44.417    0.00    0.05      0.034  O       |       |       |       |   585.72
 44.500    0.00    0.05      0.034  O       |       |       |       |   585.72
 44.583    0.00    0.05      0.034  O       |       |       |       |   585.72
 44.667    0.00    0.05      0.033  O       |       |       |       |   585.72
 44.750    0.00    0.05      0.033  O       |       |       |       |   585.71
 44.833    0.00    0.05      0.033  O       |       |       |       |   585.71
 44.917    0.00    0.05      0.032  O       |       |       |       |   585.71
 45.000    0.00    0.05      0.032  O       |       |       |       |   585.71
 45.083    0.00    0.05      0.032  O       |       |       |       |   585.71
 45.167    0.00    0.05      0.031  O       |       |       |       |   585.70
 45.250    0.00    0.05      0.031  O       |       |       |       |   585.70
 45.333    0.00    0.05      0.031  O       |       |       |       |   585.70
 45.417    0.00    0.05      0.030  O       |       |       |       |   585.70
 45.500    0.00    0.05      0.030  O       |       |       |       |   585.69
 45.583    0.00    0.05      0.030  O       |       |       |       |   585.69
 45.667    0.00    0.05      0.029  O       |       |       |       |   585.69
 45.750    0.00    0.05      0.029  O       |       |       |       |   585.69
 45.833    0.00    0.05      0.029  O       |       |       |       |   585.69
 45.917    0.00    0.04      0.028  O       |       |       |       |   585.68
 46.000    0.00    0.04      0.028  O       |       |       |       |   585.68
 46.083    0.00    0.04      0.028  O       |       |       |       |   585.68
 46.167    0.00    0.04      0.027  O       |       |       |       |   585.68
 46.250    0.00    0.04      0.027  O       |       |       |       |   585.68
```

```
 46.333    0.00    0.04      0.027  O        |        |        |        |    585.67
 46.417    0.00    0.04      0.027  O        |        |        |        |    585.67
 46.500    0.00    0.04      0.026  O        |        |        |        |    585.67
 46.583    0.00    0.04      0.026  O        |        |        |        |    585.67
 46.667    0.00    0.04      0.026  O        |        |        |        |    585.67
 46.750    0.00    0.04      0.025  O        |        |        |        |    585.66
 46.833    0.00    0.04      0.025  O        |        |        |        |    585.66
 46.917    0.00    0.04      0.025  O        |        |        |        |    585.66
 47.000    0.00    0.04      0.025  O        |        |        |        |    585.66
 47.083    0.00    0.04      0.024  O        |        |        |        |    585.66
 47.167    0.00    0.04      0.024  O        |        |        |        |    585.65
 47.250    0.00    0.04      0.024  O        |        |        |        |    585.65
 47.333    0.00    0.04      0.024  O        |        |        |        |    585.65
 47.417    0.00    0.04      0.023  O        |        |        |        |    585.65
 47.500    0.00    0.04      0.023  O        |        |        |        |    585.65
 47.583    0.00    0.04      0.023  O        |        |        |        |    585.65
 47.667    0.00    0.04      0.023  O        |        |        |        |    585.64
 47.750    0.00    0.04      0.022  O        |        |        |        |    585.64
 47.833    0.00    0.03      0.022  O        |        |        |        |    585.64
 47.917    0.00    0.03      0.022  O        |        |        |        |    585.64
 48.000    0.00    0.03      0.022  O        |        |        |        |    585.64
 48.083    0.00    0.03      0.021  O        |        |        |        |    585.64
 48.167    0.00    0.03      0.021  O        |        |        |        |    585.64
 48.250    0.00    0.03      0.021  O        |        |        |        |    585.63
 48.333    0.00    0.03      0.021  O        |        |        |        |    585.63
 48.417    0.00    0.03      0.020  O        |        |        |        |    585.63
 48.500    0.00    0.03      0.020  O        |        |        |        |    585.63
 48.583    0.00    0.03      0.020  O        |        |        |        |    585.63
 48.667    0.00    0.03      0.020  O        |        |        |        |    585.63
 48.750    0.00    0.03      0.020  O        |        |        |        |    585.62
 48.833    0.00    0.03      0.019  O        |        |        |        |    585.62
 48.917    0.00    0.03      0.019  O        |        |        |        |    585.62
 49.000    0.00    0.03      0.019  O        |        |        |        |    585.62
 49.083    0.00    0.03      0.019  O        |        |        |        |    585.62
 49.167    0.00    0.03      0.019  O        |        |        |        |    585.62
 49.250    0.00    0.03      0.018  O        |        |        |        |    585.62
 49.333    0.00    0.03      0.018  O        |        |        |        |    585.62
 49.417    0.00    0.03      0.018  O        |        |        |        |    585.61
 49.500    0.00    0.03      0.018  O        |        |        |        |    585.61
 49.583    0.00    0.03      0.018  O        |        |        |        |    585.61
 49.667    0.00    0.03      0.017  O        |        |        |        |    585.61
 49.750    0.00    0.03      0.017  O        |        |        |        |    585.61
 49.833    0.00    0.03      0.017  O        |        |        |        |    585.61
 49.917    0.00    0.03      0.017  O        |        |        |        |    585.61
 50.000    0.00    0.03      0.017  O        |        |        |        |    585.61
 50.083    0.00    0.03      0.016  O        |        |        |        |    585.60
 50.167    0.00    0.03      0.016  O        |        |        |        |    585.60
 50.250    0.00    0.03      0.016  O        |        |        |        |    585.60
 50.333    0.00    0.02      0.016  O        |        |        |        |    585.60
 50.417    0.00    0.02      0.016  O        |        |        |        |    585.60
 50.500    0.00    0.02      0.016  O        |        |        |        |    585.60
 50.583    0.00    0.02      0.015  O        |        |        |        |    585.60
 50.667    0.00    0.02      0.015  O        |        |        |        |    585.60
 50.750    0.00    0.02      0.015  O        |        |        |        |    585.59
 50.833    0.00    0.02      0.015  O        |        |        |        |    585.59
 50.917    0.00    0.02      0.015  O        |        |        |        |    585.59
 51.000    0.00    0.02      0.015  O        |        |        |        |    585.59
```

```
51.083     0.00     0.02       0.014  O        |        |        |        |    585.59
51.167     0.00     0.02       0.014  O        |        |        |        |    585.59
51.250     0.00     0.02       0.014  O        |        |        |        |    585.59
51.333     0.00     0.02       0.014  O        |        |        |        |    585.59
51.417     0.00     0.02       0.014  O        |        |        |        |    585.59
51.500     0.00     0.02       0.014  O        |        |        |        |    585.59
51.583     0.00     0.02       0.014  O        |        |        |        |    585.58
51.667     0.00     0.02       0.013  O        |        |        |        |    585.58
51.750     0.00     0.02       0.013  O        |        |        |        |    585.58
51.833     0.00     0.02       0.013  O        |        |        |        |    585.58
51.917     0.00     0.02       0.013  O        |        |        |        |    585.58
52.000     0.00     0.02       0.013  O        |        |        |        |    585.58
52.083     0.00     0.02       0.013  O        |        |        |        |    585.58
52.167     0.00     0.02       0.013  O        |        |        |        |    585.58
52.250     0.00     0.02       0.012  O        |        |        |        |    585.58
52.333     0.00     0.02       0.012  O        |        |        |        |    585.58
52.417     0.00     0.02       0.012  O        |        |        |        |    585.58
52.500     0.00     0.02       0.012  O        |        |        |        |    585.57
52.583     0.00     0.02       0.012  O        |        |        |        |    585.57
52.667     0.00     0.02       0.012  O        |        |        |        |    585.57
52.750     0.00     0.02       0.012  O        |        |        |        |    585.57
52.833     0.00     0.02       0.012  O        |        |        |        |    585.57
52.917     0.00     0.02       0.011  O        |        |        |        |    585.57
53.000     0.00     0.02       0.011  O        |        |        |        |    585.57
53.083     0.00     0.02       0.011  O        |        |        |        |    585.57
53.167     0.00     0.02       0.011  O        |        |        |        |    585.57
53.250     0.00     0.02       0.011  O        |        |        |        |    585.57
53.333     0.00     0.02       0.011  O        |        |        |        |    585.57
53.417     0.00     0.02       0.011  O        |        |        |        |    585.57
53.500     0.00     0.02       0.011  O        |        |        |        |    585.56
53.583     0.00     0.02       0.010  O        |        |        |        |    585.56
53.667     0.00     0.02       0.010  O        |        |        |        |    585.56
53.750     0.00     0.02       0.010  O        |        |        |        |    585.56
53.833     0.00     0.02       0.010  O        |        |        |        |    585.56
53.917     0.00     0.02       0.010  O        |        |        |        |    585.56
54.000     0.00     0.02       0.010  O        |        |        |        |    585.56
54.083     0.00     0.02       0.010  O        |        |        |        |    585.56
54.167     0.00     0.02       0.010  O        |        |        |        |    585.56
54.250     0.00     0.01       0.010  O        |        |        |        |    585.56
54.333     0.00     0.01       0.010  O        |        |        |        |    585.56
54.417     0.00     0.01       0.009  O        |        |        |        |    585.56
54.500     0.00     0.01       0.009  O        |        |        |        |    585.56
54.583     0.00     0.01       0.009  O        |        |        |        |    585.56
54.667     0.00     0.01       0.009  O        |        |        |        |    585.55
54.750     0.00     0.01       0.009  O        |        |        |        |    585.55
54.833     0.00     0.01       0.009  O        |        |        |        |    585.55
54.917     0.00     0.01       0.009  O        |        |        |        |    585.55
55.000     0.00     0.01       0.009  O        |        |        |        |    585.55
55.083     0.00     0.01       0.009  O        |        |        |        |    585.55
55.167     0.00     0.01       0.009  O        |        |        |        |    585.55
55.250     0.00     0.01       0.008  O        |        |        |        |    585.55
55.333     0.00     0.01       0.008  O        |        |        |        |    585.55
55.417     0.00     0.01       0.008  O        |        |        |        |    585.55
55.500     0.00     0.01       0.008  O        |        |        |        |    585.55
55.583     0.00     0.01       0.008  O        |        |        |        |    585.55
55.667     0.00     0.01       0.008  O        |        |        |        |    585.55
55.750     0.00     0.01       0.008  O        |        |        |        |    585.55
```

```
 55.833     0.00     0.01       0.008  O         |         |         |         |     585.55
 55.917     0.00     0.01       0.008  O         |         |         |         |     585.55
 56.000     0.00     0.01       0.008  O         |         |         |         |     585.55
 56.083     0.00     0.01       0.008  O         |         |         |         |     585.54
 56.167     0.00     0.01       0.008  O         |         |         |         |     585.54
 56.250     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.333     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.417     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.500     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.583     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.667     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.750     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.833     0.00     0.01       0.007  O         |         |         |         |     585.54
 56.917     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.000     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.083     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.167     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.250     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.333     0.00     0.01       0.007  O         |         |         |         |     585.54
 57.417     0.00     0.01       0.006  O         |         |         |         |     585.54
 57.500     0.00     0.01       0.006  O         |         |         |         |     585.54
 57.583     0.00     0.01       0.006  O         |         |         |         |     585.54
 57.667     0.00     0.01       0.006  O         |         |         |         |     585.54
 57.750     0.00     0.01       0.006  O         |         |         |         |     585.53
 57.833     0.00     0.01       0.006  O         |         |         |         |     585.53
 57.917     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.000     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.083     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.167     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.250     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.333     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.417     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.500     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.583     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.667     0.00     0.01       0.006  O         |         |         |         |     585.53
 58.750     0.00     0.01       0.005  O         |         |         |         |     585.53
 58.833     0.00     0.01       0.005  O         |         |         |         |     585.53
 58.917     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.000     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.083     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.167     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.250     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.333     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.417     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.500     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.583     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.667     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.750     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.833     0.00     0.01       0.005  O         |         |         |         |     585.53
 59.917     0.00     0.01       0.005  O         |         |         |         |     585.53
 60.000     0.00     0.01       0.005  O         |         |         |         |     585.52
 60.083     0.00     0.01       0.005  O         |         |         |         |     585.52
 60.167     0.00     0.01       0.005  O         |         |         |         |     585.52
 60.250     0.00     0.01       0.005  O         |         |         |         |     585.52
 60.333     0.00     0.01       0.005  O         |         |         |         |     585.52
 60.417     0.00     0.01       0.004  O         |         |         |         |     585.52
 60.500     0.00     0.01       0.004  O         |         |         |         |     585.52
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  60.583     0.00     0.01      0.004  O        |        |        |        |    585.52
  60.667     0.00     0.01      0.004  O        |        |        |        |    585.52
  60.750     0.00     0.01      0.004  O        |        |        |        |    585.52
  60.833     0.00     0.01      0.004  O        |        |        |        |    585.52
  60.917     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.000     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.083     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.167     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.250     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.333     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.417     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.500     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.583     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.667     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.750     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.833     0.00     0.01      0.004  O        |        |        |        |    585.52
  61.917     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.000     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.083     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.167     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.250     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.333     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.417     0.00     0.01      0.004  O        |        |        |        |    585.52
  62.500     0.00     0.00      0.003  O        |        |        |        |    585.52
  62.583     0.00     0.00      0.003  O        |        |        |        |    585.52
  62.667     0.00     0.00      0.003  O        |        |        |        |    585.52
  62.750     0.00     0.00      0.003  O        |        |        |        |    585.52
  62.833     0.00     0.00      0.003  O        |        |        |        |    585.52
  62.917     0.00     0.00      0.003  O        |        |        |        |    585.52
  63.000     0.00     0.00      0.003  O        |        |        |        |    585.52
  63.083     0.00     0.00      0.003  O        |        |        |        |    585.52
  63.167     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.250     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.333     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.417     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.500     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.583     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.667     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.750     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.833     0.00     0.00      0.003  O        |        |        |        |    585.51
  63.917     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.000     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.083     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.167     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.250     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.333     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.417     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.500     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.583     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.667     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.750     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.833     0.00     0.00      0.003  O        |        |        |        |    585.51
  64.917     0.00     0.00      0.003  O        |        |        |        |    585.51
  65.000     0.00     0.00      0.003  O        |        |        |        |    585.51
  65.083     0.00     0.00      0.003  O        |        |        |        |    585.51
  65.167     0.00     0.00      0.003  O        |        |        |        |    585.51
  65.250     0.00     0.00      0.003  O        |        |        |        |    585.51
```

```
   65.333     0.00     0.00       0.003  O         |         |         |         |    585.51
   65.417     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.500     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.583     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.667     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.750     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.833     0.00     0.00       0.002  O         |         |         |         |    585.51
   65.917     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.000     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.083     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.167     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.250     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.333     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.417     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.500     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.583     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.667     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.750     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.833     0.00     0.00       0.002  O         |         |         |         |    585.51
   66.917     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.000     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.083     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.167     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.250     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.333     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.417     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.500     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.583     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.667     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.750     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.833     0.00     0.00       0.002  O         |         |         |         |    585.51
   67.917     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.000     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.083     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.167     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.250     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.333     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.417     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.500     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.583     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.667     0.00     0.00       0.002  O         |         |         |         |    585.51
   68.750     0.00     0.00       0.002  O         |         |         |         |    585.50
   68.833     0.00     0.00       0.002  O         |         |         |         |    585.50
   68.917     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.000     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.083     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.167     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.250     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.333     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.417     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.500     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.583     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.667     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.750     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.833     0.00     0.00       0.002  O         |         |         |         |    585.50
   69.917     0.00     0.00       0.002  O         |         |         |         |    585.50
   70.000     0.00     0.00       0.002  O         |         |         |         |    585.50
```

```
70.083    0.00    0.00      0.002  O        |       |       |       |  585.50
70.167    0.00    0.00      0.002  O        |       |       |       |  585.50
70.250    0.00    0.00      0.001  O        |       |       |       |  585.50
70.333    0.00    0.00      0.001  O        |       |       |       |  585.50
70.417    0.00    0.00      0.001  O        |       |       |       |  585.50
70.500    0.00    0.00      0.001  O        |       |       |       |  585.50
70.583    0.00    0.00      0.001  O        |       |       |       |  585.50
70.667    0.00    0.00      0.001  O        |       |       |       |  585.50
70.750    0.00    0.00      0.001  O        |       |       |       |  585.50
70.833    0.00    0.00      0.001  O        |       |       |       |  585.50
70.917    0.00    0.00      0.001  O        |       |       |       |  585.50
71.000    0.00    0.00      0.001  O        |       |       |       |  585.50
71.083    0.00    0.00      0.001  O        |       |       |       |  585.50
71.167    0.00    0.00      0.001  O        |       |       |       |  585.50
71.250    0.00    0.00      0.001  O        |       |       |       |  585.50
71.333    0.00    0.00      0.001  O        |       |       |       |  585.50
71.417    0.00    0.00      0.001  O        |       |       |       |  585.50
71.500    0.00    0.00      0.001  O        |       |       |       |  585.50
71.583    0.00    0.00      0.001  O        |       |       |       |  585.50
71.667    0.00    0.00      0.001  O        |       |       |       |  585.50
71.750    0.00    0.00      0.001  O        |       |       |       |  585.50
71.833    0.00    0.00      0.001  O        |       |       |       |  585.50
71.917    0.00    0.00      0.001  O        |       |       |       |  585.50
72.000    0.00    0.00      0.001  O        |       |       |       |  585.50
72.083    0.00    0.00      0.001  O        |       |       |       |  585.50
72.167    0.00    0.00      0.001  O        |       |       |       |  585.50
72.250    0.00    0.00      0.001  O        |       |       |       |  585.50
72.333    0.00    0.00      0.001  O        |       |       |       |  585.50
72.417    0.00    0.00      0.001  O        |       |       |       |  585.50
72.500    0.00    0.00      0.001  O        |       |       |       |  585.50
72.583    0.00    0.00      0.001  O        |       |       |       |  585.50
72.667    0.00    0.00      0.001  O        |       |       |       |  585.50
72.750    0.00    0.00      0.001  O        |       |       |       |  585.50
72.833    0.00    0.00      0.001  O        |       |       |       |  585.50
72.917    0.00    0.00      0.001  O        |       |       |       |  585.50
73.000    0.00    0.00      0.001  O        |       |       |       |  585.50
73.083    0.00    0.00      0.001  O        |       |       |       |  585.50
73.167    0.00    0.00      0.001  O        |       |       |       |  585.50
73.250    0.00    0.00      0.001  O        |       |       |       |  585.50
73.333    0.00    0.00      0.001  O        |       |       |       |  585.50
73.417    0.00    0.00      0.001  O        |       |       |       |  585.50
73.500    0.00    0.00      0.001  O        |       |       |       |  585.50
73.583    0.00    0.00      0.001  O        |       |       |       |  585.50
73.667    0.00    0.00      0.001  O        |       |       |       |  585.50
73.750    0.00    0.00      0.001  O        |       |       |       |  585.50
73.833    0.00    0.00      0.001  O        |       |       |       |  585.50
73.917    0.00    0.00      0.001  O        |       |       |       |  585.50
74.000    0.00    0.00      0.001  O        |       |       |       |  585.50
74.083    0.00    0.00      0.001  O        |       |       |       |  585.50
74.167    0.00    0.00      0.001  O        |       |       |       |  585.50
74.250    0.00    0.00      0.001  O        |       |       |       |  585.50
74.333    0.00    0.00      0.001  O        |       |       |       |  585.50
74.417    0.00    0.00      0.001  O        |       |       |       |  585.50
74.500    0.00    0.00      0.001  O        |       |       |       |  585.50
74.583    0.00    0.00      0.001  O        |       |       |       |  585.50
74.667    0.00    0.00      0.001  O        |       |       |       |  582.72
```

```
****************************HYDROGRAPH DATA****************************
            Number of intervals =   896
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =        0.733 (CFS)
            Total volume =       1.510 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************

--------------------------------------------------------------------
```

```
                FLOOD HYDROGRAPH ROUTING PROGRAM
         Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                     Study date: 10/28/21


---------------------------------------------------------------------
```

TTM 31589
5-Year 6-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop65.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    80
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       16.347 (CFS)
            Total volume =       1.979 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 80
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
  585.500      0.001      0.001      0.001        0.001
  586.500      0.150      0.240      0.149        0.151
```

```
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       4.1    8.17   12.26   16.35 (Ft.)
 0.083    0.26    0.00      0.001  O       |       |       |       |   519.72
 0.167    0.96    0.01      0.005  OI      |       |       |       |   585.53
 0.250    1.31    0.02      0.013  O I     |       |       |       |   585.58
 0.333    1.45    0.03      0.022  O I     |       |       |       |   585.64
 0.417    1.52    0.05      0.032  O I     |       |       |       |   585.71
 0.500    1.62    0.07      0.042  O  I    |       |       |       |   585.78
 0.583    1.77    0.09      0.054  O  I    |       |       |       |   585.85
 0.667    1.84    0.10      0.065  O  I    |       |       |       |   585.93
 0.750    1.86    0.12      0.077  O  I    |       |       |       |   586.01
 0.833    1.88    0.14      0.089  O  I    |       |       |       |   586.09
 0.917    1.88    0.16      0.101  O  I    |       |       |       |   586.17
 1.000    1.94    0.18      0.113  O  I    |       |       |       |   586.25
 1.083    2.07    0.20      0.126  O   I   |       |       |       |   586.34
 1.167    2.12    0.22      0.139  O   I   |       |       |       |   586.42
 1.250    2.14    0.24      0.152  O   I   |       |       |       |   586.51
 1.333    2.15    0.25      0.165  O   I   |       |       |       |   586.60
 1.417    2.15    0.26      0.178  O   I   |       |       |       |   586.69
 1.500    2.16    0.27      0.191  O   I   |       |       |       |   586.77
 1.583    2.16    0.28      0.204  O   I   |       |       |       |   586.86
 1.667    2.16    0.29      0.217  O   I   |       |       |       |   586.94
 1.750    2.16    0.30      0.229  O   I   |       |       |       |   587.03
 1.833    2.16    0.31      0.242  O   I   |       |       |       |   587.12
 1.917    2.16    0.32      0.255  O   I   |       |       |       |   587.20
 2.000    2.21    0.33      0.268  O   I   |       |       |       |   587.29
 2.083    2.29    0.34      0.281  O   I   |       |       |       |   587.37
 2.167    2.26    0.36      0.294  O   I   |       |       |       |   587.46
 2.250    2.36    0.36      0.308  O   I   |       |       |       |   587.55
 2.333    2.40    0.37      0.322  O   I   |       |       |       |   587.64
 2.417    2.41    0.38      0.336  O   I   |       |       |       |   587.74
 2.500    2.42    0.39      0.350  O   I   |       |       |       |   587.83
 2.583    2.43    0.39      0.364  O   I   |       |       |       |   587.92
 2.667    2.43    0.40      0.378  O   I   |       |       |       |   588.02
 2.750    2.48    0.41      0.392  O   I   |       |       |       |   588.11
 2.833    2.62    0.42      0.406  O    I  |       |       |       |   588.21
 2.917    2.66    0.42      0.422  O    I  |       |       |       |   588.31
 3.000    2.68    0.43      0.437  O    I  |       |       |       |   588.41
 3.083    2.69    0.44      0.453  O    I  |       |       |       |   588.52
 3.167    2.75    0.45      0.468  O    I  |       |       |       |   588.62
 3.250    2.88    0.46      0.484  O    I  |       |       |       |   588.73
 3.333    2.93    0.46      0.501  O    I  |       |       |       |   588.84
 3.417    3.00    0.47      0.518  O    I  |       |       |       |   588.96
 3.500    3.19    0.48      0.537  O     I |       |       |       |   589.08
```

```
3.583    3.42    0.49      0.556  O     I |       |       |       |   589.21
3.667    3.62    0.50      0.577  O      I|       |       |       |   589.35
3.750    3.75    0.51      0.599  O      I|       |       |       |   589.49
3.833    3.92    0.52      0.622  |O     I|       |       |       |   589.54
3.917    4.03    0.52      0.645  |O     I|       |       |       |   589.59
4.000    4.20    0.53      0.670  |O      I       |       |       |   589.63
4.083    4.31    0.54      0.696  |O      I       |       |       |   589.68
4.167    4.52    0.55      0.722  |O      I       |       |       |   589.74
4.250    4.77    0.56      0.751  |O      |I      |       |       |   589.79
4.333    5.02    0.57      0.780  |O      |I      |       |       |   589.85
4.417    5.28    0.58      0.812  |O      | I     |       |       |   589.91
4.500    5.49    0.59      0.845  |O      | I     |       |       |   589.97
4.583    5.63    0.60      0.879  |O      |  I    |       |       |   590.04
4.667    5.86    0.61      0.914  |O      |  I    |       |       |   590.10
4.750    6.11    0.62      0.951  |O      |  I    |       |       |   590.18
4.833    6.32    0.64      0.990  |O      |   I   |       |       |   590.25
4.917    6.45    0.65      1.029  |O      |   I   |       |       |   590.33
5.000    6.67    0.66      1.070  |O      |    I  |       |       |   590.40
5.083    7.13    0.68      1.113  |O      |    I  |       |       |   590.49
5.167    8.35    0.69      1.161  |O      |       I       |       |   590.57
5.250   10.17    0.70      1.220  |O      |       |  I    |       |   590.67
5.333   11.79    0.71      1.291  |O      |       |      I|       |   590.80
5.417   13.59    0.73      1.374  |O      |       |       | I     |   590.94
5.500   16.35    0.75      1.472  |O      |       |       |       I   591.11
5.583   16.21    0.77      1.579  |O      |       |       |      I|   591.29
5.667    8.75    0.78      1.659  |O      |       |I      |       |   591.43
5.750    5.24    0.79      1.702  |O      | I     |       |       |   591.50
5.833    3.51    0.80      1.727  |O    I |       |       |       |   591.54
5.917    2.49    0.80      1.742  |O  I   |       |       |       |   591.57
6.000    1.65    0.81      1.751  |O I    |       |       |       |   591.58
6.083    1.01    0.81      1.754  |O      |       |       |       |   591.58
6.167    0.44    0.81      1.754  IO      |       |       |       |   591.58
6.250    0.18    0.81      1.750  IO      |       |       |       |   591.58
6.333    0.09    0.80      1.746  IO      |       |       |       |   591.57
6.417    0.05    0.80      1.741  IO      |       |       |       |   591.56
6.500    0.02    0.80      1.735  IO      |       |       |       |   591.56
6.583    0.01    0.80      1.730  IO      |       |       |       |   591.55
6.667    0.00    0.80      1.724  IO      |       |       |       |   591.54
6.750    0.00    0.80      1.719  IO      |       |       |       |   591.53
6.833    0.00    0.79      1.713  IO      |       |       |       |   591.52
6.917    0.00    0.79      1.708  IO      |       |       |       |   591.51
7.000    0.00    0.79      1.703  IO      |       |       |       |   591.50
7.083    0.00    0.79      1.697  IO      |       |       |       |   591.50
7.167    0.00    0.79      1.692  IO      |       |       |       |   591.49
7.250    0.00    0.79      1.686  IO      |       |       |       |   591.48
7.333    0.00    0.79      1.681  IO      |       |       |       |   591.47
7.417    0.00    0.79      1.675  IO      |       |       |       |   591.46
7.500    0.00    0.78      1.670  IO      |       |       |       |   591.45
7.583    0.00    0.78      1.665  IO      |       |       |       |   591.44
7.667    0.00    0.78      1.659  IO      |       |       |       |   591.43
7.750    0.00    0.78      1.654  IO      |       |       |       |   591.42
7.833    0.00    0.78      1.648  IO      |       |       |       |   591.41
7.917    0.00    0.78      1.643  IO      |       |       |       |   591.40
8.000    0.00    0.78      1.638  IO      |       |       |       |   591.39
8.083    0.00    0.78      1.632  IO      |       |       |       |   591.38
8.167    0.00    0.78      1.627  IO      |       |       |       |   591.37
8.250    0.00    0.78      1.622  IO      |       |       |       |   591.37
```

```
   8.333     0.00     0.77       1.616  IO        |        |        |        |     591.36
   8.417     0.00     0.77       1.611  IO        |        |        |        |     591.35
   8.500     0.00     0.77       1.606  IO        |        |        |        |     591.34
   8.583     0.00     0.77       1.600  IO        |        |        |        |     591.33
   8.667     0.00     0.77       1.595  IO        |        |        |        |     591.32
   8.750     0.00     0.77       1.590  IO        |        |        |        |     591.31
   8.833     0.00     0.77       1.585  IO        |        |        |        |     591.30
   8.917     0.00     0.77       1.579  IO        |        |        |        |     591.29
   9.000     0.00     0.77       1.574  IO        |        |        |        |     591.28
   9.083     0.00     0.77       1.569  IO        |        |        |        |     591.27
   9.167     0.00     0.76       1.563  IO        |        |        |        |     591.26
   9.250     0.00     0.76       1.558  IO        |        |        |        |     591.26
   9.333     0.00     0.76       1.553  IO        |        |        |        |     591.25
   9.417     0.00     0.76       1.548  IO        |        |        |        |     591.24
   9.500     0.00     0.76       1.542  IO        |        |        |        |     591.23
   9.583     0.00     0.76       1.537  IO        |        |        |        |     591.22
   9.667     0.00     0.76       1.532  IO        |        |        |        |     591.21
   9.750     0.00     0.76       1.527  IO        |        |        |        |     591.20
   9.833     0.00     0.76       1.522  IO        |        |        |        |     591.19
   9.917     0.00     0.76       1.516  IO        |        |        |        |     591.18
  10.000     0.00     0.75       1.511  IO        |        |        |        |     591.17
  10.083     0.00     0.75       1.506  IO        |        |        |        |     591.17
  10.167     0.00     0.75       1.501  IO        |        |        |        |     591.16
  10.250     0.00     0.75       1.496  IO        |        |        |        |     591.15
  10.333     0.00     0.75       1.490  IO        |        |        |        |     591.14
  10.417     0.00     0.75       1.485  IO        |        |        |        |     591.13
  10.500     0.00     0.75       1.480  IO        |        |        |        |     591.12
  10.583     0.00     0.75       1.475  IO        |        |        |        |     591.11
  10.667     0.00     0.75       1.470  IO        |        |        |        |     591.10
  10.750     0.00     0.75       1.465  IO        |        |        |        |     591.09
  10.833     0.00     0.74       1.460  IO        |        |        |        |     591.09
  10.917     0.00     0.74       1.454  IO        |        |        |        |     591.08
  11.000     0.00     0.74       1.449  IO        |        |        |        |     591.07
  11.083     0.00     0.74       1.444  IO        |        |        |        |     591.06
  11.167     0.00     0.74       1.439  IO        |        |        |        |     591.05
  11.250     0.00     0.74       1.434  IO        |        |        |        |     591.04
  11.333     0.00     0.74       1.429  IO        |        |        |        |     591.03
  11.417     0.00     0.74       1.424  IO        |        |        |        |     591.02
  11.500     0.00     0.74       1.419  IO        |        |        |        |     591.02
  11.583     0.00     0.74       1.414  IO        |        |        |        |     591.01
  11.667     0.00     0.73       1.409  IO        |        |        |        |     591.00
  11.750     0.00     0.73       1.404  IO        |        |        |        |     590.99
  11.833     0.00     0.73       1.398  IO        |        |        |        |     590.98
  11.917     0.00     0.73       1.393  IO        |        |        |        |     590.97
  12.000     0.00     0.73       1.388  IO        |        |        |        |     590.96
  12.083     0.00     0.73       1.383  IO        |        |        |        |     590.95
  12.167     0.00     0.73       1.378  IO        |        |        |        |     590.95
  12.250     0.00     0.73       1.373  IO        |        |        |        |     590.94
  12.333     0.00     0.73       1.368  IO        |        |        |        |     590.93
  12.417     0.00     0.73       1.363  IO        |        |        |        |     590.92
  12.500     0.00     0.73       1.358  IO        |        |        |        |     590.91
  12.583     0.00     0.72       1.353  IO        |        |        |        |     590.90
  12.667     0.00     0.72       1.348  IO        |        |        |        |     590.89
  12.750     0.00     0.72       1.343  IO        |        |        |        |     590.89
  12.833     0.00     0.72       1.338  IO        |        |        |        |     590.88
  12.917     0.00     0.72       1.333  IO        |        |        |        |     590.87
  13.000     0.00     0.72       1.328  IO        |        |        |        |     590.86
```

```
13.083    0.00    0.72      1.324  IO      |       |       |       |   590.85
13.167    0.00    0.72      1.319  IO      |       |       |       |   590.84
13.250    0.00    0.72      1.314  IO      |       |       |       |   590.83
13.333    0.00    0.72      1.309  IO      |       |       |       |   590.83
13.417    0.00    0.71      1.304  IO      |       |       |       |   590.82
13.500    0.00    0.71      1.299  IO      |       |       |       |   590.81
13.583    0.00    0.71      1.294  IO      |       |       |       |   590.80
13.667    0.00    0.71      1.289  IO      |       |       |       |   590.79
13.750    0.00    0.71      1.284  IO      |       |       |       |   590.78
13.833    0.00    0.71      1.279  IO      |       |       |       |   590.77
13.917    0.00    0.71      1.274  IO      |       |       |       |   590.77
14.000    0.00    0.71      1.269  IO      |       |       |       |   590.76
14.083    0.00    0.71      1.265  IO      |       |       |       |   590.75
14.167    0.00    0.71      1.260  IO      |       |       |       |   590.74
14.250    0.00    0.71      1.255  IO      |       |       |       |   590.73
14.333    0.00    0.70      1.250  IO      |       |       |       |   590.72
14.417    0.00    0.70      1.245  IO      |       |       |       |   590.72
14.500    0.00    0.70      1.240  IO      |       |       |       |   590.71
14.583    0.00    0.70      1.235  IO      |       |       |       |   590.70
14.667    0.00    0.70      1.231  IO      |       |       |       |   590.69
14.750    0.00    0.70      1.226  IO      |       |       |       |   590.68
14.833    0.00    0.70      1.221  IO      |       |       |       |   590.67
14.917    0.00    0.70      1.216  IO      |       |       |       |   590.67
15.000    0.00    0.70      1.211  IO      |       |       |       |   590.66
15.083    0.00    0.70      1.207  IO      |       |       |       |   590.65
15.167    0.00    0.70      1.202  IO      |       |       |       |   590.64
15.250    0.00    0.69      1.197  IO      |       |       |       |   590.63
15.333    0.00    0.69      1.192  IO      |       |       |       |   590.62
15.417    0.00    0.69      1.187  IO      |       |       |       |   590.62
15.500    0.00    0.69      1.183  IO      |       |       |       |   590.61
15.583    0.00    0.69      1.178  IO      |       |       |       |   590.60
15.667    0.00    0.69      1.173  IO      |       |       |       |   590.59
15.750    0.00    0.69      1.168  IO      |       |       |       |   590.58
15.833    0.00    0.69      1.164  IO      |       |       |       |   590.58
15.917    0.00    0.69      1.159  IO      |       |       |       |   590.57
16.000    0.00    0.69      1.154  IO      |       |       |       |   590.56
16.083    0.00    0.69      1.149  IO      |       |       |       |   590.55
16.167    0.00    0.68      1.145  IO      |       |       |       |   590.54
16.250    0.00    0.68      1.140  IO      |       |       |       |   590.53
16.333    0.00    0.68      1.135  IO      |       |       |       |   590.53
16.417    0.00    0.68      1.131  IO      |       |       |       |   590.52
16.500    0.00    0.68      1.126  IO      |       |       |       |   590.51
16.583    0.00    0.68      1.121  IO      |       |       |       |   590.50
16.667    0.00    0.68      1.117  IO      |       |       |       |   590.49
16.750    0.00    0.68      1.112  IO      |       |       |       |   590.48
16.833    0.00    0.68      1.107  IO      |       |       |       |   590.48
16.917    0.00    0.67      1.103  IO      |       |       |       |   590.47
17.000    0.00    0.67      1.098  IO      |       |       |       |   590.46
17.083    0.00    0.67      1.093  IO      |       |       |       |   590.45
17.167    0.00    0.67      1.089  IO      |       |       |       |   590.44
17.250    0.00    0.67      1.084  IO      |       |       |       |   590.43
17.333    0.00    0.67      1.080  IO      |       |       |       |   590.42
17.417    0.00    0.67      1.075  IO      |       |       |       |   590.41
17.500    0.00    0.66      1.070  IO      |       |       |       |   590.40
17.583    0.00    0.66      1.066  IO      |       |       |       |   590.40
17.667    0.00    0.66      1.061  IO      |       |       |       |   590.39
17.750    0.00    0.66      1.057  IO      |       |       |       |   590.38
```

```
  17.833    0.00    0.66      1.052  IO       |       |       |       |    590.37
  17.917    0.00    0.66      1.048  IO       |       |       |       |    590.36
  18.000    0.00    0.65      1.043  IO       |       |       |       |    590.35
  18.083    0.00    0.65      1.039  IO       |       |       |       |    590.34
  18.167    0.00    0.65      1.034  IO       |       |       |       |    590.33
  18.250    0.00    0.65      1.030  IO       |       |       |       |    590.33
  18.333    0.00    0.65      1.025  IO       |       |       |       |    590.32
  18.417    0.00    0.65      1.021  IO       |       |       |       |    590.31
  18.500    0.00    0.65      1.016  IO       |       |       |       |    590.30
  18.583    0.00    0.64      1.012  IO       |       |       |       |    590.29
  18.667    0.00    0.64      1.007  IO       |       |       |       |    590.28
  18.750    0.00    0.64      1.003  IO       |       |       |       |    590.27
  18.833    0.00    0.64      0.998  IO       |       |       |       |    590.27
  18.917    0.00    0.64      0.994  IO       |       |       |       |    590.26
  19.000    0.00    0.64      0.990  IO       |       |       |       |    590.25
  19.083    0.00    0.64      0.985  IO       |       |       |       |    590.24
  19.167    0.00    0.63      0.981  IO       |       |       |       |    590.23
  19.250    0.00    0.63      0.977  IO       |       |       |       |    590.22
  19.333    0.00    0.63      0.972  IO       |       |       |       |    590.22
  19.417    0.00    0.63      0.968  IO       |       |       |       |    590.21
  19.500    0.00    0.63      0.964  IO       |       |       |       |    590.20
  19.583    0.00    0.63      0.959  IO       |       |       |       |    590.19
  19.667    0.00    0.63      0.955  IO       |       |       |       |    590.18
  19.750    0.00    0.62      0.951  IO       |       |       |       |    590.17
  19.833    0.00    0.62      0.946  IO       |       |       |       |    590.17
  19.917    0.00    0.62      0.942  IO       |       |       |       |    590.16
  20.000    0.00    0.62      0.938  IO       |       |       |       |    590.15
  20.083    0.00    0.62      0.933  IO       |       |       |       |    590.14
  20.167    0.00    0.62      0.929  IO       |       |       |       |    590.13
  20.250    0.00    0.62      0.925  IO       |       |       |       |    590.12
  20.333    0.00    0.61      0.921  IO       |       |       |       |    590.12
  20.417    0.00    0.61      0.916  IO       |       |       |       |    590.11
  20.500    0.00    0.61      0.912  IO       |       |       |       |    590.10
  20.583    0.00    0.61      0.908  IO       |       |       |       |    590.09
  20.667    0.00    0.61      0.904  IO       |       |       |       |    590.08
  20.750    0.00    0.61      0.900  IO       |       |       |       |    590.08
  20.833    0.00    0.61      0.895  IO       |       |       |       |    590.07
  20.917    0.00    0.61      0.891  IO       |       |       |       |    590.06
  21.000    0.00    0.60      0.887  IO       |       |       |       |    590.05
  21.083    0.00    0.60      0.883  IO       |       |       |       |    590.04
  21.167    0.00    0.60      0.879  IO       |       |       |       |    590.04
  21.250    0.00    0.60      0.875  IO       |       |       |       |    590.03
  21.333    0.00    0.60      0.871  IO       |       |       |       |    590.02
  21.417    0.00    0.60      0.866  IO       |       |       |       |    590.01
  21.500    0.00    0.60      0.862  IO       |       |       |       |    590.00
  21.583    0.00    0.59      0.858  IO       |       |       |       |    590.00
  21.667    0.00    0.59      0.854  IO       |       |       |       |    589.99
  21.750    0.00    0.59      0.850  IO       |       |       |       |    589.98
  21.833    0.00    0.59      0.846  IO       |       |       |       |    589.97
  21.917    0.00    0.59      0.842  IO       |       |       |       |    589.97
  22.000    0.00    0.59      0.838  IO       |       |       |       |    589.96
  22.083    0.00    0.59      0.834  IO       |       |       |       |    589.95
  22.167    0.00    0.59      0.830  IO       |       |       |       |    589.94
  22.250    0.00    0.58      0.826  IO       |       |       |       |    589.93
  22.333    0.00    0.58      0.822  IO       |       |       |       |    589.93
  22.417    0.00    0.58      0.818  IO       |       |       |       |    589.92
  22.500    0.00    0.58      0.814  IO       |       |       |       |    589.91
```

```
   22.583    0.00    0.58     0.810  IO      |       |       |       |    589.90
   22.667    0.00    0.58     0.806  IO      |       |       |       |    589.90
   22.750    0.00    0.58     0.802  IO      |       |       |       |    589.89
   22.833    0.00    0.57     0.798  IO      |       |       |       |    589.88
   22.917    0.00    0.57     0.794  IO      |       |       |       |    589.87
   23.000    0.00    0.57     0.790  IO      |       |       |       |    589.87
   23.083    0.00    0.57     0.786  IO      |       |       |       |    589.86
   23.167    0.00    0.57     0.782  IO      |       |       |       |    589.85
   23.250    0.00    0.57     0.778  IO      |       |       |       |    589.84
   23.333    0.00    0.57     0.774  IO      |       |       |       |    589.84
   23.417    0.00    0.57     0.770  IO      |       |       |       |    589.83
   23.500    0.00    0.56     0.766  IO      |       |       |       |    589.82
   23.583    0.00    0.56     0.763  IO      |       |       |       |    589.81
   23.667    0.00    0.56     0.759  IO      |       |       |       |    589.81
   23.750    0.00    0.56     0.755  IO      |       |       |       |    589.80
   23.833    0.00    0.56     0.751  IO      |       |       |       |    589.79
   23.917    0.00    0.56     0.747  IO      |       |       |       |    589.78
   24.000    0.00    0.56     0.743  IO      |       |       |       |    589.78
   24.083    0.00    0.56     0.739  IO      |       |       |       |    589.77
   24.167    0.00    0.55     0.736  IO      |       |       |       |    589.76
   24.250    0.00    0.55     0.732  IO      |       |       |       |    589.75
   24.333    0.00    0.55     0.728  IO      |       |       |       |    589.75
   24.417    0.00    0.55     0.724  IO      |       |       |       |    589.74
   24.500    0.00    0.55     0.720  IO      |       |       |       |    589.73
   24.583    0.00    0.55     0.717  IO      |       |       |       |    589.72
   24.667    0.00    0.55     0.713  IO      |       |       |       |    589.72
   24.750    0.00    0.55     0.709  IO      |       |       |       |    589.71
   24.833    0.00    0.54     0.705  IO      |       |       |       |    589.70
   24.917    0.00    0.54     0.702  IO      |       |       |       |    589.70
   25.000    0.00    0.54     0.698  IO      |       |       |       |    589.69
   25.083    0.00    0.54     0.694  IO      |       |       |       |    589.68
   25.167    0.00    0.54     0.690  IO      |       |       |       |    589.67
   25.250    0.00    0.54     0.687  IO      |       |       |       |    589.67
   25.333    0.00    0.54     0.683  IO      |       |       |       |    589.66
   25.417    0.00    0.54     0.679  IO      |       |       |       |    589.65
   25.500    0.00    0.53     0.676  IO      |       |       |       |    589.65
   25.583    0.00    0.53     0.672  IO      |       |       |       |    589.64
   25.667    0.00    0.53     0.668  IO      |       |       |       |    589.63
   25.750    0.00    0.53     0.665  IO      |       |       |       |    589.62
   25.833    0.00    0.53     0.661  IO      |       |       |       |    589.62
   25.917    0.00    0.53     0.657  IO      |       |       |       |    589.61
   26.000    0.00    0.53     0.654  IO      |       |       |       |    589.60
   26.083    0.00    0.53     0.650  IO      |       |       |       |    589.60
   26.167    0.00    0.53     0.646  IO      |       |       |       |    589.59
   26.250    0.00    0.52     0.643  IO      |       |       |       |    589.58
   26.333    0.00    0.52     0.639  IO      |       |       |       |    589.58
   26.417    0.00    0.52     0.636  IO      |       |       |       |    589.57
   26.500    0.00    0.52     0.632  IO      |       |       |       |    589.56
   26.583    0.00    0.52     0.628  IO      |       |       |       |    589.55
   26.667    0.00    0.52     0.625  IO      |       |       |       |    589.55
   26.750    0.00    0.52     0.621  IO      |       |       |       |    589.54
   26.833    0.00    0.52     0.618  IO      |       |       |       |    589.53
   26.917    0.00    0.51     0.614  IO      |       |       |       |    589.53
   27.000    0.00    0.51     0.611  IO      |       |       |       |    589.52
   27.083    0.00    0.51     0.607  IO      |       |       |       |    589.51
   27.167    0.00    0.51     0.604  IO      |       |       |       |    589.51
   27.250    0.00    0.51     0.600  O       |       |       |       |    589.50
```

```
 27.333    0.00    0.51      0.597  O         |         |         |         |     589.48
 27.417    0.00    0.51      0.593  O         |         |         |         |     589.45
 27.500    0.00    0.51      0.590  O         |         |         |         |     589.43
 27.583    0.00    0.50      0.586  O         |         |         |         |     589.41
 27.667    0.00    0.50      0.583  O         |         |         |         |     589.38
 27.750    0.00    0.50      0.579  O         |         |         |         |     589.36
 27.833    0.00    0.50      0.576  O         |         |         |         |     589.34
 27.917    0.00    0.50      0.572  O         |         |         |         |     589.32
 28.000    0.00    0.50      0.569  O         |         |         |         |     589.29
 28.083    0.00    0.49      0.566  O         |         |         |         |     589.27
 28.167    0.00    0.49      0.562  O         |         |         |         |     589.25
 28.250    0.00    0.49      0.559  O         |         |         |         |     589.23
 28.333    0.00    0.49      0.555  O         |         |         |         |     589.20
 28.417    0.00    0.49      0.552  O         |         |         |         |     589.18
 28.500    0.00    0.49      0.549  O         |         |         |         |     589.16
 28.583    0.00    0.48      0.545  O         |         |         |         |     589.14
 28.667    0.00    0.48      0.542  O         |         |         |         |     589.11
 28.750    0.00    0.48      0.539  O         |         |         |         |     589.09
 28.833    0.00    0.48      0.535  O         |         |         |         |     589.07
 28.917    0.00    0.48      0.532  O         |         |         |         |     589.05
 29.000    0.00    0.48      0.529  O         |         |         |         |     589.03
 29.083    0.00    0.48      0.526  O         |         |         |         |     589.00
 29.167    0.00    0.47      0.522  O         |         |         |         |     588.98
 29.250    0.00    0.47      0.519  O         |         |         |         |     588.96
 29.333    0.00    0.47      0.516  O         |         |         |         |     588.94
 29.417    0.00    0.47      0.513  O         |         |         |         |     588.92
 29.500    0.00    0.47      0.509  O         |         |         |         |     588.90
 29.583    0.00    0.47      0.506  O         |         |         |         |     588.87
 29.667    0.00    0.46      0.503  O         |         |         |         |     588.85
 29.750    0.00    0.46      0.500  O         |         |         |         |     588.83
 29.833    0.00    0.46      0.496  O         |         |         |         |     588.81
 29.917    0.00    0.46      0.493  O         |         |         |         |     588.79
 30.000    0.00    0.46      0.490  O         |         |         |         |     588.77
 30.083    0.00    0.46      0.487  O         |         |         |         |     588.75
 30.167    0.00    0.46      0.484  O         |         |         |         |     588.73
 30.250    0.00    0.45      0.481  O         |         |         |         |     588.70
 30.333    0.00    0.45      0.478  O         |         |         |         |     588.68
 30.417    0.00    0.45      0.474  O         |         |         |         |     588.66
 30.500    0.00    0.45      0.471  O         |         |         |         |     588.64
 30.583    0.00    0.45      0.468  O         |         |         |         |     588.62
 30.667    0.00    0.45      0.465  O         |         |         |         |     588.60
 30.750    0.00    0.45      0.462  O         |         |         |         |     588.58
 30.833    0.00    0.44      0.459  O         |         |         |         |     588.56
 30.917    0.00    0.44      0.456  O         |         |         |         |     588.54
 31.000    0.00    0.44      0.453  O         |         |         |         |     588.52
 31.083    0.00    0.44      0.450  O         |         |         |         |     588.50
 31.167    0.00    0.44      0.447  O         |         |         |         |     588.48
 31.250    0.00    0.44      0.444  O         |         |         |         |     588.46
 31.333    0.00    0.44      0.441  O         |         |         |         |     588.44
 31.417    0.00    0.43      0.438  O         |         |         |         |     588.42
 31.500    0.00    0.43      0.435  O         |         |         |         |     588.40
 31.583    0.00    0.43      0.432  O         |         |         |         |     588.38
 31.667    0.00    0.43      0.429  O         |         |         |         |     588.36
 31.750    0.00    0.43      0.426  O         |         |         |         |     588.34
 31.833    0.00    0.43      0.423  O         |         |         |         |     588.32
 31.917    0.00    0.42      0.420  O         |         |         |         |     588.30
 32.000    0.00    0.42      0.417  O         |         |         |         |     588.28
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  32.083     0.00     0.42       0.414  O        |         |         |         |     588.26
  32.167     0.00     0.42       0.411  O        |         |         |         |     588.24
  32.250     0.00     0.42       0.409  O        |         |         |         |     588.22
  32.333     0.00     0.42       0.406  O        |         |         |         |     588.20
  32.417     0.00     0.41       0.403  O        |         |         |         |     588.19
  32.500     0.00     0.41       0.400  O        |         |         |         |     588.17
  32.583     0.00     0.41       0.397  O        |         |         |         |     588.15
  32.667     0.00     0.41       0.394  O        |         |         |         |     588.13
  32.750     0.00     0.41       0.391  O        |         |         |         |     588.11
  32.833     0.00     0.41       0.389  O        |         |         |         |     588.09
  32.917     0.00     0.41       0.386  O        |         |         |         |     588.07
  33.000     0.00     0.40       0.383  O        |         |         |         |     588.05
  33.083     0.00     0.40       0.380  O        |         |         |         |     588.04
  33.167     0.00     0.40       0.378  O        |         |         |         |     588.02
  33.250     0.00     0.40       0.375  O        |         |         |         |     588.00
  33.333     0.00     0.40       0.372  O        |         |         |         |     587.98
  33.417     0.00     0.40       0.369  O        |         |         |         |     587.96
  33.500     0.00     0.40       0.367  O        |         |         |         |     587.94
  33.583     0.00     0.39       0.364  O        |         |         |         |     587.93
  33.667     0.00     0.39       0.361  O        |         |         |         |     587.91
  33.750     0.00     0.39       0.358  O        |         |         |         |     587.89
  33.833     0.00     0.39       0.356  O        |         |         |         |     587.87
  33.917     0.00     0.39       0.353  O        |         |         |         |     587.85
  34.000     0.00     0.39       0.350  O        |         |         |         |     587.84
  34.083     0.00     0.39       0.348  O        |         |         |         |     587.82
  34.167     0.00     0.38       0.345  O        |         |         |         |     587.80
  34.250     0.00     0.38       0.342  O        |         |         |         |     587.78
  34.333     0.00     0.38       0.340  O        |         |         |         |     587.77
  34.417     0.00     0.38       0.337  O        |         |         |         |     587.75
  34.500     0.00     0.38       0.335  O        |         |         |         |     587.73
  34.583     0.00     0.38       0.332  O        |         |         |         |     587.71
  34.667     0.00     0.38       0.329  O        |         |         |         |     587.70
  34.750     0.00     0.37       0.327  O        |         |         |         |     587.68
  34.833     0.00     0.37       0.324  O        |         |         |         |     587.66
  34.917     0.00     0.37       0.322  O        |         |         |         |     587.64
  35.000     0.00     0.37       0.319  O        |         |         |         |     587.63
  35.083     0.00     0.37       0.317  O        |         |         |         |     587.61
  35.167     0.00     0.37       0.314  O        |         |         |         |     587.59
  35.250     0.00     0.37       0.312  O        |         |         |         |     587.58
  35.333     0.00     0.36       0.309  O        |         |         |         |     587.56
  35.417     0.00     0.36       0.306  O        |         |         |         |     587.54
  35.500     0.00     0.36       0.304  O        |         |         |         |     587.53
  35.583     0.00     0.36       0.302  O        |         |         |         |     587.51
  35.667     0.00     0.36       0.299  O        |         |         |         |     587.49
  35.750     0.00     0.36       0.297  O        |         |         |         |     587.48
  35.833     0.00     0.36       0.294  O        |         |         |         |     587.46
  35.917     0.00     0.35       0.292  O        |         |         |         |     587.44
  36.000     0.00     0.35       0.289  O        |         |         |         |     587.43
  36.083     0.00     0.35       0.287  O        |         |         |         |     587.41
  36.167     0.00     0.35       0.284  O        |         |         |         |     587.40
  36.250     0.00     0.35       0.282  O        |         |         |         |     587.38
  36.333     0.00     0.34       0.280  O        |         |         |         |     587.36
  36.417     0.00     0.34       0.277  O        |         |         |         |     587.35
  36.500     0.00     0.34       0.275  O        |         |         |         |     587.33
  36.583     0.00     0.34       0.273  O        |         |         |         |     587.32
  36.667     0.00     0.34       0.270  O        |         |         |         |     587.30
  36.750     0.00     0.33       0.268  O        |         |         |         |     587.29
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 36.833     0.00     0.33       0.266  O           |         |         |         |    587.27
 36.917     0.00     0.33       0.263  O           |         |         |         |    587.26
 37.000     0.00     0.33       0.261  O           |         |         |         |    587.24
 37.083     0.00     0.33       0.259  O           |         |         |         |    587.23
 37.167     0.00     0.33       0.257  O           |         |         |         |    587.21
 37.250     0.00     0.32       0.254  O           |         |         |         |    587.20
 37.333     0.00     0.32       0.252  O           |         |         |         |    587.18
 37.417     0.00     0.32       0.250  O           |         |         |         |    587.17
 37.500     0.00     0.32       0.248  O           |         |         |         |    587.15
 37.583     0.00     0.32       0.246  O           |         |         |         |    587.14
 37.667     0.00     0.31       0.243  O           |         |         |         |    587.12
 37.750     0.00     0.31       0.241  O           |         |         |         |    587.11
 37.833     0.00     0.31       0.239  O           |         |         |         |    587.09
 37.917     0.00     0.31       0.237  O           |         |         |         |    587.08
 38.000     0.00     0.31       0.235  O           |         |         |         |    587.07
 38.083     0.00     0.31       0.233  O           |         |         |         |    587.05
 38.167     0.00     0.30       0.231  O           |         |         |         |    587.04
 38.250     0.00     0.30       0.229  O           |         |         |         |    587.02
 38.333     0.00     0.30       0.226  O           |         |         |         |    587.01
 38.417     0.00     0.30       0.224  O           |         |         |         |    587.00
 38.500     0.00     0.30       0.222  O           |         |         |         |    586.98
 38.583     0.00     0.30       0.220  O           |         |         |         |    586.97
 38.667     0.00     0.29       0.218  O           |         |         |         |    586.95
 38.750     0.00     0.29       0.216  O           |         |         |         |    586.94
 38.833     0.00     0.29       0.214  O           |         |         |         |    586.93
 38.917     0.00     0.29       0.212  O           |         |         |         |    586.91
 39.000     0.00     0.29       0.210  O           |         |         |         |    586.90
 39.083     0.00     0.29       0.208  O           |         |         |         |    586.89
 39.167     0.00     0.29       0.206  O           |         |         |         |    586.88
 39.250     0.00     0.28       0.204  O           |         |         |         |    586.86
 39.333     0.00     0.28       0.202  O           |         |         |         |    586.85
 39.417     0.00     0.28       0.200  O           |         |         |         |    586.84
 39.500     0.00     0.28       0.198  O           |         |         |         |    586.82
 39.583     0.00     0.28       0.197  O           |         |         |         |    586.81
 39.667     0.00     0.28       0.195  O           |         |         |         |    586.80
 39.750     0.00     0.27       0.193  O           |         |         |         |    586.79
 39.833     0.00     0.27       0.191  O           |         |         |         |    586.77
 39.917     0.00     0.27       0.189  O           |         |         |         |    586.76
 40.000     0.00     0.27       0.187  O           |         |         |         |    586.75
 40.083     0.00     0.27       0.185  O           |         |         |         |    586.74
 40.167     0.00     0.27       0.183  O           |         |         |         |    586.72
 40.250     0.00     0.27       0.182  O           |         |         |         |    586.71
 40.333     0.00     0.26       0.180  O           |         |         |         |    586.70
 40.417     0.00     0.26       0.178  O           |         |         |         |    586.69
 40.500     0.00     0.26       0.176  O           |         |         |         |    586.67
 40.583     0.00     0.26       0.174  O           |         |         |         |    586.66
 40.667     0.00     0.26       0.173  O           |         |         |         |    586.65
 40.750     0.00     0.26       0.171  O           |         |         |         |    586.64
 40.833     0.00     0.26       0.169  O           |         |         |         |    586.63
 40.917     0.00     0.25       0.167  O           |         |         |         |    586.62
 41.000     0.00     0.25       0.166  O           |         |         |         |    586.60
 41.083     0.00     0.25       0.164  O           |         |         |         |    586.59
 41.167     0.00     0.25       0.162  O           |         |         |         |    586.58
 41.250     0.00     0.25       0.160  O           |         |         |         |    586.57
 41.333     0.00     0.25       0.159  O           |         |         |         |    586.56
 41.417     0.00     0.25       0.157  O           |         |         |         |    586.55
 41.500     0.00     0.24       0.155  O           |         |         |         |    586.54
```

```
 41.583    0.00    0.24     0.154  O         |         |         |         |   586.52
 41.667    0.00    0.24     0.152  O         |         |         |         |   586.51
 41.750    0.00    0.24     0.150  O         |         |         |         |   586.50
 41.833    0.00    0.24     0.149  O         |         |         |         |   586.49
 41.917    0.00    0.24     0.147  O         |         |         |         |   586.48
 42.000    0.00    0.23     0.145  O         |         |         |         |   586.47
 42.083    0.00    0.23     0.144  O         |         |         |         |   586.46
 42.167    0.00    0.23     0.142  O         |         |         |         |   586.45
 42.250    0.00    0.23     0.141  O         |         |         |         |   586.44
 42.333    0.00    0.22     0.139  O         |         |         |         |   586.43
 42.417    0.00    0.22     0.138  O         |         |         |         |   586.42
 42.500    0.00    0.22     0.136  O         |         |         |         |   586.41
 42.583    0.00    0.22     0.135  O         |         |         |         |   586.40
 42.667    0.00    0.21     0.133  O         |         |         |         |   586.39
 42.750    0.00    0.21     0.132  O         |         |         |         |   586.38
 42.833    0.00    0.21     0.130  O         |         |         |         |   586.37
 42.917    0.00    0.21     0.129  O         |         |         |         |   586.36
 43.000    0.00    0.20     0.127  O         |         |         |         |   586.35
 43.083    0.00    0.20     0.126  O         |         |         |         |   586.34
 43.167    0.00    0.20     0.125  O         |         |         |         |   586.33
 43.250    0.00    0.20     0.123  O         |         |         |         |   586.32
 43.333    0.00    0.19     0.122  O         |         |         |         |   586.31
 43.417    0.00    0.19     0.121  O         |         |         |         |   586.30
 43.500    0.00    0.19     0.119  O         |         |         |         |   586.29
 43.583    0.00    0.19     0.118  O         |         |         |         |   586.29
 43.667    0.00    0.19     0.117  O         |         |         |         |   586.28
 43.750    0.00    0.18     0.115  O         |         |         |         |   586.27
 43.833    0.00    0.18     0.114  O         |         |         |         |   586.26
 43.917    0.00    0.18     0.113  O         |         |         |         |   586.25
 44.000    0.00    0.18     0.112  O         |         |         |         |   586.24
 44.083    0.00    0.18     0.110  O         |         |         |         |   586.23
 44.167    0.00    0.17     0.109  O         |         |         |         |   586.23
 44.250    0.00    0.17     0.108  O         |         |         |         |   586.22
 44.333    0.00    0.17     0.107  O         |         |         |         |   586.21
 44.417    0.00    0.17     0.106  O         |         |         |         |   586.20
 44.500    0.00    0.17     0.105  O         |         |         |         |   586.19
 44.583    0.00    0.17     0.103  O         |         |         |         |   586.19
 44.667    0.00    0.16     0.102  O         |         |         |         |   586.18
 44.750    0.00    0.16     0.101  O         |         |         |         |   586.17
 44.833    0.00    0.16     0.100  O         |         |         |         |   586.16
 44.917    0.00    0.16     0.099  O         |         |         |         |   586.16
 45.000    0.00    0.16     0.098  O         |         |         |         |   586.15
 45.083    0.00    0.15     0.097  O         |         |         |         |   586.14
 45.167    0.00    0.15     0.096  O         |         |         |         |   586.14
 45.250    0.00    0.15     0.095  O         |         |         |         |   586.13
 45.333    0.00    0.15     0.094  O         |         |         |         |   586.12
 45.417    0.00    0.15     0.093  O         |         |         |         |   586.11
 45.500    0.00    0.15     0.092  O         |         |         |         |   586.11
 45.583    0.00    0.14     0.091  O         |         |         |         |   586.10
 45.667    0.00    0.14     0.090  O         |         |         |         |   586.09
 45.750    0.00    0.14     0.089  O         |         |         |         |   586.09
 45.833    0.00    0.14     0.088  O         |         |         |         |   586.08
 45.917    0.00    0.14     0.087  O         |         |         |         |   586.08
 46.000    0.00    0.14     0.086  O         |         |         |         |   586.07
 46.083    0.00    0.14     0.085  O         |         |         |         |   586.06
 46.167    0.00    0.13     0.084  O         |         |         |         |   586.06
 46.250    0.00    0.13     0.083  O         |         |         |         |   586.05
```

```
46.333    0.00    0.13      0.082  O        |        |        |        |    586.04
46.417    0.00    0.13      0.081  O        |        |        |        |    586.04
46.500    0.00    0.13      0.080  O        |        |        |        |    586.03
46.583    0.00    0.13      0.079  O        |        |        |        |    586.03
46.667    0.00    0.13      0.079  O        |        |        |        |    586.02
46.750    0.00    0.12      0.078  O        |        |        |        |    586.01
46.833    0.00    0.12      0.077  O        |        |        |        |    586.01
46.917    0.00    0.12      0.076  O        |        |        |        |    586.00
47.000    0.00    0.12      0.075  O        |        |        |        |    586.00
47.083    0.00    0.12      0.074  O        |        |        |        |    585.99
47.167    0.00    0.12      0.074  O        |        |        |        |    585.99
47.250    0.00    0.12      0.073  O        |        |        |        |    585.98
47.333    0.00    0.11      0.072  O        |        |        |        |    585.98
47.417    0.00    0.11      0.071  O        |        |        |        |    585.97
47.500    0.00    0.11      0.070  O        |        |        |        |    585.97
47.583    0.00    0.11      0.070  O        |        |        |        |    585.96
47.667    0.00    0.11      0.069  O        |        |        |        |    585.96
47.750    0.00    0.11      0.068  O        |        |        |        |    585.95
47.833    0.00    0.11      0.067  O        |        |        |        |    585.95
47.917    0.00    0.11      0.067  O        |        |        |        |    585.94
48.000    0.00    0.11      0.066  O        |        |        |        |    585.94
48.083    0.00    0.10      0.065  O        |        |        |        |    585.93
48.167    0.00    0.10      0.064  O        |        |        |        |    585.93
48.250    0.00    0.10      0.064  O        |        |        |        |    585.92
48.333    0.00    0.10      0.063  O        |        |        |        |    585.92
48.417    0.00    0.10      0.062  O        |        |        |        |    585.91
48.500    0.00    0.10      0.062  O        |        |        |        |    585.91
48.583    0.00    0.10      0.061  O        |        |        |        |    585.90
48.667    0.00    0.10      0.060  O        |        |        |        |    585.90
48.750    0.00    0.10      0.060  O        |        |        |        |    585.89
48.833    0.00    0.09      0.059  O        |        |        |        |    585.89
48.917    0.00    0.09      0.058  O        |        |        |        |    585.89
49.000    0.00    0.09      0.058  O        |        |        |        |    585.88
49.083    0.00    0.09      0.057  O        |        |        |        |    585.88
49.167    0.00    0.09      0.056  O        |        |        |        |    585.87
49.250    0.00    0.09      0.056  O        |        |        |        |    585.87
49.333    0.00    0.09      0.055  O        |        |        |        |    585.86
49.417    0.00    0.09      0.055  O        |        |        |        |    585.86
49.500    0.00    0.09      0.054  O        |        |        |        |    585.86
49.583    0.00    0.09      0.053  O        |        |        |        |    585.85
49.667    0.00    0.08      0.053  O        |        |        |        |    585.85
49.750    0.00    0.08      0.052  O        |        |        |        |    585.84
49.833    0.00    0.08      0.052  O        |        |        |        |    585.84
49.917    0.00    0.08      0.051  O        |        |        |        |    585.84
50.000    0.00    0.08      0.051  O        |        |        |        |    585.83
50.083    0.00    0.08      0.050  O        |        |        |        |    585.83
50.167    0.00    0.08      0.050  O        |        |        |        |    585.83
50.250    0.00    0.08      0.049  O        |        |        |        |    585.82
50.333    0.00    0.08      0.048  O        |        |        |        |    585.82
50.417    0.00    0.08      0.048  O        |        |        |        |    585.81
50.500    0.00    0.08      0.047  O        |        |        |        |    585.81
50.583    0.00    0.07      0.047  O        |        |        |        |    585.81
50.667    0.00    0.07      0.046  O        |        |        |        |    585.80
50.750    0.00    0.07      0.046  O        |        |        |        |    585.80
50.833    0.00    0.07      0.045  O        |        |        |        |    585.80
50.917    0.00    0.07      0.045  O        |        |        |        |    585.79
51.000    0.00    0.07      0.044  O        |        |        |        |    585.79
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 51.083    0.00    0.07      0.044  O         |         |         |         |      585.79
 51.167    0.00    0.07      0.043  O         |         |         |         |      585.78
 51.250    0.00    0.07      0.043  O         |         |         |         |      585.78
 51.333    0.00    0.07      0.042  O         |         |         |         |      585.78
 51.417    0.00    0.07      0.042  O         |         |         |         |      585.78
 51.500    0.00    0.07      0.042  O         |         |         |         |      585.77
 51.583    0.00    0.07      0.041  O         |         |         |         |      585.77
 51.667    0.00    0.06      0.041  O         |         |         |         |      585.77
 51.750    0.00    0.06      0.040  O         |         |         |         |      585.76
 51.833    0.00    0.06      0.040  O         |         |         |         |      585.76
 51.917    0.00    0.06      0.039  O         |         |         |         |      585.76
 52.000    0.00    0.06      0.039  O         |         |         |         |      585.75
 52.083    0.00    0.06      0.038  O         |         |         |         |      585.75
 52.167    0.00    0.06      0.038  O         |         |         |         |      585.75
 52.250    0.00    0.06      0.038  O         |         |         |         |      585.75
 52.333    0.00    0.06      0.037  O         |         |         |         |      585.74
 52.417    0.00    0.06      0.037  O         |         |         |         |      585.74
 52.500    0.00    0.06      0.036  O         |         |         |         |      585.74
 52.583    0.00    0.06      0.036  O         |         |         |         |      585.74
 52.667    0.00    0.06      0.036  O         |         |         |         |      585.73
 52.750    0.00    0.06      0.035  O         |         |         |         |      585.73
 52.833    0.00    0.06      0.035  O         |         |         |         |      585.73
 52.917    0.00    0.05      0.035  O         |         |         |         |      585.72
 53.000    0.00    0.05      0.034  O         |         |         |         |      585.72
 53.083    0.00    0.05      0.034  O         |         |         |         |      585.72
 53.167    0.00    0.05      0.033  O         |         |         |         |      585.72
 53.250    0.00    0.05      0.033  O         |         |         |         |      585.71
 53.333    0.00    0.05      0.033  O         |         |         |         |      585.71
 53.417    0.00    0.05      0.032  O         |         |         |         |      585.71
 53.500    0.00    0.05      0.032  O         |         |         |         |      585.71
 53.583    0.00    0.05      0.032  O         |         |         |         |      585.71
 53.667    0.00    0.05      0.031  O         |         |         |         |      585.70
 53.750    0.00    0.05      0.031  O         |         |         |         |      585.70
 53.833    0.00    0.05      0.031  O         |         |         |         |      585.70
 53.917    0.00    0.05      0.030  O         |         |         |         |      585.70
 54.000    0.00    0.05      0.030  O         |         |         |         |      585.69
 54.083    0.00    0.05      0.030  O         |         |         |         |      585.69
 54.167    0.00    0.05      0.029  O         |         |         |         |      585.69
 54.250    0.00    0.05      0.029  O         |         |         |         |      585.69
 54.333    0.00    0.05      0.029  O         |         |         |         |      585.69
 54.417    0.00    0.04      0.028  O         |         |         |         |      585.68
 54.500    0.00    0.04      0.028  O         |         |         |         |      585.68
 54.583    0.00    0.04      0.028  O         |         |         |         |      585.68
 54.667    0.00    0.04      0.027  O         |         |         |         |      585.68
 54.750    0.00    0.04      0.027  O         |         |         |         |      585.68
 54.833    0.00    0.04      0.027  O         |         |         |         |      585.67
 54.917    0.00    0.04      0.027  O         |         |         |         |      585.67
 55.000    0.00    0.04      0.026  O         |         |         |         |      585.67
 55.083    0.00    0.04      0.026  O         |         |         |         |      585.67
 55.167    0.00    0.04      0.026  O         |         |         |         |      585.67
 55.250    0.00    0.04      0.025  O         |         |         |         |      585.66
 55.333    0.00    0.04      0.025  O         |         |         |         |      585.66
 55.417    0.00    0.04      0.025  O         |         |         |         |      585.66
 55.500    0.00    0.04      0.025  O         |         |         |         |      585.66
 55.583    0.00    0.04      0.024  O         |         |         |         |      585.66
 55.667    0.00    0.04      0.024  O         |         |         |         |      585.65
 55.750    0.00    0.04      0.024  O         |         |         |         |      585.65
```

```
 55.833    0.00    0.04      0.024  O        |        |        |        |    585.65
 55.917    0.00    0.04      0.023  O        |        |        |        |    585.65
 56.000    0.00    0.04      0.023  O        |        |        |        |    585.65
 56.083    0.00    0.04      0.023  O        |        |        |        |    585.65
 56.167    0.00    0.04      0.023  O        |        |        |        |    585.64
 56.250    0.00    0.04      0.022  O        |        |        |        |    585.64
 56.333    0.00    0.03      0.022  O        |        |        |        |    585.64
 56.417    0.00    0.03      0.022  O        |        |        |        |    585.64
 56.500    0.00    0.03      0.022  O        |        |        |        |    585.64
 56.583    0.00    0.03      0.021  O        |        |        |        |    585.64
 56.667    0.00    0.03      0.021  O        |        |        |        |    585.64
 56.750    0.00    0.03      0.021  O        |        |        |        |    585.63
 56.833    0.00    0.03      0.021  O        |        |        |        |    585.63
 56.917    0.00    0.03      0.020  O        |        |        |        |    585.63
 57.000    0.00    0.03      0.020  O        |        |        |        |    585.63
 57.083    0.00    0.03      0.020  O        |        |        |        |    585.63
 57.167    0.00    0.03      0.020  O        |        |        |        |    585.63
 57.250    0.00    0.03      0.020  O        |        |        |        |    585.62
 57.333    0.00    0.03      0.019  O        |        |        |        |    585.62
 57.417    0.00    0.03      0.019  O        |        |        |        |    585.62
 57.500    0.00    0.03      0.019  O        |        |        |        |    585.62
 57.583    0.00    0.03      0.019  O        |        |        |        |    585.62
 57.667    0.00    0.03      0.019  O        |        |        |        |    585.62
 57.750    0.00    0.03      0.018  O        |        |        |        |    585.62
 57.833    0.00    0.03      0.018  O        |        |        |        |    585.62
 57.917    0.00    0.03      0.018  O        |        |        |        |    585.61
 58.000    0.00    0.03      0.018  O        |        |        |        |    585.61
 58.083    0.00    0.03      0.018  O        |        |        |        |    585.61
 58.167    0.00    0.03      0.017  O        |        |        |        |    585.61
 58.250    0.00    0.03      0.017  O        |        |        |        |    585.61
 58.333    0.00    0.03      0.017  O        |        |        |        |    585.61
 58.417    0.00    0.03      0.017  O        |        |        |        |    585.61
 58.500    0.00    0.03      0.017  O        |        |        |        |    585.61
 58.583    0.00    0.03      0.016  O        |        |        |        |    585.60
 58.667    0.00    0.03      0.016  O        |        |        |        |    585.60
 58.750    0.00    0.03      0.016  O        |        |        |        |    585.60
 58.833    0.00    0.02      0.016  O        |        |        |        |    585.60
 58.917    0.00    0.02      0.016  O        |        |        |        |    585.60
 59.000    0.00    0.02      0.016  O        |        |        |        |    585.60
 59.083    0.00    0.02      0.015  O        |        |        |        |    585.60
 59.167    0.00    0.02      0.015  O        |        |        |        |    585.60
 59.250    0.00    0.02      0.015  O        |        |        |        |    585.59
 59.333    0.00    0.02      0.015  O        |        |        |        |    585.59
 59.417    0.00    0.02      0.015  O        |        |        |        |    585.59
 59.500    0.00    0.02      0.015  O        |        |        |        |    585.59
 59.583    0.00    0.02      0.014  O        |        |        |        |    585.59
 59.667    0.00    0.02      0.014  O        |        |        |        |    585.59
 59.750    0.00    0.02      0.014  O        |        |        |        |    585.59
 59.833    0.00    0.02      0.014  O        |        |        |        |    585.59
 59.917    0.00    0.02      0.014  O        |        |        |        |    585.59
 60.000    0.00    0.02      0.014  O        |        |        |        |    585.59
 60.083    0.00    0.02      0.014  O        |        |        |        |    585.58
 60.167    0.00    0.02      0.013  O        |        |        |        |    585.58
 60.250    0.00    0.02      0.013  O        |        |        |        |    585.58
 60.333    0.00    0.02      0.013  O        |        |        |        |    585.58
 60.417    0.00    0.02      0.013  O        |        |        |        |    585.58
 60.500    0.00    0.02      0.013  O        |        |        |        |    585.58
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  60.583     0.00     0.02       0.013  O         |         |         |         |     585.58
  60.667     0.00     0.02       0.013  O         |         |         |         |     585.58
  60.750     0.00     0.02       0.012  O         |         |         |         |     585.58
  60.833     0.00     0.02       0.012  O         |         |         |         |     585.58
  60.917     0.00     0.02       0.012  O         |         |         |         |     585.58
  61.000     0.00     0.02       0.012  O         |         |         |         |     585.57
  61.083     0.00     0.02       0.012  O         |         |         |         |     585.57
  61.167     0.00     0.02       0.012  O         |         |         |         |     585.57
  61.250     0.00     0.02       0.012  O         |         |         |         |     585.57
  61.333     0.00     0.02       0.012  O         |         |         |         |     585.57
  61.417     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.500     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.583     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.667     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.750     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.833     0.00     0.02       0.011  O         |         |         |         |     585.57
  61.917     0.00     0.02       0.011  O         |         |         |         |     585.57
  62.000     0.00     0.02       0.011  O         |         |         |         |     585.56
  62.083     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.167     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.250     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.333     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.417     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.500     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.583     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.667     0.00     0.02       0.010  O         |         |         |         |     585.56
  62.750     0.00     0.01       0.010  O         |         |         |         |     585.56
  62.833     0.00     0.01       0.010  O         |         |         |         |     585.56
  62.917     0.00     0.01       0.009  O         |         |         |         |     585.56
  63.000     0.00     0.01       0.009  O         |         |         |         |     585.56
  63.083     0.00     0.01       0.009  O         |         |         |         |     585.56
  63.167     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.250     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.333     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.417     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.500     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.583     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.667     0.00     0.01       0.009  O         |         |         |         |     585.55
  63.750     0.00     0.01       0.008  O         |         |         |         |     585.55
  63.833     0.00     0.01       0.008  O         |         |         |         |     585.55
  63.917     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.000     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.083     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.167     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.250     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.333     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.417     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.500     0.00     0.01       0.008  O         |         |         |         |     585.55
  64.583     0.00     0.01       0.008  O         |         |         |         |     585.54
  64.667     0.00     0.01       0.008  O         |         |         |         |     585.54
  64.750     0.00     0.01       0.007  O         |         |         |         |     585.54
  64.833     0.00     0.01       0.007  O         |         |         |         |     585.54
  64.917     0.00     0.01       0.007  O         |         |         |         |     585.54
  65.000     0.00     0.01       0.007  O         |         |         |         |     585.54
  65.083     0.00     0.01       0.007  O         |         |         |         |     585.54
  65.167     0.00     0.01       0.007  O         |         |         |         |     585.54
  65.250     0.00     0.01       0.007  O         |         |         |         |     585.54
```

```
 65.333     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.417     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.500     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.583     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.667     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.750     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.833     0.00     0.01       0.007  O         |         |         |         |    585.54
 65.917     0.00     0.01       0.006  O         |         |         |         |    585.54
 66.000     0.00     0.01       0.006  O         |         |         |         |    585.54
 66.083     0.00     0.01       0.006  O         |         |         |         |    585.54
 66.167     0.00     0.01       0.006  O         |         |         |         |    585.54
 66.250     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.333     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.417     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.500     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.583     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.667     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.750     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.833     0.00     0.01       0.006  O         |         |         |         |    585.53
 66.917     0.00     0.01       0.006  O         |         |         |         |    585.53
 67.000     0.00     0.01       0.006  O         |         |         |         |    585.53
 67.083     0.00     0.01       0.006  O         |         |         |         |    585.53
 67.167     0.00     0.01       0.006  O         |         |         |         |    585.53
 67.250     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.333     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.417     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.500     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.583     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.667     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.750     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.833     0.00     0.01       0.005  O         |         |         |         |    585.53
 67.917     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.000     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.083     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.167     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.250     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.333     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.417     0.00     0.01       0.005  O         |         |         |         |    585.53
 68.500     0.00     0.01       0.005  O         |         |         |         |    585.52
 68.583     0.00     0.01       0.005  O         |         |         |         |    585.52
 68.667     0.00     0.01       0.005  O         |         |         |         |    585.52
 68.750     0.00     0.01       0.005  O         |         |         |         |    585.52
 68.833     0.00     0.01       0.005  O         |         |         |         |    585.52
 68.917     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.000     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.083     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.167     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.250     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.333     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.417     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.500     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.583     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.667     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.750     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.833     0.00     0.01       0.004  O         |         |         |         |    585.52
 69.917     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.000     0.00     0.01       0.004  O         |         |         |         |    585.52
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 70.083     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.167     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.250     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.333     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.417     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.500     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.583     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.667     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.750     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.833     0.00     0.01       0.004  O         |         |         |         |    585.52
 70.917     0.00     0.01       0.004  O         |         |         |         |    585.52
 71.000     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.083     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.167     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.250     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.333     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.417     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.500     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.583     0.00     0.00       0.003  O         |         |         |         |    585.52
 71.667     0.00     0.00       0.003  O         |         |         |         |    585.51
 71.750     0.00     0.00       0.003  O         |         |         |         |    585.51
 71.833     0.00     0.00       0.003  O         |         |         |         |    585.51
 71.917     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.000     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.083     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.167     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.250     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.333     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.417     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.500     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.583     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.667     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.750     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.833     0.00     0.00       0.003  O         |         |         |         |    585.51
 72.917     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.000     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.083     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.167     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.250     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.333     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.417     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.500     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.583     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.667     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.750     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.833     0.00     0.00       0.003  O         |         |         |         |    585.51
 73.917     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.000     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.083     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.167     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.250     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.333     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.417     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.500     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.583     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.667     0.00     0.00       0.002  O         |         |         |         |    585.51
 74.750     0.00     0.00       0.002  O         |         |         |         |    585.51
```

```
  74.833    0.00    0.00      0.002  O       |       |       |       |    585.51
  74.917    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.000    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.083    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.167    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.250    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.333    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.417    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.500    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.583    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.667    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.750    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.833    0.00    0.00      0.002  O       |       |       |       |    585.51
  75.917    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.000    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.083    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.167    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.250    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.333    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.417    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.500    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.583    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.667    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.750    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.833    0.00    0.00      0.002  O       |       |       |       |    585.51
  76.917    0.00    0.00      0.002  O       |       |       |       |    585.51
  77.000    0.00    0.00      0.002  O       |       |       |       |    585.51
  77.083    0.00    0.00      0.002  O       |       |       |       |    585.51
  77.167    0.00    0.00      0.002  O       |       |       |       |    585.51
  77.250    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.333    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.417    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.500    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.583    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.667    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.750    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.833    0.00    0.00      0.002  O       |       |       |       |    585.50
  77.917    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.000    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.083    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.167    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.250    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.333    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.417    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.500    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.583    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.667    0.00    0.00      0.002  O       |       |       |       |    585.50
  78.750    0.00    0.00      0.001  O       |       |       |       |    585.50
  78.833    0.00    0.00      0.001  O       |       |       |       |    585.50
  78.917    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.000    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.083    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.167    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.250    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.333    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.417    0.00    0.00      0.001  O       |       |       |       |    585.50
  79.500    0.00    0.00      0.001  O       |       |       |       |    585.50
```

```
79.583    0.00    0.00      0.001  O       |       |       |       |   585.50
79.667    0.00    0.00      0.001  O       |       |       |       |   585.50
79.750    0.00    0.00      0.001  O       |       |       |       |   585.50
79.833    0.00    0.00      0.001  O       |       |       |       |   585.50
79.917    0.00    0.00      0.001  O       |       |       |       |   585.50
80.000    0.00    0.00      0.001  O       |       |       |       |   585.50
80.083    0.00    0.00      0.001  O       |       |       |       |   585.50
80.167    0.00    0.00      0.001  O       |       |       |       |   585.50
80.250    0.00    0.00      0.001  O       |       |       |       |   585.50
80.333    0.00    0.00      0.001  O       |       |       |       |   585.50
80.417    0.00    0.00      0.001  O       |       |       |       |   585.50
80.500    0.00    0.00      0.001  O       |       |       |       |   585.50
80.583    0.00    0.00      0.001  O       |       |       |       |   585.50
80.667    0.00    0.00      0.001  O       |       |       |       |   585.50
80.750    0.00    0.00      0.001  O       |       |       |       |   585.50
80.833    0.00    0.00      0.001  O       |       |       |       |   585.50
80.917    0.00    0.00      0.001  O       |       |       |       |   585.50
81.000    0.00    0.00      0.001  O       |       |       |       |   585.50
81.083    0.00    0.00      0.001  O       |       |       |       |   585.50
81.167    0.00    0.00      0.001  O       |       |       |       |   585.50
81.250    0.00    0.00      0.001  O       |       |       |       |   585.50
81.333    0.00    0.00      0.001  O       |       |       |       |   585.50
81.417    0.00    0.00      0.001  O       |       |       |       |   585.50
81.500    0.00    0.00      0.001  O       |       |       |       |   585.50
81.583    0.00    0.00      0.001  O       |       |       |       |   585.50
81.667    0.00    0.00      0.001  O       |       |       |       |   585.50
81.750    0.00    0.00      0.001  O       |       |       |       |   585.50
81.833    0.00    0.00      0.001  O       |       |       |       |   585.50
81.917    0.00    0.00      0.001  O       |       |       |       |   585.50
82.000    0.00    0.00      0.001  O       |       |       |       |   585.50
82.083    0.00    0.00      0.001  O       |       |       |       |   585.50
82.167    0.00    0.00      0.001  O       |       |       |       |   585.50
82.250    0.00    0.00      0.001  O       |       |       |       |   585.50
82.333    0.00    0.00      0.001  O       |       |       |       |   585.50
82.417    0.00    0.00      0.001  O       |       |       |       |   585.50
82.500    0.00    0.00      0.001  O       |       |       |       |   585.50
82.583    0.00    0.00      0.001  O       |       |       |       |   585.50
82.667    0.00    0.00      0.001  O       |       |       |       |   585.50
82.750    0.00    0.00      0.001  O       |       |       |       |   585.50
82.833    0.00    0.00      0.001  O       |       |       |       |   585.50
82.917    0.00    0.00      0.001  O       |       |       |       |   585.50
83.000    0.00    0.00      0.001  O       |       |       |       |   585.50
83.083    0.00    0.00      0.001  O       |       |       |       |   585.50
83.167    0.00    0.00      0.001  O       |       |       |       |   582.74

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   998
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.807 (CFS)
                 Total volume =       1.978 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
               Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                         Study date: 10/28/21

--------------------------------------------------------------------
```

TTM 31589
5-Year 24-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop245.rte
****************************HYDROGRAPH DATA*****************************
            Number of intervals =   296
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =        4.932 (CFS)
            Total volume =       3.011 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 296
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
  585.500      0.001      0.001      0.001        0.001
  586.500      0.150      0.240      0.149        0.151
```

```
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ----------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ----------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                      Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       1.2     2.47    3.70    4.93 (Ft.)
 0.083    0.06    0.00      0.000  O        |       |       |       |   112.06
 0.167    0.20    0.00      0.001  OI       |       |       |       |   585.50
 0.250    0.24    0.00      0.003  OI       |       |       |       |   585.51
 0.333    0.29    0.01      0.004  OI       |       |       |       |   585.52
 0.417    0.37    0.01      0.007  O I      |       |       |       |   585.54
 0.500    0.40    0.01      0.009  O I      |       |       |       |   585.55
 0.583    0.42    0.02      0.012  O I      |       |       |       |   585.57
 0.667    0.43    0.02      0.015  O I      |       |       |       |   585.59
 0.750    0.43    0.03      0.017  O I      |       |       |       |   585.61
 0.833    0.46    0.03      0.020  O  I     |       |       |       |   585.63
 0.917    0.53    0.04      0.024  O  I     |       |       |       |   585.65
 1.000    0.56    0.04      0.027  O  I     |       |       |       |   585.67
 1.083    0.54    0.05      0.030  O  I     |       |       |       |   585.70
 1.167    0.48    0.05      0.034  O  I     |       |       |       |   585.72
 1.250    0.46    0.06      0.036  O I      |       |       |       |   585.74
 1.333    0.45    0.06      0.039  O I      |       |       |       |   585.76
 1.417    0.44    0.07      0.042  O I      |       |       |       |   585.77
 1.500    0.44    0.07      0.044  O I      |       |       |       |   585.79
 1.583    0.44    0.07      0.047  O I      |       |       |       |   585.81
 1.667    0.44    0.08      0.049  O I      |       |       |       |   585.83
 1.750    0.44    0.08      0.052  O I      |       |       |       |   585.84
 1.833    0.47    0.09      0.054  O  I     |       |       |       |   585.86
 1.917    0.54    0.09      0.057  O  I     |       |       |       |   585.88
 2.000    0.56    0.10      0.060  O  I     |       |       |       |   585.90
 2.083    0.57    0.10      0.064  O  I     |       |       |       |   585.92
 2.167    0.57    0.11      0.067  O  I     |       |       |       |   585.94
 2.250    0.58    0.11      0.070  O  I     |       |       |       |   585.96
 2.333    0.58    0.12      0.073  O  I     |       |       |       |   585.98
 2.417    0.58    0.12      0.076  O  I     |       |       |       |   586.01
 2.500    0.58    0.13      0.080  O  I     |       |       |       |   586.03
 2.583    0.61    0.13      0.083  O  I     |       |       |       |   586.05
 2.667    0.68    0.14      0.086  O   I    |       |       |       |   586.07
 2.750    0.70    0.14      0.090  O   I    |       |       |       |   586.10
 2.833    0.71    0.15      0.094  O   I    |       |       |       |   586.12
 2.917    0.72    0.16      0.098  |O  I    |       |       |       |   586.15
 3.000    0.72    0.16      0.102  |O  I    |       |       |       |   586.18
 3.083    0.73    0.17      0.106  |O  I    |       |       |       |   586.20
 3.167    0.73    0.17      0.109  |O  I    |       |       |       |   586.23
 3.250    0.73    0.18      0.113  |O  I    |       |       |       |   586.25
 3.333    0.73    0.19      0.117  |O  I    |       |       |       |   586.28
 3.417    0.73    0.19      0.121  |O  I    |       |       |       |   586.30
 3.500    0.73    0.20      0.124  |O  I    |       |       |       |   586.33
```

```
3.583    0.73    0.20      0.128  |O  I   |       |       |       |   586.35
3.667    0.73    0.21      0.132  |O  I   |       |       |       |   586.38
3.750    0.73    0.22      0.135  |O  I   |       |       |       |   586.40
3.833    0.76    0.22      0.139  |O  I   |       |       |       |   586.42
3.917    0.83    0.23      0.143  |O   I  |       |       |       |   586.45
4.000    0.85    0.23      0.147  |O   I  |       |       |       |   586.48
4.083    0.86    0.24      0.151  |O   I  |       |       |       |   586.51
4.167    0.87    0.24      0.155  |O   I  |       |       |       |   586.54
4.250    0.87    0.25      0.160  |O   I  |       |       |       |   586.56
4.333    0.90    0.25      0.164  |O   I  |       |       |       |   586.59
4.417    0.97    0.25      0.169  |O    I |       |       |       |   586.62
4.500    1.00    0.26      0.174  |O    I |       |       |       |   586.66
4.583    1.01    0.26      0.179  |O    I |       |       |       |   586.69
4.667    1.01    0.27      0.184  |O    I |       |       |       |   586.73
4.750    1.02    0.27      0.189  |O    I |       |       |       |   586.76
4.833    1.05    0.28      0.194  |O    I |       |       |       |   586.79
4.917    1.12    0.28      0.200  |O     I|       |       |       |   586.83
5.000    1.14    0.28      0.206  |O     I|       |       |       |   586.87
5.083    1.10    0.29      0.211  |O     I|       |       |       |   586.91
5.167    0.96    0.29      0.216  |O    I |       |       |       |   586.94
5.250    0.92    0.30      0.221  |O   I  |       |       |       |   586.97
5.333    0.93    0.30      0.225  |O    I |       |       |       |   587.00
5.417    0.99    0.30      0.230  |O    I |       |       |       |   587.03
5.500    1.00    0.31      0.234  |O    I |       |       |       |   587.06
5.583    1.04    0.31      0.239  | O   I |       |       |       |   587.10
5.667    1.11    0.32      0.245  | O    I|       |       |       |   587.13
5.750    1.14    0.32      0.250  | O    I|       |       |       |   587.17
5.833    1.15    0.32      0.256  | O    I|       |       |       |   587.21
5.917    1.16    0.33      0.261  | O    I|       |       |       |   587.24
6.000    1.16    0.33      0.267  | O    I|       |       |       |   587.28
6.083    1.19    0.34      0.273  | O    I|       |       |       |   587.32
6.167    1.26    0.34      0.279  | O     I       |       |       |   587.36
6.250    1.29    0.35      0.285  | O     I       |       |       |   587.40
6.333    1.30    0.35      0.292  | O     I       |       |       |   587.45
6.417    1.30    0.36      0.298  | O     I       |       |       |   587.49
6.500    1.31    0.36      0.305  | O     I       |       |       |   587.53
6.583    1.34    0.37      0.312  | O     I       |       |       |   587.58
6.667    1.41    0.37      0.318  | O     |I      |       |       |   587.62
6.750    1.43    0.37      0.326  | O     |I      |       |       |   587.67
6.833    1.44    0.38      0.333  | O     |I      |       |       |   587.72
6.917    1.45    0.38      0.340  | O     |I      |       |       |   587.77
7.000    1.45    0.39      0.348  | O     |I      |       |       |   587.82
7.083    1.46    0.39      0.355  | O     |I      |       |       |   587.87
7.167    1.46    0.39      0.362  | O     |I      |       |       |   587.92
7.250    1.46    0.40      0.370  | O     |I      |       |       |   587.96
7.333    1.49    0.40      0.377  | O     |I      |       |       |   588.01
7.417    1.56    0.41      0.385  | O     | I     |       |       |   588.07
7.500    1.58    0.41      0.393  | O     | I     |       |       |   588.12
7.583    1.62    0.41      0.401  | O     | I     |       |       |   588.17
7.667    1.69    0.42      0.409  | O     | I     |       |       |   588.23
7.750    1.72    0.42      0.418  | O     |  I    |       |       |   588.29
7.833    1.76    0.43      0.427  | O     |  I    |       |       |   588.35
7.917    1.84    0.43      0.437  | O     |  I    |       |       |   588.41
8.000    1.87    0.44      0.447  | O     |   I   |       |       |   588.48
8.083    1.93    0.44      0.457  | O     |   I   |       |       |   588.54
8.167    2.08    0.45      0.467  | O     |    I  |       |       |   588.62
8.250    2.13    0.45      0.479  | O     |    I  |       |       |   588.69
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  8.333    2.16    0.46      0.490  | O     |    I  |       |       |   588.77
  8.417    2.17    0.46      0.502  |  O    |     I |       |       |   588.85
  8.500    2.18    0.47      0.514  |  O    |     I |       |       |   588.93
  8.583    2.21    0.48      0.526  |  O    |     I |       |       |   589.00
  8.667    2.28    0.48      0.538  |  O    |     I |       |       |   589.09
  8.750    2.31    0.49      0.550  |  O    |     I |       |       |   589.17
  8.833    2.35    0.49      0.563  |  O    |      I|       |       |   589.25
  8.917    2.42    0.50      0.576  |  O    |      I|       |       |   589.34
  9.000    2.45    0.51      0.589  |  O    |      I|       |       |   589.43
  9.083    2.52    0.51      0.603  |  O    |       I       |       |   589.51
  9.167    2.67    0.52      0.617  |  O    |       |I      |       |   589.53
  9.250    2.72    0.52      0.632  |  O    |       |I      |       |   589.56
  9.333    2.77    0.53      0.647  |  O    |       |I      |       |   589.59
  9.417    2.85    0.53      0.663  |  O    |       | I     |       |   589.62
  9.500    2.88    0.54      0.679  |  O    |       | I     |       |   589.65
  9.583    2.92    0.54      0.696  |  O    |       | I     |       |   589.68
  9.667    3.00    0.55      0.712  |  O    |       |  I    |       |   589.72
  9.750    3.03    0.55      0.729  |  O    |       |  I    |       |   589.75
  9.833    3.07    0.56      0.746  |  O    |       |  I    |       |   589.78
  9.917    3.15    0.56      0.764  |  O    |       |   I   |       |   589.82
 10.000    3.18    0.57      0.782  |  O    |       |   I   |       |   589.85
 10.083    2.99    0.58      0.799  |  O    |       |  I    |       |   589.88
 10.167    2.51    0.58      0.814  |  O    |       I       |       |   589.91
 10.250    2.35    0.58      0.827  |  O    |      I|       |       |   589.94
 10.333    2.28    0.59      0.839  |  O    |     I |       |       |   589.96
 10.417    2.24    0.59      0.850  |  O    |     I |       |       |   589.98
 10.500    2.22    0.60      0.862  |  O    |     I |       |       |   590.00
 10.583    2.34    0.60      0.873  |  O    |      I|       |       |   590.03
 10.667    2.68    0.60      0.886  |  O    |       |I      |       |   590.05
 10.750    2.79    0.61      0.901  |  O    |       | I     |       |   590.08
 10.833    2.84    0.61      0.916  |  O    |       | I     |       |   590.11
 10.917    2.87    0.62      0.932  |   O   |       | I     |       |   590.14
 11.000    2.89    0.62      0.947  |   O   |       | I     |       |   590.17
 11.083    2.88    0.63      0.963  |   O   |       | I     |       |   590.20
 11.167    2.81    0.63      0.978  |   O   |       | I     |       |   590.23
 11.250    2.79    0.64      0.993  |   O   |       | I     |       |   590.26
 11.333    2.78    0.64      1.008  |   O   |       | I     |       |   590.28
 11.417    2.78    0.65      1.022  |   O   |       | I     |       |   590.31
 11.500    2.77    0.65      1.037  |   O   |       |I      |       |   590.34
 11.583    2.72    0.66      1.051  |   O   |       |I      |       |   590.37
 11.667    2.57    0.66      1.065  |   O   |       I       |       |   590.39
 11.750    2.53    0.67      1.078  |   O   |       I       |       |   590.42
 11.833    2.53    0.67      1.091  |   O   |       I       |       |   590.44
 11.917    2.59    0.67      1.104  |   O   |       I       |       |   590.47
 12.000    2.61    0.68      1.117  |   O   |       I       |       |   590.49
 12.083    2.81    0.68      1.131  |   O   |       | I     |       |   590.52
 12.167    3.31    0.69      1.148  |   O   |       |    I  |       |   590.55
 12.250    3.47    0.69      1.166  |   O   |       |     I |       |   590.58
 12.333    3.57    0.69      1.186  |   O   |       |      I|       |   590.61
 12.417    3.68    0.70      1.206  |   O   |       |      I|       |   590.65
 12.500    3.73    0.70      1.226  |   O   |       |       I       |   590.68
 12.583    3.81    0.70      1.248  |   O   |       |       I       |   590.72
 12.667    3.97    0.71      1.270  |   O   |       |       |I      |   590.76
 12.750    4.03    0.71      1.292  |   O   |       |       | I     |   590.80
 12.833    4.08    0.72      1.315  |   O   |       |       | I     |   590.84
 12.917    4.16    0.72      1.339  |   O   |       |       |  I    |   590.88
 13.000    4.19    0.73      1.362  |   O   |       |       |  I    |   590.92
```

```
13.083    4.35    0.73      1.387  |   O   |       |       |   I   |   590.96
13.167    4.71    0.74      1.413  |   O   |       |       |     I |   591.01
13.250    4.83    0.74      1.441  |   O   |       |       |      I|   591.05
13.333    4.88    0.75      1.469  |   O   |       |       |      I|   591.10
13.417    4.91    0.75      1.498  |   O   |       |       |      I|   591.15
13.500    4.93    0.76      1.526  |   O   |       |       |       I   591.20
13.583    4.64    0.76      1.554  |   O   |       |       |     I |   591.25
13.667    3.87    0.77      1.578  |   O   |       |       |I      |   591.29
13.750    3.62    0.77      1.599  |    O  |       |      I|       |   591.33
13.833    3.51    0.77      1.618  |    O  |       |     I |       |   591.36
13.917    3.44    0.78      1.636  |    O  |       |     I |       |   591.39
14.000    3.40    0.78      1.655  |    O  |       |     I |       |   591.42
14.083    3.49    0.78      1.673  |    O  |       |     I |       |   591.45
14.167    3.75    0.79      1.692  |    O  |       |       I       |   591.49
14.250    3.84    0.79      1.713  |    O  |       |       I       |   591.52
14.333    3.85    0.80      1.734  |    O  |       |       I       |   591.55
14.417    3.80    0.81      1.755  |    O  |       |       I       |   591.59
14.500    3.80    0.81      1.776  |    O  |       |       I       |   591.62
14.583    3.79    0.82      1.796  |    O  |       |       I       |   591.65
14.667    3.79    0.83      1.816  |    O  |       |       I       |   591.68
14.750    3.79    0.83      1.837  |    O  |       |       I       |   591.71
14.833    3.76    0.84      1.857  |    O  |       |       I       |   591.75
14.917    3.69    0.85      1.877  |    O  |       |      I|       |   591.78
15.000    3.67    0.85      1.897  |    O  |       |      I|       |   591.81
15.083    3.63    0.86      1.916  |    O  |       |      I|       |   591.84
15.167    3.55    0.86      1.935  |    O  |       |      I|       |   591.87
15.250    3.53    0.87      1.953  |    O  |       |     I |       |   591.90
15.333    3.49    0.87      1.971  |    O  |       |     I |       |   591.92
15.417    3.41    0.88      1.989  |    O  |       |     I |       |   591.95
15.500    3.38    0.89      2.006  |    O  |       |    I  |       |   591.98
15.583    3.26    0.89      2.023  |    O  |       |    I  |       |   592.00
15.667    2.97    0.90      2.038  |    O  |       |  I    |       |   592.03
15.750    2.87    0.90      2.052  |    O  |       | I     |       |   592.05
15.833    2.83    0.90      2.066  |    O  |       | I     |       |   592.07
15.917    2.80    0.91      2.079  |    O  |       | I     |       |   592.09
16.000    2.79    0.91      2.092  |    O  |       | I     |       |   592.11
16.083    2.36    0.92      2.103  |    O  |      I|       |       |   592.13
16.167    1.30    0.92      2.109  |    O  I       |       |       |   592.14
16.250    0.95    0.92      2.111  |    OI |       |       |       |   592.14
16.333    0.80    0.92      2.110  |    O  |       |       |       |   592.14
16.417    0.71    0.92      2.109  |   IO  |       |       |       |   592.14
16.500    0.65    0.92      2.108  |   IO  |       |       |       |   592.14
16.583    0.59    0.92      2.106  |  I O  |       |       |       |   592.13
16.667    0.50    0.92      2.103  |  I O  |       |       |       |   592.13
16.750    0.46    0.92      2.100  | I  O  |       |       |       |   592.13
16.833    0.45    0.91      2.097  | I  O  |       |       |       |   592.12
16.917    0.45    0.91      2.094  | I  O  |       |       |       |   592.12
17.000    0.44    0.91      2.090  | I  O  |       |       |       |   592.11
17.083    0.50    0.91      2.087  |  I O  |       |       |       |   592.11
17.167    0.63    0.91      2.085  |   IO  |       |       |       |   592.10
17.250    0.68    0.91      2.083  |   IO  |       |       |       |   592.10
17.333    0.70    0.91      2.082  |   IO  |       |       |       |   592.10
17.417    0.71    0.91      2.080  |   IO  |       |       |       |   592.09
17.500    0.72    0.91      2.079  |   IO  |       |       |       |   592.09
17.583    0.72    0.91      2.078  |   IO  |       |       |       |   592.09
17.667    0.73    0.91      2.077  |   IO  |       |       |       |   592.09
17.750    0.73    0.91      2.075  |   IO  |       |       |       |   592.09
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17.833    0.70    0.91      2.074  |   IO  |       |       |       |   592.08
17.917    0.63    0.91      2.072  |   IO  |       |       |       |   592.08
18.000    0.61    0.91      2.070  |  I O  |       |       |       |   592.08
18.083    0.60    0.91      2.068  |  I O  |       |       |       |   592.08
18.167    0.59    0.90      2.066  |  I O  |       |       |       |   592.07
18.250    0.59    0.90      2.064  |  I O  |       |       |       |   592.07
18.333    0.59    0.90      2.062  |  I O  |       |       |       |   592.07
18.417    0.58    0.90      2.060  |  I O  |       |       |       |   592.06
18.500    0.58    0.90      2.057  |  I O  |       |       |       |   592.06
18.583    0.56    0.90      2.055  |  I O  |       |       |       |   592.05
18.667    0.48    0.90      2.052  |  I O  |       |       |       |   592.05
18.750    0.46    0.90      2.050  | I  O  |       |       |       |   592.05
18.833    0.42    0.90      2.046  | I  O  |       |       |       |   592.04
18.917    0.35    0.90      2.043  | I  O  |       |       |       |   592.04
19.000    0.32    0.90      2.039  | I  O  |       |       |       |   592.03
19.083    0.34    0.89      2.035  | I  O  |       |       |       |   592.02
19.167    0.40    0.89      2.031  | I  O  |       |       |       |   592.02
19.250    0.42    0.89      2.028  | I  O  |       |       |       |   592.01
19.333    0.45    0.89      2.025  | I  O  |       |       |       |   592.01
19.417    0.53    0.89      2.022  |  I O  |       |       |       |   592.00
19.500    0.55    0.89      2.020  |  I O  |       |       |       |   592.00
19.583    0.54    0.89      2.017  |  I O  |       |       |       |   592.00
19.667    0.48    0.89      2.015  |  I O  |       |       |       |   591.99
19.750    0.46    0.89      2.012  | I  O  |       |       |       |   591.99
19.833    0.42    0.89      2.009  | I  O  |       |       |       |   591.98
19.917    0.35    0.89      2.005  | I  O  |       |       |       |   591.98
20.000    0.32    0.88      2.002  | I  O  |       |       |       |   591.97
20.083    0.34    0.88      1.998  | I  O  |       |       |       |   591.97
20.167    0.40    0.88      1.994  | I  O  |       |       |       |   591.96
20.250    0.42    0.88      1.991  | I  O  |       |       |       |   591.95
20.333    0.43    0.88      1.988  | I  O  |       |       |       |   591.95
20.417    0.43    0.88      1.985  | I  O  |       |       |       |   591.94
20.500    0.43    0.88      1.982  | I  O  |       |       |       |   591.94
20.583    0.43    0.88      1.978  | I  O  |       |       |       |   591.94
20.667    0.44    0.88      1.975  | I  O  |       |       |       |   591.93
20.750    0.44    0.88      1.972  | I  O  |       |       |       |   591.93
20.833    0.41    0.87      1.969  | I  O  |       |       |       |   591.92
20.917    0.34    0.87      1.966  | I  O  |       |       |       |   591.92
21.000    0.32    0.87      1.962  | I  O  |       |       |       |   591.91
21.083    0.33    0.87      1.958  | I  O  |       |       |       |   591.90
21.167    0.40    0.87      1.955  | I  O  |       |       |       |   591.90
21.250    0.42    0.87      1.952  | I  O  |       |       |       |   591.89
21.333    0.40    0.87      1.949  | I  O  |       |       |       |   591.89
21.417    0.33    0.87      1.945  | I  O  |       |       |       |   591.88
21.500    0.31    0.87      1.941  | I  O  |       |       |       |   591.88
21.583    0.33    0.86      1.938  | I  O  |       |       |       |   591.87
21.667    0.40    0.86      1.934  | I  O  |       |       |       |   591.87
21.750    0.42    0.86      1.931  | I  O  |       |       |       |   591.86
21.833    0.40    0.86      1.928  | I  O  |       |       |       |   591.86
21.917    0.33    0.86      1.924  | I  O  |       |       |       |   591.85
22.000    0.31    0.86      1.921  | I  O  |       |       |       |   591.84
22.083    0.33    0.86      1.917  | I  O  |       |       |       |   591.84
22.167    0.40    0.86      1.914  | I  O  |       |       |       |   591.83
22.250    0.42    0.86      1.911  | I  O  |       |       |       |   591.83
22.333    0.40    0.85      1.907  | I  O  |       |       |       |   591.82
22.417    0.33    0.85      1.904  | I  O  |       |       |       |   591.82
22.500    0.31    0.85      1.900  | I  O  |       |       |       |   591.81
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 22.583     0.30     0.85       1.897  |I    O  |        |        |        |   591.81
 22.667     0.30     0.85       1.893  |I    O  |        |        |        |   591.80
 22.750     0.30     0.85       1.889  |I    O  |        |        |        |   591.80
 22.833     0.29     0.85       1.885  |I    O  |        |        |        |   591.79
 22.917     0.29     0.85       1.881  |I    O  |        |        |        |   591.78
 23.000     0.29     0.85       1.878  |I    O  |        |        |        |   591.78
 23.083     0.29     0.84       1.874  |I    O  |        |        |        |   591.77
 23.167     0.29     0.84       1.870  |I    O  |        |        |        |   591.77
 23.250     0.29     0.84       1.866  |I    O  |        |        |        |   591.76
 23.333     0.29     0.84       1.862  |I    O  |        |        |        |   591.75
 23.417     0.29     0.84       1.859  |I    O  |        |        |        |   591.75
 23.500     0.29     0.84       1.855  |I    O  |        |        |        |   591.74
 23.583     0.29     0.84       1.851  |I    O  |        |        |        |   591.74
 23.667     0.29     0.84       1.847  |I    O  |        |        |        |   591.73
 23.750     0.29     0.83       1.844  |I    O  |        |        |        |   591.72
 23.833     0.29     0.83       1.840  |I    O  |        |        |        |   591.72
 23.917     0.29     0.83       1.836  |I    O  |        |        |        |   591.71
 24.000     0.29     0.83       1.832  |I    O  |        |        |        |   591.71
 24.083     0.24     0.83       1.829  |I    O  |        |        |        |   591.70
 24.167     0.09     0.83       1.824  I     O  |        |        |        |   591.69
 24.250     0.05     0.83       1.819  I     O  |        |        |        |   591.69
 24.333     0.03     0.83       1.813  I     O  |        |        |        |   591.68
 24.417     0.02     0.82       1.808  I     O  |        |        |        |   591.67
 24.500     0.01     0.82       1.802  I     O  |        |        |        |   591.66
 24.583     0.00     0.82       1.797  I     O  |        |        |        |   591.65
 24.667     0.00     0.82       1.791  I     O  |        |        |        |   591.64
 24.750     0.00     0.82       1.785  I     O  |        |        |        |   591.63
 24.833     0.00     0.81       1.780  I     O  |        |        |        |   591.62
 24.917     0.00     0.81       1.774  I     O  |        |        |        |   591.62
 25.000     0.00     0.81       1.769  I     O  |        |        |        |   591.61
 25.083     0.00     0.81       1.763  I     O  |        |        |        |   591.60
 25.167     0.00     0.81       1.757  I     O  |        |        |        |   591.59
 25.250     0.00     0.81       1.752  I     O  |        |        |        |   591.58
 25.333     0.00     0.80       1.746  I     O  |        |        |        |   591.57
 25.417     0.00     0.80       1.741  I     O  |        |        |        |   591.56
 25.500     0.00     0.80       1.735  I     O  |        |        |        |   591.56
 25.583     0.00     0.80       1.730  I     O  |        |        |        |   591.55
 25.667     0.00     0.80       1.724  I     O  |        |        |        |   591.54
 25.750     0.00     0.80       1.719  I     O  |        |        |        |   591.53
 25.833     0.00     0.79       1.713  I     O  |        |        |        |   591.52
 25.917     0.00     0.79       1.708  I     O  |        |        |        |   591.51
 26.000     0.00     0.79       1.702  I     O  |        |        |        |   591.50
 26.083     0.00     0.79       1.697  I     O  |        |        |        |   591.49
 26.167     0.00     0.79       1.691  I     O  |        |        |        |   591.49
 26.250     0.00     0.79       1.686  I     O  |        |        |        |   591.48
 26.333     0.00     0.79       1.681  I     O  |        |        |        |   591.47
 26.417     0.00     0.79       1.675  I     O  |        |        |        |   591.46
 26.500     0.00     0.78       1.670  I     O  |        |        |        |   591.45
 26.583     0.00     0.78       1.664  I     O  |        |        |        |   591.44
 26.667     0.00     0.78       1.659  I     O  |        |        |        |   591.43
 26.750     0.00     0.78       1.654  I     O  |        |        |        |   591.42
 26.833     0.00     0.78       1.648  I     O  |        |        |        |   591.41
 26.917     0.00     0.78       1.643  I     O  |        |        |        |   591.40
 27.000     0.00     0.78       1.638  I     O  |        |        |        |   591.39
 27.083     0.00     0.78       1.632  I     O  |        |        |        |   591.38
 27.167     0.00     0.78       1.627  I     O  |        |        |        |   591.37
 27.250     0.00     0.78       1.622  I     O  |        |        |        |   591.36
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
27.333    0.00    0.77      1.616  I    O   |       |       |       |   591.36
27.417    0.00    0.77      1.611  I    O   |       |       |       |   591.35
27.500    0.00    0.77      1.606  I    O   |       |       |       |   591.34
27.583    0.00    0.77      1.600  I    O   |       |       |       |   591.33
27.667    0.00    0.77      1.595  I   O    |       |       |       |   591.32
27.750    0.00    0.77      1.590  I   O    |       |       |       |   591.31
27.833    0.00    0.77      1.584  I   O    |       |       |       |   591.30
27.917    0.00    0.77      1.579  I   O    |       |       |       |   591.29
28.000    0.00    0.77      1.574  I   O    |       |       |       |   591.28
28.083    0.00    0.77      1.568  I   O    |       |       |       |   591.27
28.167    0.00    0.76      1.563  I   O    |       |       |       |   591.26
28.250    0.00    0.76      1.558  I   O    |       |       |       |   591.26
28.333    0.00    0.76      1.553  I   O    |       |       |       |   591.25
28.417    0.00    0.76      1.547  I   O    |       |       |       |   591.24
28.500    0.00    0.76      1.542  I   O    |       |       |       |   591.23
28.583    0.00    0.76      1.537  I   O    |       |       |       |   591.22
28.667    0.00    0.76      1.532  I   O    |       |       |       |   591.21
28.750    0.00    0.76      1.527  I   O    |       |       |       |   591.20
28.833    0.00    0.76      1.521  I   O    |       |       |       |   591.19
28.917    0.00    0.76      1.516  I   O    |       |       |       |   591.18
29.000    0.00    0.75      1.511  I   O    |       |       |       |   591.17
29.083    0.00    0.75      1.506  I   O    |       |       |       |   591.17
29.167    0.00    0.75      1.501  I   O    |       |       |       |   591.16
29.250    0.00    0.75      1.495  I   O    |       |       |       |   591.15
29.333    0.00    0.75      1.490  I   O    |       |       |       |   591.14
29.417    0.00    0.75      1.485  I   O    |       |       |       |   591.13
29.500    0.00    0.75      1.480  I   O    |       |       |       |   591.12
29.583    0.00    0.75      1.475  I   O    |       |       |       |   591.11
29.667    0.00    0.75      1.470  I   O    |       |       |       |   591.10
29.750    0.00    0.75      1.464  I   O    |       |       |       |   591.09
29.833    0.00    0.74      1.459  I   O    |       |       |       |   591.09
29.917    0.00    0.74      1.454  I   O    |       |       |       |   591.08
30.000    0.00    0.74      1.449  I   O    |       |       |       |   591.07
30.083    0.00    0.74      1.444  I   O    |       |       |       |   591.06
30.167    0.00    0.74      1.439  I   O    |       |       |       |   591.05
30.250    0.00    0.74      1.434  I   O    |       |       |       |   591.04
30.333    0.00    0.74      1.429  I   O    |       |       |       |   591.03
30.417    0.00    0.74      1.424  I   O    |       |       |       |   591.02
30.500    0.00    0.74      1.419  I   O    |       |       |       |   591.01
30.583    0.00    0.74      1.413  I   O    |       |       |       |   591.01
30.667    0.00    0.73      1.408  I   O    |       |       |       |   591.00
30.750    0.00    0.73      1.403  I   O    |       |       |       |   590.99
30.833    0.00    0.73      1.398  I   O    |       |       |       |   590.98
30.917    0.00    0.73      1.393  I   O    |       |       |       |   590.97
31.000    0.00    0.73      1.388  I   O    |       |       |       |   590.96
31.083    0.00    0.73      1.383  I   O    |       |       |       |   590.95
31.167    0.00    0.73      1.378  I   O    |       |       |       |   590.95
31.250    0.00    0.73      1.373  I   O    |       |       |       |   590.94
31.333    0.00    0.73      1.368  I   O    |       |       |       |   590.93
31.417    0.00    0.73      1.363  I   O    |       |       |       |   590.92
31.500    0.00    0.73      1.358  I   O    |       |       |       |   590.91
31.583    0.00    0.72      1.353  I   O    |       |       |       |   590.90
31.667    0.00    0.72      1.348  I   O    |       |       |       |   590.89
31.750    0.00    0.72      1.343  I   O    |       |       |       |   590.88
31.833    0.00    0.72      1.338  I   O    |       |       |       |   590.88
31.917    0.00    0.72      1.333  I   O    |       |       |       |   590.87
32.000    0.00    0.72      1.328  I   O    |       |       |       |   590.86
```

```
  32.083     0.00     0.72       1.323  I    O  |        |        |        |    590.85
  32.167     0.00     0.72       1.318  I    O  |        |        |        |    590.84
  32.250     0.00     0.72       1.313  I    O  |        |        |        |    590.83
  32.333     0.00     0.72       1.309  I    O  |        |        |        |    590.83
  32.417     0.00     0.71       1.304  I    O  |        |        |        |    590.82
  32.500     0.00     0.71       1.299  I    O  |        |        |        |    590.81
  32.583     0.00     0.71       1.294  I    O  |        |        |        |    590.80
  32.667     0.00     0.71       1.289  I    O  |        |        |        |    590.79
  32.750     0.00     0.71       1.284  I    O  |        |        |        |    590.78
  32.833     0.00     0.71       1.279  I    O  |        |        |        |    590.77
  32.917     0.00     0.71       1.274  I    O  |        |        |        |    590.77
  33.000     0.00     0.71       1.269  I    O  |        |        |        |    590.76
  33.083     0.00     0.71       1.264  I    O  |        |        |        |    590.75
  33.167     0.00     0.71       1.260  I    O  |        |        |        |    590.74
  33.250     0.00     0.71       1.255  I    O  |        |        |        |    590.73
  33.333     0.00     0.70       1.250  I    O  |        |        |        |    590.72
  33.417     0.00     0.70       1.245  I    O  |        |        |        |    590.72
  33.500     0.00     0.70       1.240  I    O  |        |        |        |    590.71
  33.583     0.00     0.70       1.235  I    O  |        |        |        |    590.70
  33.667     0.00     0.70       1.230  I    O  |        |        |        |    590.69
  33.750     0.00     0.70       1.226  I    O  |        |        |        |    590.68
  33.833     0.00     0.70       1.221  I    O  |        |        |        |    590.67
  33.917     0.00     0.70       1.216  I    O  |        |        |        |    590.67
  34.000     0.00     0.70       1.211  I    O  |        |        |        |    590.66
  34.083     0.00     0.70       1.206  I    O  |        |        |        |    590.65
  34.167     0.00     0.70       1.202  I    O  |        |        |        |    590.64
  34.250     0.00     0.69       1.197  I    O  |        |        |        |    590.63
  34.333     0.00     0.69       1.192  I    O  |        |        |        |    590.62
  34.417     0.00     0.69       1.187  I    O  |        |        |        |    590.62
  34.500     0.00     0.69       1.182  I    O  |        |        |        |    590.61
  34.583     0.00     0.69       1.178  I    O  |        |        |        |    590.60
  34.667     0.00     0.69       1.173  I    O  |        |        |        |    590.59
  34.750     0.00     0.69       1.168  I    O  |        |        |        |    590.58
  34.833     0.00     0.69       1.163  I    O  |        |        |        |    590.57
  34.917     0.00     0.69       1.159  I    O  |        |        |        |    590.57
  35.000     0.00     0.69       1.154  I    O  |        |        |        |    590.56
  35.083     0.00     0.69       1.149  I    O  |        |        |        |    590.55
  35.167     0.00     0.68       1.145  I    O  |        |        |        |    590.54
  35.250     0.00     0.68       1.140  I    O  |        |        |        |    590.53
  35.333     0.00     0.68       1.135  I    O  |        |        |        |    590.53
  35.417     0.00     0.68       1.130  I    O  |        |        |        |    590.52
  35.500     0.00     0.68       1.126  I    O  |        |        |        |    590.51
  35.583     0.00     0.68       1.121  I    O  |        |        |        |    590.50
  35.667     0.00     0.68       1.116  I    O  |        |        |        |    590.49
  35.750     0.00     0.68       1.112  I    O  |        |        |        |    590.48
  35.833     0.00     0.68       1.107  I    O  |        |        |        |    590.48
  35.917     0.00     0.67       1.102  I    O  |        |        |        |    590.47
  36.000     0.00     0.67       1.098  I    O  |        |        |        |    590.46
  36.083     0.00     0.67       1.093  I    O  |        |        |        |    590.45
  36.167     0.00     0.67       1.089  I    O  |        |        |        |    590.44
  36.250     0.00     0.67       1.084  I    O  |        |        |        |    590.43
  36.333     0.00     0.67       1.079  I    O  |        |        |        |    590.42
  36.417     0.00     0.67       1.075  I    O  |        |        |        |    590.41
  36.500     0.00     0.66       1.070  I    O  |        |        |        |    590.40
  36.583     0.00     0.66       1.066  I    O  |        |        |        |    590.40
  36.667     0.00     0.66       1.061  I    O  |        |        |        |    590.39
  36.750     0.00     0.66       1.057  I    O  |        |        |        |    590.38
```

```
36.833    0.00    0.66      1.052  I   O    |       |       |       |   590.37
36.917    0.00    0.66      1.047  I   O    |       |       |       |   590.36
37.000    0.00    0.65      1.043  I   O    |       |       |       |   590.35
37.083    0.00    0.65      1.038  I   O    |       |       |       |   590.34
37.167    0.00    0.65      1.034  I   O    |       |       |       |   590.33
37.250    0.00    0.65      1.029  I   O    |       |       |       |   590.33
37.333    0.00    0.65      1.025  I   O    |       |       |       |   590.32
37.417    0.00    0.65      1.021  I   O    |       |       |       |   590.31
37.500    0.00    0.65      1.016  I   O    |       |       |       |   590.30
37.583    0.00    0.64      1.012  I   O    |       |       |       |   590.29
37.667    0.00    0.64      1.007  I   O    |       |       |       |   590.28
37.750    0.00    0.64      1.003  I   O    |       |       |       |   590.27
37.833    0.00    0.64      0.998  I   O    |       |       |       |   590.27
37.917    0.00    0.64      0.994  I   O    |       |       |       |   590.26
38.000    0.00    0.64      0.990  I   O    |       |       |       |   590.25
38.083    0.00    0.64      0.985  I   O    |       |       |       |   590.24
38.167    0.00    0.63      0.981  I   O    |       |       |       |   590.23
38.250    0.00    0.63      0.976  I   O    |       |       |       |   590.22
38.333    0.00    0.63      0.972  I   O    |       |       |       |   590.22
38.417    0.00    0.63      0.968  I   O    |       |       |       |   590.21
38.500    0.00    0.63      0.963  I   O    |       |       |       |   590.20
38.583    0.00    0.63      0.959  I   O    |       |       |       |   590.19
38.667    0.00    0.63      0.955  I   O    |       |       |       |   590.18
38.750    0.00    0.62      0.950  I   O    |       |       |       |   590.17
38.833    0.00    0.62      0.946  I   O    |       |       |       |   590.17
38.917    0.00    0.62      0.942  I   O    |       |       |       |   590.16
39.000    0.00    0.62      0.938  I   O    |       |       |       |   590.15
39.083    0.00    0.62      0.933  I   O    |       |       |       |   590.14
39.167    0.00    0.62      0.929  I   O    |       |       |       |   590.13
39.250    0.00    0.62      0.925  I  O     |       |       |       |   590.12
39.333    0.00    0.61      0.921  I  O     |       |       |       |   590.12
39.417    0.00    0.61      0.916  I  O     |       |       |       |   590.11
39.500    0.00    0.61      0.912  I  O     |       |       |       |   590.10
39.583    0.00    0.61      0.908  I  O     |       |       |       |   590.09
39.667    0.00    0.61      0.904  I  O     |       |       |       |   590.08
39.750    0.00    0.61      0.900  I  O     |       |       |       |   590.08
39.833    0.00    0.61      0.895  I  O     |       |       |       |   590.07
39.917    0.00    0.61      0.891  I  O     |       |       |       |   590.06
40.000    0.00    0.60      0.887  I  O     |       |       |       |   590.05
40.083    0.00    0.60      0.883  I  O     |       |       |       |   590.04
40.167    0.00    0.60      0.879  I  O     |       |       |       |   590.04
40.250    0.00    0.60      0.875  I  O     |       |       |       |   590.03
40.333    0.00    0.60      0.870  I  O     |       |       |       |   590.02
40.417    0.00    0.60      0.866  I  O     |       |       |       |   590.01
40.500    0.00    0.60      0.862  I  O     |       |       |       |   590.00
40.583    0.00    0.59      0.858  I  O     |       |       |       |   590.00
40.667    0.00    0.59      0.854  I  O     |       |       |       |   589.99
40.750    0.00    0.59      0.850  I  O     |       |       |       |   589.98
40.833    0.00    0.59      0.846  I  O     |       |       |       |   589.97
40.917    0.00    0.59      0.842  I  O     |       |       |       |   589.97
41.000    0.00    0.59      0.838  I  O     |       |       |       |   589.96
41.083    0.00    0.59      0.834  I  O     |       |       |       |   589.95
41.167    0.00    0.59      0.830  I  O     |       |       |       |   589.94
41.250    0.00    0.58      0.826  I  O     |       |       |       |   589.93
41.333    0.00    0.58      0.822  I  O     |       |       |       |   589.93
41.417    0.00    0.58      0.818  I  O     |       |       |       |   589.92
41.500    0.00    0.58      0.814  I  O     |       |       |       |   589.91
```

```
41.583    0.00    0.58     0.810  I  O     |         |         |         |    589.90
41.667    0.00    0.58     0.806  I  O     |         |         |         |    589.90
41.750    0.00    0.58     0.802  I  O     |         |         |         |    589.89
41.833    0.00    0.57     0.798  I  O     |         |         |         |    589.88
41.917    0.00    0.57     0.794  I  O     |         |         |         |    589.87
42.000    0.00    0.57     0.790  I  O     |         |         |         |    589.87
42.083    0.00    0.57     0.786  I  O     |         |         |         |    589.86
42.167    0.00    0.57     0.782  I  O     |         |         |         |    589.85
42.250    0.00    0.57     0.778  I  O     |         |         |         |    589.84
42.333    0.00    0.57     0.774  I  O     |         |         |         |    589.83
42.417    0.00    0.57     0.770  I  O     |         |         |         |    589.83
42.500    0.00    0.56     0.766  I  O     |         |         |         |    589.82
42.583    0.00    0.56     0.762  I  O     |         |         |         |    589.81
42.667    0.00    0.56     0.759  I  O     |         |         |         |    589.80
42.750    0.00    0.56     0.755  I  O     |         |         |         |    589.80
42.833    0.00    0.56     0.751  I  O     |         |         |         |    589.79
42.917    0.00    0.56     0.747  I  O     |         |         |         |    589.78
43.000    0.00    0.56     0.743  I  O     |         |         |         |    589.78
43.083    0.00    0.56     0.739  I  O     |         |         |         |    589.77
43.167    0.00    0.55     0.736  I  O     |         |         |         |    589.76
43.250    0.00    0.55     0.732  I  O     |         |         |         |    589.75
43.333    0.00    0.55     0.728  I  O     |         |         |         |    589.75
43.417    0.00    0.55     0.724  I  O     |         |         |         |    589.74
43.500    0.00    0.55     0.720  I  O     |         |         |         |    589.73
43.583    0.00    0.55     0.717  I  O     |         |         |         |    589.72
43.667    0.00    0.55     0.713  I  O     |         |         |         |    589.72
43.750    0.00    0.55     0.709  I  O     |         |         |         |    589.71
43.833    0.00    0.54     0.705  I  O     |         |         |         |    589.70
43.917    0.00    0.54     0.702  I  O     |         |         |         |    589.70
44.000    0.00    0.54     0.698  I  O     |         |         |         |    589.69
44.083    0.00    0.54     0.694  I  O     |         |         |         |    589.68
44.167    0.00    0.54     0.690  I  O     |         |         |         |    589.67
44.250    0.00    0.54     0.687  I  O     |         |         |         |    589.67
44.333    0.00    0.54     0.683  I  O     |         |         |         |    589.66
44.417    0.00    0.54     0.679  I  O     |         |         |         |    589.65
44.500    0.00    0.53     0.676  I  O     |         |         |         |    589.65
44.583    0.00    0.53     0.672  I  O     |         |         |         |    589.64
44.667    0.00    0.53     0.668  I  O     |         |         |         |    589.63
44.750    0.00    0.53     0.665  I  O     |         |         |         |    589.62
44.833    0.00    0.53     0.661  I  O     |         |         |         |    589.62
44.917    0.00    0.53     0.657  I  O     |         |         |         |    589.61
45.000    0.00    0.53     0.654  I  O     |         |         |         |    589.60
45.083    0.00    0.53     0.650  I  O     |         |         |         |    589.60
45.167    0.00    0.53     0.646  I  O     |         |         |         |    589.59
45.250    0.00    0.52     0.643  I  O     |         |         |         |    589.58
45.333    0.00    0.52     0.639  I  O     |         |         |         |    589.58
45.417    0.00    0.52     0.636  I  O     |         |         |         |    589.57
45.500    0.00    0.52     0.632  I  O     |         |         |         |    589.56
45.583    0.00    0.52     0.628  I  O     |         |         |         |    589.55
45.667    0.00    0.52     0.625  I  O     |         |         |         |    589.55
45.750    0.00    0.52     0.621  I  O     |         |         |         |    589.54
45.833    0.00    0.52     0.618  I  O     |         |         |         |    589.53
45.917    0.00    0.51     0.614  I  O     |         |         |         |    589.53
46.000    0.00    0.51     0.611  I  O     |         |         |         |    589.52
46.083    0.00    0.51     0.607  I  O     |         |         |         |    589.51
46.167    0.00    0.51     0.604  I  O     |         |         |         |    589.51
46.250    0.00    0.51     0.600  I  O     |         |         |         |    589.50
```

```
 46.333    0.00    0.51     0.596  I   O    |       |       |       |   589.48
 46.417    0.00    0.51     0.593  I   O    |       |       |       |   589.45
 46.500    0.00    0.51     0.590  I   O    |       |       |       |   589.43
 46.583    0.00    0.50     0.586  I   O    |       |       |       |   589.41
 46.667    0.00    0.50     0.583  I   O    |       |       |       |   589.38
 46.750    0.00    0.50     0.579  I   O    |       |       |       |   589.36
 46.833    0.00    0.50     0.576  I   O    |       |       |       |   589.34
 46.917    0.00    0.50     0.572  I   O    |       |       |       |   589.32
 47.000    0.00    0.50     0.569  I   O    |       |       |       |   589.29
 47.083    0.00    0.49     0.565  I   O    |       |       |       |   589.27
 47.167    0.00    0.49     0.562  I   O    |       |       |       |   589.25
 47.250    0.00    0.49     0.559  I   O    |       |       |       |   589.22
 47.333    0.00    0.49     0.555  I   O    |       |       |       |   589.20
 47.417    0.00    0.49     0.552  I   O    |       |       |       |   589.18
 47.500    0.00    0.49     0.549  I   O    |       |       |       |   589.16
 47.583    0.00    0.48     0.545  I   O    |       |       |       |   589.13
 47.667    0.00    0.48     0.542  I   O    |       |       |       |   589.11
 47.750    0.00    0.48     0.539  I   O    |       |       |       |   589.09
 47.833    0.00    0.48     0.535  I   O    |       |       |       |   589.07
 47.917    0.00    0.48     0.532  I   O    |       |       |       |   589.05
 48.000    0.00    0.48     0.529  I   O    |       |       |       |   589.02
 48.083    0.00    0.48     0.525  I   O    |       |       |       |   589.00
 48.167    0.00    0.47     0.522  I   O    |       |       |       |   588.98
 48.250    0.00    0.47     0.519  I   O    |       |       |       |   588.96
 48.333    0.00    0.47     0.516  I   O    |       |       |       |   588.94
 48.417    0.00    0.47     0.512  I   O    |       |       |       |   588.92
 48.500    0.00    0.47     0.509  I   O    |       |       |       |   588.89
 48.583    0.00    0.47     0.506  I   O    |       |       |       |   588.87
 48.667    0.00    0.46     0.503  I   O    |       |       |       |   588.85
 48.750    0.00    0.46     0.500  I   O    |       |       |       |   588.83
 48.833    0.00    0.46     0.496  I O      |       |       |       |   588.81
 48.917    0.00    0.46     0.493  I O      |       |       |       |   588.79
 49.000    0.00    0.46     0.490  I O      |       |       |       |   588.77
 49.083    0.00    0.46     0.487  I O      |       |       |       |   588.75
 49.167    0.00    0.46     0.484  I O      |       |       |       |   588.72
 49.250    0.00    0.45     0.481  I O      |       |       |       |   588.70
 49.333    0.00    0.45     0.477  I O      |       |       |       |   588.68
 49.417    0.00    0.45     0.474  I O      |       |       |       |   588.66
 49.500    0.00    0.45     0.471  I O      |       |       |       |   588.64
 49.583    0.00    0.45     0.468  I O      |       |       |       |   588.62
 49.667    0.00    0.45     0.465  I O      |       |       |       |   588.60
 49.750    0.00    0.45     0.462  I O      |       |       |       |   588.58
 49.833    0.00    0.44     0.459  I O      |       |       |       |   588.56
 49.917    0.00    0.44     0.456  I O      |       |       |       |   588.54
 50.000    0.00    0.44     0.453  I O      |       |       |       |   588.52
 50.083    0.00    0.44     0.450  I O      |       |       |       |   588.50
 50.167    0.00    0.44     0.447  I O      |       |       |       |   588.48
 50.250    0.00    0.44     0.444  I O      |       |       |       |   588.46
 50.333    0.00    0.44     0.441  I O      |       |       |       |   588.44
 50.417    0.00    0.43     0.438  I O      |       |       |       |   588.42
 50.500    0.00    0.43     0.435  I O      |       |       |       |   588.40
 50.583    0.00    0.43     0.432  I O      |       |       |       |   588.38
 50.667    0.00    0.43     0.429  I O      |       |       |       |   588.36
 50.750    0.00    0.43     0.426  I O      |       |       |       |   588.34
 50.833    0.00    0.43     0.423  I O      |       |       |       |   588.32
 50.917    0.00    0.42     0.420  I O      |       |       |       |   588.30
 51.000    0.00    0.42     0.417  I O      |       |       |       |   588.28
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 51.083    0.00    0.42      0.414  I O      |       |       |       |    588.26
 51.167    0.00    0.42      0.411  I O      |       |       |       |    588.24
 51.250    0.00    0.42      0.408  I O      |       |       |       |    588.22
 51.333    0.00    0.42      0.406  I O      |       |       |       |    588.20
 51.417    0.00    0.41      0.403  I O      |       |       |       |    588.18
 51.500    0.00    0.41      0.400  I O      |       |       |       |    588.17
 51.583    0.00    0.41      0.397  I O      |       |       |       |    588.15
 51.667    0.00    0.41      0.394  I O      |       |       |       |    588.13
 51.750    0.00    0.41      0.391  I O      |       |       |       |    588.11
 51.833    0.00    0.41      0.389  I O      |       |       |       |    588.09
 51.917    0.00    0.41      0.386  I O      |       |       |       |    588.07
 52.000    0.00    0.40      0.383  I O      |       |       |       |    588.05
 52.083    0.00    0.40      0.380  I O      |       |       |       |    588.03
 52.167    0.00    0.40      0.377  I O      |       |       |       |    588.02
 52.250    0.00    0.40      0.375  I O      |       |       |       |    588.00
 52.333    0.00    0.40      0.372  I O      |       |       |       |    587.98
 52.417    0.00    0.40      0.369  I O      |       |       |       |    587.96
 52.500    0.00    0.40      0.366  I O      |       |       |       |    587.94
 52.583    0.00    0.39      0.364  I O      |       |       |       |    587.93
 52.667    0.00    0.39      0.361  I O      |       |       |       |    587.91
 52.750    0.00    0.39      0.358  I O      |       |       |       |    587.89
 52.833    0.00    0.39      0.356  I O      |       |       |       |    587.87
 52.917    0.00    0.39      0.353  I O      |       |       |       |    587.85
 53.000    0.00    0.39      0.350  I O      |       |       |       |    587.84
 53.083    0.00    0.39      0.348  I O      |       |       |       |    587.82
 53.167    0.00    0.38      0.345  I O      |       |       |       |    587.80
 53.250    0.00    0.38      0.342  I O      |       |       |       |    587.78
 53.333    0.00    0.38      0.340  I O      |       |       |       |    587.76
 53.417    0.00    0.38      0.337  I O      |       |       |       |    587.75
 53.500    0.00    0.38      0.334  I O      |       |       |       |    587.73
 53.583    0.00    0.38      0.332  I O      |       |       |       |    587.71
 53.667    0.00    0.38      0.329  I O      |       |       |       |    587.70
 53.750    0.00    0.37      0.327  I O      |       |       |       |    587.68
 53.833    0.00    0.37      0.324  I O      |       |       |       |    587.66
 53.917    0.00    0.37      0.322  I O      |       |       |       |    587.64
 54.000    0.00    0.37      0.319  I O      |       |       |       |    587.63
 54.083    0.00    0.37      0.316  I O      |       |       |       |    587.61
 54.167    0.00    0.37      0.314  I O      |       |       |       |    587.59
 54.250    0.00    0.37      0.311  I O      |       |       |       |    587.58
 54.333    0.00    0.36      0.309  I O      |       |       |       |    587.56
 54.417    0.00    0.36      0.306  I O      |       |       |       |    587.54
 54.500    0.00    0.36      0.304  I O      |       |       |       |    587.53
 54.583    0.00    0.36      0.301  I O      |       |       |       |    587.51
 54.667    0.00    0.36      0.299  I O      |       |       |       |    587.49
 54.750    0.00    0.36      0.296  I O      |       |       |       |    587.48
 54.833    0.00    0.36      0.294  I O      |       |       |       |    587.46
 54.917    0.00    0.35      0.292  I O      |       |       |       |    587.44
 55.000    0.00    0.35      0.289  I O      |       |       |       |    587.43
 55.083    0.00    0.35      0.287  I O      |       |       |       |    587.41
 55.167    0.00    0.35      0.284  I O      |       |       |       |    587.40
 55.250    0.00    0.35      0.282  I O      |       |       |       |    587.38
 55.333    0.00    0.34      0.280  I O      |       |       |       |    587.36
 55.417    0.00    0.34      0.277  I O      |       |       |       |    587.35
 55.500    0.00    0.34      0.275  I O      |       |       |       |    587.33
 55.583    0.00    0.34      0.273  I O      |       |       |       |    587.32
 55.667    0.00    0.34      0.270  I O      |       |       |       |    587.30
 55.750    0.00    0.33      0.268  I O      |       |       |       |    587.29
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 55.833    0.00    0.33      0.266  I O      |       |       |       |    587.27
 55.917    0.00    0.33      0.263  I O      |       |       |       |    587.26
 56.000    0.00    0.33      0.261  I O      |       |       |       |    587.24
 56.083    0.00    0.33      0.259  I O      |       |       |       |    587.23
 56.167    0.00    0.33      0.257  I O      |       |       |       |    587.21
 56.250    0.00    0.32      0.254  I O      |       |       |       |    587.20
 56.333    0.00    0.32      0.252  I O      |       |       |       |    587.18
 56.417    0.00    0.32      0.250  I O      |       |       |       |    587.17
 56.500    0.00    0.32      0.248  I O      |       |       |       |    587.15
 56.583    0.00    0.32      0.246  I O      |       |       |       |    587.14
 56.667    0.00    0.31      0.243  I O      |       |       |       |    587.12
 56.750    0.00    0.31      0.241  I O      |       |       |       |    587.11
 56.833    0.00    0.31      0.239  I O      |       |       |       |    587.09
 56.917    0.00    0.31      0.237  I O      |       |       |       |    587.08
 57.000    0.00    0.31      0.235  IO       |       |       |       |    587.07
 57.083    0.00    0.31      0.233  IO       |       |       |       |    587.05
 57.167    0.00    0.30      0.231  IO       |       |       |       |    587.04
 57.250    0.00    0.30      0.228  IO       |       |       |       |    587.02
 57.333    0.00    0.30      0.226  IO       |       |       |       |    587.01
 57.417    0.00    0.30      0.224  IO       |       |       |       |    587.00
 57.500    0.00    0.30      0.222  IO       |       |       |       |    586.98
 57.583    0.00    0.30      0.220  IO       |       |       |       |    586.97
 57.667    0.00    0.29      0.218  IO       |       |       |       |    586.95
 57.750    0.00    0.29      0.216  IO       |       |       |       |    586.94
 57.833    0.00    0.29      0.214  IO       |       |       |       |    586.93
 57.917    0.00    0.29      0.212  IO       |       |       |       |    586.91
 58.000    0.00    0.29      0.210  IO       |       |       |       |    586.90
 58.083    0.00    0.29      0.208  IO       |       |       |       |    586.89
 58.167    0.00    0.28      0.206  IO       |       |       |       |    586.87
 58.250    0.00    0.28      0.204  IO       |       |       |       |    586.86
 58.333    0.00    0.28      0.202  IO       |       |       |       |    586.85
 58.417    0.00    0.28      0.200  IO       |       |       |       |    586.84
 58.500    0.00    0.28      0.198  IO       |       |       |       |    586.82
 58.583    0.00    0.28      0.197  IO       |       |       |       |    586.81
 58.667    0.00    0.28      0.195  IO       |       |       |       |    586.80
 58.750    0.00    0.27      0.193  IO       |       |       |       |    586.78
 58.833    0.00    0.27      0.191  IO       |       |       |       |    586.77
 58.917    0.00    0.27      0.189  IO       |       |       |       |    586.76
 59.000    0.00    0.27      0.187  IO       |       |       |       |    586.75
 59.083    0.00    0.27      0.185  IO       |       |       |       |    586.73
 59.167    0.00    0.27      0.183  IO       |       |       |       |    586.72
 59.250    0.00    0.27      0.182  IO       |       |       |       |    586.71
 59.333    0.00    0.26      0.180  IO       |       |       |       |    586.70
 59.417    0.00    0.26      0.178  IO       |       |       |       |    586.69
 59.500    0.00    0.26      0.176  IO       |       |       |       |    586.67
 59.583    0.00    0.26      0.174  IO       |       |       |       |    586.66
 59.667    0.00    0.26      0.173  IO       |       |       |       |    586.65
 59.750    0.00    0.26      0.171  IO       |       |       |       |    586.64
 59.833    0.00    0.26      0.169  IO       |       |       |       |    586.63
 59.917    0.00    0.25      0.167  IO       |       |       |       |    586.62
 60.000    0.00    0.25      0.166  IO       |       |       |       |    586.60
 60.083    0.00    0.25      0.164  IO       |       |       |       |    586.59
 60.167    0.00    0.25      0.162  IO       |       |       |       |    586.58
 60.250    0.00    0.25      0.160  IO       |       |       |       |    586.57
 60.333    0.00    0.25      0.159  IO       |       |       |       |    586.56
 60.417    0.00    0.25      0.157  IO       |       |       |       |    586.55
 60.500    0.00    0.24      0.155  IO       |       |       |       |    586.54
```

```
 60.583    0.00    0.24     0.154  IO      |         |         |         |    586.52
 60.667    0.00    0.24     0.152  IO      |         |         |         |    586.51
 60.750    0.00    0.24     0.150  IO      |         |         |         |    586.50
 60.833    0.00    0.24     0.149  IO      |         |         |         |    586.49
 60.917    0.00    0.24     0.147  IO      |         |         |         |    586.48
 61.000    0.00    0.23     0.145  IO      |         |         |         |    586.47
 61.083    0.00    0.23     0.144  IO      |         |         |         |    586.46
 61.167    0.00    0.23     0.142  IO      |         |         |         |    586.45
 61.250    0.00    0.23     0.141  IO      |         |         |         |    586.44
 61.333    0.00    0.22     0.139  IO      |         |         |         |    586.43
 61.417    0.00    0.22     0.138  IO      |         |         |         |    586.42
 61.500    0.00    0.22     0.136  IO      |         |         |         |    586.41
 61.583    0.00    0.22     0.135  IO      |         |         |         |    586.40
 61.667    0.00    0.21     0.133  IO      |         |         |         |    586.39
 61.750    0.00    0.21     0.132  IO      |         |         |         |    586.38
 61.833    0.00    0.21     0.130  IO      |         |         |         |    586.37
 61.917    0.00    0.21     0.129  IO      |         |         |         |    586.36
 62.000    0.00    0.20     0.127  IO      |         |         |         |    586.35
 62.083    0.00    0.20     0.126  IO      |         |         |         |    586.34
 62.167    0.00    0.20     0.125  IO      |         |         |         |    586.33
 62.250    0.00    0.20     0.123  IO      |         |         |         |    586.32
 62.333    0.00    0.19     0.122  IO      |         |         |         |    586.31
 62.417    0.00    0.19     0.121  IO      |         |         |         |    586.30
 62.500    0.00    0.19     0.119  IO      |         |         |         |    586.29
 62.583    0.00    0.19     0.118  IO      |         |         |         |    586.28
 62.667    0.00    0.19     0.117  IO      |         |         |         |    586.28
 62.750    0.00    0.18     0.115  IO      |         |         |         |    586.27
 62.833    0.00    0.18     0.114  IO      |         |         |         |    586.26
 62.917    0.00    0.18     0.113  IO      |         |         |         |    586.25
 63.000    0.00    0.18     0.112  IO      |         |         |         |    586.24
 63.083    0.00    0.18     0.110  IO      |         |         |         |    586.23
 63.167    0.00    0.17     0.109  IO      |         |         |         |    586.23
 63.250    0.00    0.17     0.108  IO      |         |         |         |    586.22
 63.333    0.00    0.17     0.107  IO      |         |         |         |    586.21
 63.417    0.00    0.17     0.106  IO      |         |         |         |    586.20
 63.500    0.00    0.17     0.104  IO      |         |         |         |    586.19
 63.583    0.00    0.17     0.103  IO      |         |         |         |    586.19
 63.667    0.00    0.16     0.102  IO      |         |         |         |    586.18
 63.750    0.00    0.16     0.101  IO      |         |         |         |    586.17
 63.833    0.00    0.16     0.100  IO      |         |         |         |    586.16
 63.917    0.00    0.16     0.099  IO      |         |         |         |    586.16
 64.000    0.00    0.16     0.098  IO      |         |         |         |    586.15
 64.083    0.00    0.15     0.097  IO      |         |         |         |    586.14
 64.167    0.00    0.15     0.096  O       |         |         |         |    586.14
 64.250    0.00    0.15     0.095  O       |         |         |         |    586.13
 64.333    0.00    0.15     0.094  O       |         |         |         |    586.12
 64.417    0.00    0.15     0.093  O       |         |         |         |    586.11
 64.500    0.00    0.15     0.092  O       |         |         |         |    586.11
 64.583    0.00    0.14     0.091  O       |         |         |         |    586.10
 64.667    0.00    0.14     0.090  O       |         |         |         |    586.09
 64.750    0.00    0.14     0.089  O       |         |         |         |    586.09
 64.833    0.00    0.14     0.088  O       |         |         |         |    586.08
 64.917    0.00    0.14     0.087  O       |         |         |         |    586.07
 65.000    0.00    0.14     0.086  O       |         |         |         |    586.07
 65.083    0.00    0.14     0.085  O       |         |         |         |    586.06
 65.167    0.00    0.13     0.084  O       |         |         |         |    586.06
 65.250    0.00    0.13     0.083  O       |         |         |         |    586.05
```

```
65.333     0.00     0.13       0.082  O        |        |        |        |     586.04
65.417     0.00     0.13       0.081  O        |        |        |        |     586.04
65.500     0.00     0.13       0.080  O        |        |        |        |     586.03
65.583     0.00     0.13       0.079  O        |        |        |        |     586.03
65.667     0.00     0.13       0.078  O        |        |        |        |     586.02
65.750     0.00     0.12       0.078  O        |        |        |        |     586.01
65.833     0.00     0.12       0.077  O        |        |        |        |     586.01
65.917     0.00     0.12       0.076  O        |        |        |        |     586.00
66.000     0.00     0.12       0.075  O        |        |        |        |     586.00
66.083     0.00     0.12       0.074  O        |        |        |        |     585.99
66.167     0.00     0.12       0.073  O        |        |        |        |     585.99
66.250     0.00     0.12       0.073  O        |        |        |        |     585.98
66.333     0.00     0.11       0.072  O        |        |        |        |     585.98
66.417     0.00     0.11       0.071  O        |        |        |        |     585.97
66.500     0.00     0.11       0.070  O        |        |        |        |     585.97
66.583     0.00     0.11       0.070  O        |        |        |        |     585.96
66.667     0.00     0.11       0.069  O        |        |        |        |     585.95
66.750     0.00     0.11       0.068  O        |        |        |        |     585.95
66.833     0.00     0.11       0.067  O        |        |        |        |     585.94
66.917     0.00     0.11       0.067  O        |        |        |        |     585.94
67.000     0.00     0.10       0.066  O        |        |        |        |     585.94
67.083     0.00     0.10       0.065  O        |        |        |        |     585.93
67.167     0.00     0.10       0.064  O        |        |        |        |     585.93
67.250     0.00     0.10       0.064  O        |        |        |        |     585.92
67.333     0.00     0.10       0.063  O        |        |        |        |     585.92
67.417     0.00     0.10       0.062  O        |        |        |        |     585.91
67.500     0.00     0.10       0.062  O        |        |        |        |     585.91
67.583     0.00     0.10       0.061  O        |        |        |        |     585.90
67.667     0.00     0.10       0.060  O        |        |        |        |     585.90
67.750     0.00     0.10       0.060  O        |        |        |        |     585.89
67.833     0.00     0.09       0.059  O        |        |        |        |     585.89
67.917     0.00     0.09       0.058  O        |        |        |        |     585.88
68.000     0.00     0.09       0.058  O        |        |        |        |     585.88
68.083     0.00     0.09       0.057  O        |        |        |        |     585.88
68.167     0.00     0.09       0.056  O        |        |        |        |     585.87
68.250     0.00     0.09       0.056  O        |        |        |        |     585.87
68.333     0.00     0.09       0.055  O        |        |        |        |     585.86
68.417     0.00     0.09       0.055  O        |        |        |        |     585.86
68.500     0.00     0.09       0.054  O        |        |        |        |     585.86
68.583     0.00     0.09       0.053  O        |        |        |        |     585.85
68.667     0.00     0.08       0.053  O        |        |        |        |     585.85
68.750     0.00     0.08       0.052  O        |        |        |        |     585.84
68.833     0.00     0.08       0.052  O        |        |        |        |     585.84
68.917     0.00     0.08       0.051  O        |        |        |        |     585.84
69.000     0.00     0.08       0.051  O        |        |        |        |     585.83
69.083     0.00     0.08       0.050  O        |        |        |        |     585.83
69.167     0.00     0.08       0.049  O        |        |        |        |     585.83
69.250     0.00     0.08       0.049  O        |        |        |        |     585.82
69.333     0.00     0.08       0.048  O        |        |        |        |     585.82
69.417     0.00     0.08       0.048  O        |        |        |        |     585.81
69.500     0.00     0.08       0.047  O        |        |        |        |     585.81
69.583     0.00     0.07       0.047  O        |        |        |        |     585.81
69.667     0.00     0.07       0.046  O        |        |        |        |     585.80
69.750     0.00     0.07       0.046  O        |        |        |        |     585.80
69.833     0.00     0.07       0.045  O        |        |        |        |     585.80
69.917     0.00     0.07       0.045  O        |        |        |        |     585.79
70.000     0.00     0.07       0.044  O        |        |        |        |     585.79
```

```
  70.083     0.00     0.07       0.044  O         |         |         |         |      585.79
  70.167     0.00     0.07       0.043  O         |         |         |         |      585.78
  70.250     0.00     0.07       0.043  O         |         |         |         |      585.78
  70.333     0.00     0.07       0.042  O         |         |         |         |      585.78
  70.417     0.00     0.07       0.042  O         |         |         |         |      585.78
  70.500     0.00     0.07       0.042  O         |         |         |         |      585.77
  70.583     0.00     0.07       0.041  O         |         |         |         |      585.77
  70.667     0.00     0.06       0.041  O         |         |         |         |      585.77
  70.750     0.00     0.06       0.040  O         |         |         |         |      585.76
  70.833     0.00     0.06       0.040  O         |         |         |         |      585.76
  70.917     0.00     0.06       0.039  O         |         |         |         |      585.76
  71.000     0.00     0.06       0.039  O         |         |         |         |      585.75
  71.083     0.00     0.06       0.038  O         |         |         |         |      585.75
  71.167     0.00     0.06       0.038  O         |         |         |         |      585.75
  71.250     0.00     0.06       0.038  O         |         |         |         |      585.75
  71.333     0.00     0.06       0.037  O         |         |         |         |      585.74
  71.417     0.00     0.06       0.037  O         |         |         |         |      585.74
  71.500     0.00     0.06       0.036  O         |         |         |         |      585.74
  71.583     0.00     0.06       0.036  O         |         |         |         |      585.74
  71.667     0.00     0.06       0.036  O         |         |         |         |      585.73
  71.750     0.00     0.06       0.035  O         |         |         |         |      585.73
  71.833     0.00     0.06       0.035  O         |         |         |         |      585.73
  71.917     0.00     0.05       0.034  O         |         |         |         |      585.72
  72.000     0.00     0.05       0.034  O         |         |         |         |      585.72
  72.083     0.00     0.05       0.034  O         |         |         |         |      585.72
  72.167     0.00     0.05       0.033  O         |         |         |         |      585.72
  72.250     0.00     0.05       0.033  O         |         |         |         |      585.71
  72.333     0.00     0.05       0.033  O         |         |         |         |      585.71
  72.417     0.00     0.05       0.032  O         |         |         |         |      585.71
  72.500     0.00     0.05       0.032  O         |         |         |         |      585.71
  72.583     0.00     0.05       0.032  O         |         |         |         |      585.71
  72.667     0.00     0.05       0.031  O         |         |         |         |      585.70
  72.750     0.00     0.05       0.031  O         |         |         |         |      585.70
  72.833     0.00     0.05       0.031  O         |         |         |         |      585.70
  72.917     0.00     0.05       0.030  O         |         |         |         |      585.70
  73.000     0.00     0.05       0.030  O         |         |         |         |      585.69
  73.083     0.00     0.05       0.030  O         |         |         |         |      585.69
  73.167     0.00     0.05       0.029  O         |         |         |         |      585.69
  73.250     0.00     0.05       0.029  O         |         |         |         |      585.69
  73.333     0.00     0.05       0.029  O         |         |         |         |      585.69
  73.417     0.00     0.04       0.028  O         |         |         |         |      585.68
  73.500     0.00     0.04       0.028  O         |         |         |         |      585.68
  73.583     0.00     0.04       0.028  O         |         |         |         |      585.68
  73.667     0.00     0.04       0.027  O         |         |         |         |      585.68
  73.750     0.00     0.04       0.027  O         |         |         |         |      585.68
  73.833     0.00     0.04       0.027  O         |         |         |         |      585.67
  73.917     0.00     0.04       0.027  O         |         |         |         |      585.67
  74.000     0.00     0.04       0.026  O         |         |         |         |      585.67
  74.083     0.00     0.04       0.026  O         |         |         |         |      585.67
  74.167     0.00     0.04       0.026  O         |         |         |         |      585.67
  74.250     0.00     0.04       0.025  O         |         |         |         |      585.66
  74.333     0.00     0.04       0.025  O         |         |         |         |      585.66
  74.417     0.00     0.04       0.025  O         |         |         |         |      585.66
  74.500     0.00     0.04       0.025  O         |         |         |         |      585.66
  74.583     0.00     0.04       0.024  O         |         |         |         |      585.66
  74.667     0.00     0.04       0.024  O         |         |         |         |      585.65
  74.750     0.00     0.04       0.024  O         |         |         |         |      585.65
```

```
74.833    0.00    0.04      0.024  O       |       |       |       |   585.65
74.917    0.00    0.04      0.023  O       |       |       |       |   585.65
75.000    0.00    0.04      0.023  O       |       |       |       |   585.65
75.083    0.00    0.04      0.023  O       |       |       |       |   585.65
75.167    0.00    0.04      0.023  O       |       |       |       |   585.64
75.250    0.00    0.04      0.022  O       |       |       |       |   585.64
75.333    0.00    0.03      0.022  O       |       |       |       |   585.64
75.417    0.00    0.03      0.022  O       |       |       |       |   585.64
75.500    0.00    0.03      0.022  O       |       |       |       |   585.64
75.583    0.00    0.03      0.021  O       |       |       |       |   585.64
75.667    0.00    0.03      0.021  O       |       |       |       |   585.64
75.750    0.00    0.03      0.021  O       |       |       |       |   585.63
75.833    0.00    0.03      0.021  O       |       |       |       |   585.63
75.917    0.00    0.03      0.020  O       |       |       |       |   585.63
76.000    0.00    0.03      0.020  O       |       |       |       |   585.63
76.083    0.00    0.03      0.020  O       |       |       |       |   585.63
76.167    0.00    0.03      0.020  O       |       |       |       |   585.63
76.250    0.00    0.03      0.020  O       |       |       |       |   585.62
76.333    0.00    0.03      0.019  O       |       |       |       |   585.62
76.417    0.00    0.03      0.019  O       |       |       |       |   585.62
76.500    0.00    0.03      0.019  O       |       |       |       |   585.62
76.583    0.00    0.03      0.019  O       |       |       |       |   585.62
76.667    0.00    0.03      0.019  O       |       |       |       |   585.62
76.750    0.00    0.03      0.018  O       |       |       |       |   585.62
76.833    0.00    0.03      0.018  O       |       |       |       |   585.62
76.917    0.00    0.03      0.018  O       |       |       |       |   585.61
77.000    0.00    0.03      0.018  O       |       |       |       |   585.61
77.083    0.00    0.03      0.018  O       |       |       |       |   585.61
77.167    0.00    0.03      0.017  O       |       |       |       |   585.61
77.250    0.00    0.03      0.017  O       |       |       |       |   585.61
77.333    0.00    0.03      0.017  O       |       |       |       |   585.61
77.417    0.00    0.03      0.017  O       |       |       |       |   585.61
77.500    0.00    0.03      0.017  O       |       |       |       |   585.61
77.583    0.00    0.03      0.016  O       |       |       |       |   585.60
77.667    0.00    0.03      0.016  O       |       |       |       |   585.60
77.750    0.00    0.03      0.016  O       |       |       |       |   585.60
77.833    0.00    0.02      0.016  O       |       |       |       |   585.60
77.917    0.00    0.02      0.016  O       |       |       |       |   585.60
78.000    0.00    0.02      0.016  O       |       |       |       |   585.60
78.083    0.00    0.02      0.015  O       |       |       |       |   585.60
78.167    0.00    0.02      0.015  O       |       |       |       |   585.60
78.250    0.00    0.02      0.015  O       |       |       |       |   585.59
78.333    0.00    0.02      0.015  O       |       |       |       |   585.59
78.417    0.00    0.02      0.015  O       |       |       |       |   585.59
78.500    0.00    0.02      0.015  O       |       |       |       |   585.59
78.583    0.00    0.02      0.014  O       |       |       |       |   585.59
78.667    0.00    0.02      0.014  O       |       |       |       |   585.59
78.750    0.00    0.02      0.014  O       |       |       |       |   585.59
78.833    0.00    0.02      0.014  O       |       |       |       |   585.59
78.917    0.00    0.02      0.014  O       |       |       |       |   585.59
79.000    0.00    0.02      0.014  O       |       |       |       |   585.59
79.083    0.00    0.02      0.014  O       |       |       |       |   585.58
79.167    0.00    0.02      0.013  O       |       |       |       |   585.58
79.250    0.00    0.02      0.013  O       |       |       |       |   585.58
79.333    0.00    0.02      0.013  O       |       |       |       |   585.58
79.417    0.00    0.02      0.013  O       |       |       |       |   585.58
79.500    0.00    0.02      0.013  O       |       |       |       |   585.58
```

```
 79.583     0.00     0.02       0.013  O        |        |        |        |   585.58
 79.667     0.00     0.02       0.013  O        |        |        |        |   585.58
 79.750     0.00     0.02       0.012  O        |        |        |        |   585.58
 79.833     0.00     0.02       0.012  O        |        |        |        |   585.58
 79.917     0.00     0.02       0.012  O        |        |        |        |   585.58
 80.000     0.00     0.02       0.012  O        |        |        |        |   585.57
 80.083     0.00     0.02       0.012  O        |        |        |        |   585.57
 80.167     0.00     0.02       0.012  O        |        |        |        |   585.57
 80.250     0.00     0.02       0.012  O        |        |        |        |   585.57
 80.333     0.00     0.02       0.012  O        |        |        |        |   585.57
 80.417     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.500     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.583     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.667     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.750     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.833     0.00     0.02       0.011  O        |        |        |        |   585.57
 80.917     0.00     0.02       0.011  O        |        |        |        |   585.57
 81.000     0.00     0.02       0.011  O        |        |        |        |   585.56
 81.083     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.167     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.250     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.333     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.417     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.500     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.583     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.667     0.00     0.02       0.010  O        |        |        |        |   585.56
 81.750     0.00     0.01       0.010  O        |        |        |        |   585.56
 81.833     0.00     0.01       0.010  O        |        |        |        |   585.56
 81.917     0.00     0.01       0.009  O        |        |        |        |   585.56
 82.000     0.00     0.01       0.009  O        |        |        |        |   585.56
 82.083     0.00     0.01       0.009  O        |        |        |        |   585.56
 82.167     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.250     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.333     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.417     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.500     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.583     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.667     0.00     0.01       0.009  O        |        |        |        |   585.55
 82.750     0.00     0.01       0.008  O        |        |        |        |   585.55
 82.833     0.00     0.01       0.008  O        |        |        |        |   585.55
 82.917     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.000     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.083     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.167     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.250     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.333     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.417     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.500     0.00     0.01       0.008  O        |        |        |        |   585.55
 83.583     0.00     0.01       0.008  O        |        |        |        |   585.54
 83.667     0.00     0.01       0.008  O        |        |        |        |   585.54
 83.750     0.00     0.01       0.007  O        |        |        |        |   585.54
 83.833     0.00     0.01       0.007  O        |        |        |        |   585.54
 83.917     0.00     0.01       0.007  O        |        |        |        |   585.54
 84.000     0.00     0.01       0.007  O        |        |        |        |   585.54
 84.083     0.00     0.01       0.007  O        |        |        |        |   585.54
 84.167     0.00     0.01       0.007  O        |        |        |        |   585.54
 84.250     0.00     0.01       0.007  O        |        |        |        |   585.54
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  84.333     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.417     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.500     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.583     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.667     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.750     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.833     0.00     0.01       0.007  O        |         |         |         |      585.54
  84.917     0.00     0.01       0.006  O        |         |         |         |      585.54
  85.000     0.00     0.01       0.006  O        |         |         |         |      585.54
  85.083     0.00     0.01       0.006  O        |         |         |         |      585.54
  85.167     0.00     0.01       0.006  O        |         |         |         |      585.54
  85.250     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.333     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.417     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.500     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.583     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.667     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.750     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.833     0.00     0.01       0.006  O        |         |         |         |      585.53
  85.917     0.00     0.01       0.006  O        |         |         |         |      585.53
  86.000     0.00     0.01       0.006  O        |         |         |         |      585.53
  86.083     0.00     0.01       0.006  O        |         |         |         |      585.53
  86.167     0.00     0.01       0.006  O        |         |         |         |      585.53
  86.250     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.333     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.417     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.500     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.583     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.667     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.750     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.833     0.00     0.01       0.005  O        |         |         |         |      585.53
  86.917     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.000     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.083     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.167     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.250     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.333     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.417     0.00     0.01       0.005  O        |         |         |         |      585.53
  87.500     0.00     0.01       0.005  O        |         |         |         |      585.52
  87.583     0.00     0.01       0.005  O        |         |         |         |      585.52
  87.667     0.00     0.01       0.005  O        |         |         |         |      585.52
  87.750     0.00     0.01       0.005  O        |         |         |         |      585.52
  87.833     0.00     0.01       0.005  O        |         |         |         |      585.52
  87.917     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.000     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.083     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.167     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.250     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.333     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.417     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.500     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.583     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.667     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.750     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.833     0.00     0.01       0.004  O        |         |         |         |      585.52
  88.917     0.00     0.01       0.004  O        |         |         |         |      585.52
  89.000     0.00     0.01       0.004  O        |         |         |         |      585.52
```

```
 89.083    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.167    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.250    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.333    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.417    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.500    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.583    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.667    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.750    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.833    0.00    0.01     0.004  O      |       |       |       |     585.52
 89.917    0.00    0.01     0.004  O      |       |       |       |     585.52
 90.000    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.083    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.167    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.250    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.333    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.417    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.500    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.583    0.00    0.00     0.003  O      |       |       |       |     585.52
 90.667    0.00    0.00     0.003  O      |       |       |       |     585.51
 90.750    0.00    0.00     0.003  O      |       |       |       |     585.51
 90.833    0.00    0.00     0.003  O      |       |       |       |     585.51
 90.917    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.000    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.083    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.167    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.250    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.333    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.417    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.500    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.583    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.667    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.750    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.833    0.00    0.00     0.003  O      |       |       |       |     585.51
 91.917    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.000    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.083    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.167    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.250    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.333    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.417    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.500    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.583    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.667    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.750    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.833    0.00    0.00     0.003  O      |       |       |       |     585.51
 92.917    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.000    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.083    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.167    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.250    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.333    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.417    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.500    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.583    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.667    0.00    0.00     0.002  O      |       |       |       |     585.51
 93.750    0.00    0.00     0.002  O      |       |       |       |     585.51
```

```
    93.833    0.00    0.00      0.002  O       |       |       |       |    585.51
    93.917    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.000    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.083    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.167    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.250    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.333    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.417    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.500    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.583    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.667    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.750    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.833    0.00    0.00      0.002  O       |       |       |       |    585.51
    94.917    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.000    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.083    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.167    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.250    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.333    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.417    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.500    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.583    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.667    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.750    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.833    0.00    0.00      0.002  O       |       |       |       |    585.51
    95.917    0.00    0.00      0.002  O       |       |       |       |    585.51
    96.000    0.00    0.00      0.002  O       |       |       |       |    585.51
    96.083    0.00    0.00      0.002  O       |       |       |       |    585.51
    96.167    0.00    0.00      0.002  O       |       |       |       |    585.51
    96.250    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.333    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.417    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.500    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.583    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.667    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.750    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.833    0.00    0.00      0.002  O       |       |       |       |    585.50
    96.917    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.000    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.083    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.167    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.250    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.333    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.417    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.500    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.583    0.00    0.00      0.002  O       |       |       |       |    585.50
    97.667    0.00    0.00      0.001  O       |       |       |       |    585.50
    97.750    0.00    0.00      0.001  O       |       |       |       |    585.50
    97.833    0.00    0.00      0.001  O       |       |       |       |    585.50
    97.917    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.000    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.083    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.167    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.250    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.333    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.417    0.00    0.00      0.001  O       |       |       |       |    585.50
    98.500    0.00    0.00      0.001  O       |       |       |       |    585.50
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  98.583    0.00    0.00      0.001  O       |       |       |       |   585.50
  98.667    0.00    0.00      0.001  O       |       |       |       |   585.50
  98.750    0.00    0.00      0.001  O       |       |       |       |   585.50
  98.833    0.00    0.00      0.001  O       |       |       |       |   585.50
  98.917    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.000    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.083    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.167    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.250    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.333    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.417    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.500    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.583    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.667    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.750    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.833    0.00    0.00      0.001  O       |       |       |       |   585.50
  99.917    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.000    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.083    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.167    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.250    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.333    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.417    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.500    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.583    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.667    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.750    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.833    0.00    0.00      0.001  O       |       |       |       |   585.50
 100.917    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.000    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.083    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.167    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.250    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.333    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.417    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.500    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.583    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.667    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.750    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.833    0.00    0.00      0.001  O       |       |       |       |   585.50
 101.917    0.00    0.00      0.001  O       |       |       |       |   585.50
 102.000    0.00    0.00      0.001  O       |       |       |       |   585.50
 102.083    0.00    0.00      0.001  O       |       |       |       |   585.50
 102.167    0.00    0.00      0.001  O       |       |       |       |   582.59

      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =  1226
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =        0.918 (CFS)
                  Total volume =       3.010 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1   Stream 2   Stream 3   Stream 4   Stream 5
            Peak (CFS)      0.000      0.000      0.000      0.000      0.000
            Vol (Ac.Ft)      0.000      0.000      0.000      0.000      0.000
      ***********************************************************************

      --------------------------------------------------------------------
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
             Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                         Study date: 10/28/21

---------------------------------------------------------------------
```

TTM 31589
10-Year 1-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop110.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    20
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       45.470 (CFS)
            Total volume =       1.358 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 20
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
  585.500      0.001      0.001      0.001        0.001
  586.500      0.150      0.240      0.149        0.151
```

```
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)      (Ac.Ft) .0      11.4   22.74   34.10   45.47 (Ft.)
 0.083    1.17     0.01      0.004  O       |       |       |       |   585.52
 0.167    4.15     0.03      0.022  O I     |       |       |       |   585.64
 0.250    5.37     0.09      0.055  O  I    |       |       |       |   585.86
 0.333    6.32     0.15      0.094  O   I   |       |       |       |   586.12
 0.417    6.96     0.22      0.138  O   I   |       |       |       |   586.42
 0.500    8.13     0.27      0.189  O    I  |       |       |       |   586.76
 0.583    9.91     0.32      0.249  O     I |       |       |       |   587.16
 0.667   12.33     0.37      0.323  O       I       |       |       |   587.65
 0.750   16.72     0.42      0.420  O       |  I    |       |       |   588.30
 0.833   32.13     0.50      0.585  O       |       |     I |       |   589.40
 0.917   45.47     0.59      0.849  O       |       |       |       I   589.98
 1.000   21.99     0.67      1.077  O       |      I|       |       |   590.42
 1.083   12.54     0.69      1.191  O       I       |       |       |   590.62
 1.167    6.13     0.70      1.251  O   I   |       |       |       |   590.73
 1.250    3.61     0.71      1.279  O I     |       |       |       |   590.77
 1.333    2.18     0.71      1.294  OI      |       |       |       |   590.80
 1.417    1.31     0.71      1.301  O       |       |       |       |   590.81
 1.500    0.63     0.71      1.303  O       |       |       |       |   590.82
 1.583    0.13     0.71      1.301  O       |       |       |       |   590.81
 1.667    0.04     0.71      1.296  O       |       |       |       |   590.80
 1.750    0.00     0.71      1.292  O       |       |       |       |   590.80
 1.833    0.00     0.71      1.287  O       |       |       |       |   590.79
 1.917    0.00     0.71      1.282  O       |       |       |       |   590.78
 2.000    0.00     0.71      1.277  O       |       |       |       |   590.77
 2.083    0.00     0.71      1.272  O       |       |       |       |   590.76
 2.167    0.00     0.71      1.267  O       |       |       |       |   590.75
 2.250    0.00     0.71      1.262  O       |       |       |       |   590.75
 2.333    0.00     0.71      1.257  O       |       |       |       |   590.74
 2.417    0.00     0.71      1.253  O       |       |       |       |   590.73
 2.500    0.00     0.70      1.248  O       |       |       |       |   590.72
 2.583    0.00     0.70      1.243  O       |       |       |       |   590.71
 2.667    0.00     0.70      1.238  O       |       |       |       |   590.70
 2.750    0.00     0.70      1.233  O       |       |       |       |   590.70
 2.833    0.00     0.70      1.228  O       |       |       |       |   590.69
 2.917    0.00     0.70      1.224  O       |       |       |       |   590.68
 3.000    0.00     0.70      1.219  O       |       |       |       |   590.67
 3.083    0.00     0.70      1.214  O       |       |       |       |   590.66
 3.167    0.00     0.70      1.209  O       |       |       |       |   590.65
 3.250    0.00     0.70      1.204  O       |       |       |       |   590.65
 3.333    0.00     0.70      1.200  O       |       |       |       |   590.64
 3.417    0.00     0.69      1.195  O       |       |       |       |   590.63
 3.500    0.00     0.69      1.190  O       |       |       |       |   590.62
```

```
 3.583     0.00     0.69      1.185  O         |         |         |         |      590.61
 3.667     0.00     0.69      1.180  O         |         |         |         |      590.60
 3.750     0.00     0.69      1.176  O         |         |         |         |      590.60
 3.833     0.00     0.69      1.171  O         |         |         |         |      590.59
 3.917     0.00     0.69      1.166  O         |         |         |         |      590.58
 4.000     0.00     0.69      1.161  O         |         |         |         |      590.57
 4.083     0.00     0.69      1.157  O         |         |         |         |      590.56
 4.167     0.00     0.69      1.152  O         |         |         |         |      590.56
 4.250     0.00     0.69      1.147  O         |         |         |         |      590.55
 4.333     0.00     0.68      1.143  O         |         |         |         |      590.54
 4.417     0.00     0.68      1.138  O         |         |         |         |      590.53
 4.500     0.00     0.68      1.133  O         |         |         |         |      590.52
 4.583     0.00     0.68      1.128  O         |         |         |         |      590.51
 4.667     0.00     0.68      1.124  O         |         |         |         |      590.51
 4.750     0.00     0.68      1.119  O         |         |         |         |      590.50
 4.833     0.00     0.68      1.114  O         |         |         |         |      590.49
 4.917     0.00     0.68      1.110  O         |         |         |         |      590.48
 5.000     0.00     0.68      1.105  O         |         |         |         |      590.47
 5.083     0.00     0.67      1.100  O         |         |         |         |      590.46
 5.167     0.00     0.67      1.096  O         |         |         |         |      590.45
 5.250     0.00     0.67      1.091  O         |         |         |         |      590.44
 5.333     0.00     0.67      1.087  O         |         |         |         |      590.44
 5.417     0.00     0.67      1.082  O         |         |         |         |      590.43
 5.500     0.00     0.67      1.077  O         |         |         |         |      590.42
 5.583     0.00     0.66      1.073  O         |         |         |         |      590.41
 5.667     0.00     0.66      1.068  O         |         |         |         |      590.40
 5.750     0.00     0.66      1.064  O         |         |         |         |      590.39
 5.833     0.00     0.66      1.059  O         |         |         |         |      590.38
 5.917     0.00     0.66      1.055  O         |         |         |         |      590.37
 6.000     0.00     0.66      1.050  O         |         |         |         |      590.37
 6.083     0.00     0.66      1.046  O         |         |         |         |      590.36
 6.167     0.00     0.65      1.041  O         |         |         |         |      590.35
 6.250     0.00     0.65      1.036  O         |         |         |         |      590.34
 6.333     0.00     0.65      1.032  O         |         |         |         |      590.33
 6.417     0.00     0.65      1.028  O         |         |         |         |      590.32
 6.500     0.00     0.65      1.023  O         |         |         |         |      590.31
 6.583     0.00     0.65      1.019  O         |         |         |         |      590.30
 6.667     0.00     0.65      1.014  O         |         |         |         |      590.30
 6.750     0.00     0.64      1.010  O         |         |         |         |      590.29
 6.833     0.00     0.64      1.005  O         |         |         |         |      590.28
 6.917     0.00     0.64      1.001  O         |         |         |         |      590.27
 7.000     0.00     0.64      0.996  O         |         |         |         |      590.26
 7.083     0.00     0.64      0.992  O         |         |         |         |      590.25
 7.167     0.00     0.64      0.988  O         |         |         |         |      590.25
 7.250     0.00     0.64      0.983  O         |         |         |         |      590.24
 7.333     0.00     0.63      0.979  O         |         |         |         |      590.23
 7.417     0.00     0.63      0.975  O         |         |         |         |      590.22
 7.500     0.00     0.63      0.970  O         |         |         |         |      590.21
 7.583     0.00     0.63      0.966  O         |         |         |         |      590.20
 7.667     0.00     0.63      0.962  O         |         |         |         |      590.20
 7.750     0.00     0.63      0.957  O         |         |         |         |      590.19
 7.833     0.00     0.63      0.953  O         |         |         |         |      590.18
 7.917     0.00     0.62      0.949  O         |         |         |         |      590.17
 8.000     0.00     0.62      0.944  O         |         |         |         |      590.16
 8.083     0.00     0.62      0.940  O         |         |         |         |      590.15
 8.167     0.00     0.62      0.936  O         |         |         |         |      590.15
 8.250     0.00     0.62      0.931  O         |         |         |         |      590.14
```

```
   8.333     0.00     0.62       0.927  O        |        |        |        |    590.13
   8.417     0.00     0.62       0.923  O        |        |        |        |    590.12
   8.500     0.00     0.61       0.919  O        |        |        |        |    590.11
   8.583     0.00     0.61       0.915  O        |        |        |        |    590.10
   8.667     0.00     0.61       0.910  O        |        |        |        |    590.10
   8.750     0.00     0.61       0.906  O        |        |        |        |    590.09
   8.833     0.00     0.61       0.902  O        |        |        |        |    590.08
   8.917     0.00     0.61       0.898  O        |        |        |        |    590.07
   9.000     0.00     0.61       0.894  O        |        |        |        |    590.06
   9.083     0.00     0.60       0.889  O        |        |        |        |    590.06
   9.167     0.00     0.60       0.885  O        |        |        |        |    590.05
   9.250     0.00     0.60       0.881  O        |        |        |        |    590.04
   9.333     0.00     0.60       0.877  O        |        |        |        |    590.03
   9.417     0.00     0.60       0.873  O        |        |        |        |    590.02
   9.500     0.00     0.60       0.869  O        |        |        |        |    590.02
   9.583     0.00     0.60       0.865  O        |        |        |        |    590.01
   9.667     0.00     0.60       0.860  O        |        |        |        |    590.00
   9.750     0.00     0.59       0.856  O        |        |        |        |    589.99
   9.833     0.00     0.59       0.852  O        |        |        |        |    589.99
   9.917     0.00     0.59       0.848  O        |        |        |        |    589.98
  10.000     0.00     0.59       0.844  O        |        |        |        |    589.97
  10.083     0.00     0.59       0.840  O        |        |        |        |    589.96
  10.167     0.00     0.59       0.836  O        |        |        |        |    589.95
  10.250     0.00     0.59       0.832  O        |        |        |        |    589.95
  10.333     0.00     0.58       0.828  O        |        |        |        |    589.94
  10.417     0.00     0.58       0.824  O        |        |        |        |    589.93
  10.500     0.00     0.58       0.820  O        |        |        |        |    589.92
  10.583     0.00     0.58       0.816  O        |        |        |        |    589.92
  10.667     0.00     0.58       0.812  O        |        |        |        |    589.91
  10.750     0.00     0.58       0.808  O        |        |        |        |    589.90
  10.833     0.00     0.58       0.804  O        |        |        |        |    589.89
  10.917     0.00     0.58       0.800  O        |        |        |        |    589.88
  11.000     0.00     0.57       0.796  O        |        |        |        |    589.88
  11.083     0.00     0.57       0.792  O        |        |        |        |    589.87
  11.167     0.00     0.57       0.788  O        |        |        |        |    589.86
  11.250     0.00     0.57       0.784  O        |        |        |        |    589.85
  11.333     0.00     0.57       0.780  O        |        |        |        |    589.85
  11.417     0.00     0.57       0.776  O        |        |        |        |    589.84
  11.500     0.00     0.57       0.772  O        |        |        |        |    589.83
  11.583     0.00     0.57       0.769  O        |        |        |        |    589.82
  11.667     0.00     0.56       0.765  O        |        |        |        |    589.82
  11.750     0.00     0.56       0.761  O        |        |        |        |    589.81
  11.833     0.00     0.56       0.757  O        |        |        |        |    589.80
  11.917     0.00     0.56       0.753  O        |        |        |        |    589.79
  12.000     0.00     0.56       0.749  O        |        |        |        |    589.79
  12.083     0.00     0.56       0.745  O        |        |        |        |    589.78
  12.167     0.00     0.56       0.742  O        |        |        |        |    589.77
  12.250     0.00     0.56       0.738  O        |        |        |        |    589.76
  12.333     0.00     0.55       0.734  O        |        |        |        |    589.76
  12.417     0.00     0.55       0.730  O        |        |        |        |    589.75
  12.500     0.00     0.55       0.726  O        |        |        |        |    589.74
  12.583     0.00     0.55       0.722  O        |        |        |        |    589.74
  12.667     0.00     0.55       0.719  O        |        |        |        |    589.73
  12.750     0.00     0.55       0.715  O        |        |        |        |    589.72
  12.833     0.00     0.55       0.711  O        |        |        |        |    589.71
  12.917     0.00     0.55       0.707  O        |        |        |        |    589.71
  13.000     0.00     0.54       0.704  O        |        |        |        |    589.70
```

```
 13.083    0.00    0.54     0.700  O        |        |        |        |   589.69
 13.167    0.00    0.54     0.696  O        |        |        |        |   589.68
 13.250    0.00    0.54     0.692  O        |        |        |        |   589.68
 13.333    0.00    0.54     0.689  O        |        |        |        |   589.67
 13.417    0.00    0.54     0.685  O        |        |        |        |   589.66
 13.500    0.00    0.54     0.681  O        |        |        |        |   589.66
 13.583    0.00    0.54     0.678  O        |        |        |        |   589.65
 13.667    0.00    0.53     0.674  O        |        |        |        |   589.64
 13.750    0.00    0.53     0.670  O        |        |        |        |   589.64
 13.833    0.00    0.53     0.667  O        |        |        |        |   589.63
 13.917    0.00    0.53     0.663  O        |        |        |        |   589.62
 14.000    0.00    0.53     0.659  O        |        |        |        |   589.61
 14.083    0.00    0.53     0.656  O        |        |        |        |   589.61
 14.167    0.00    0.53     0.652  O        |        |        |        |   589.60
 14.250    0.00    0.53     0.648  O        |        |        |        |   589.59
 14.333    0.00    0.52     0.645  O        |        |        |        |   589.59
 14.417    0.00    0.52     0.641  O        |        |        |        |   589.58
 14.500    0.00    0.52     0.638  O        |        |        |        |   589.57
 14.583    0.00    0.52     0.634  O        |        |        |        |   589.57
 14.667    0.00    0.52     0.630  O        |        |        |        |   589.56
 14.750    0.00    0.52     0.627  O        |        |        |        |   589.55
 14.833    0.00    0.52     0.623  O        |        |        |        |   589.54
 14.917    0.00    0.52     0.620  O        |        |        |        |   589.54
 15.000    0.00    0.52     0.616  O        |        |        |        |   589.53
 15.083    0.00    0.51     0.613  O        |        |        |        |   589.52
 15.167    0.00    0.51     0.609  O        |        |        |        |   589.52
 15.250    0.00    0.51     0.606  O        |        |        |        |   589.51
 15.333    0.00    0.51     0.602  O        |        |        |        |   589.50
 15.417    0.00    0.51     0.599  O        |        |        |        |   589.49
 15.500    0.00    0.51     0.595  O        |        |        |        |   589.47
 15.583    0.00    0.51     0.592  O        |        |        |        |   589.44
 15.667    0.00    0.50     0.588  O        |        |        |        |   589.42
 15.750    0.00    0.50     0.585  O        |        |        |        |   589.40
 15.833    0.00    0.50     0.581  O        |        |        |        |   589.37
 15.917    0.00    0.50     0.578  O        |        |        |        |   589.35
 16.000    0.00    0.50     0.574  O        |        |        |        |   589.33
 16.083    0.00    0.50     0.571  O        |        |        |        |   589.31
 16.167    0.00    0.49     0.567  O        |        |        |        |   589.28
 16.250    0.00    0.49     0.564  O        |        |        |        |   589.26
 16.333    0.00    0.49     0.561  O        |        |        |        |   589.24
 16.417    0.00    0.49     0.557  O        |        |        |        |   589.21
 16.500    0.00    0.49     0.554  O        |        |        |        |   589.19
 16.583    0.00    0.49     0.550  O        |        |        |        |   589.17
 16.667    0.00    0.49     0.547  O        |        |        |        |   589.15
 16.750    0.00    0.48     0.544  O        |        |        |        |   589.13
 16.833    0.00    0.48     0.540  O        |        |        |        |   589.10
 16.917    0.00    0.48     0.537  O        |        |        |        |   589.08
 17.000    0.00    0.48     0.534  O        |        |        |        |   589.06
 17.083    0.00    0.48     0.531  O        |        |        |        |   589.04
 17.167    0.00    0.48     0.527  O        |        |        |        |   589.02
 17.250    0.00    0.47     0.524  O        |        |        |        |   588.99
 17.333    0.00    0.47     0.521  O        |        |        |        |   588.97
 17.417    0.00    0.47     0.517  O        |        |        |        |   588.95
 17.500    0.00    0.47     0.514  O        |        |        |        |   588.93
 17.583    0.00    0.47     0.511  O        |        |        |        |   588.91
 17.667    0.00    0.47     0.508  O        |        |        |        |   588.89
 17.750    0.00    0.47     0.505  O        |        |        |        |   588.86
```

```
 17.833    0.00    0.46     0.501  O        |        |        |        |     588.84
 17.917    0.00    0.46     0.498  O        |        |        |        |     588.82
 18.000    0.00    0.46     0.495  O        |        |        |        |     588.80
 18.083    0.00    0.46     0.492  O        |        |        |        |     588.78
 18.167    0.00    0.46     0.489  O        |        |        |        |     588.76
 18.250    0.00    0.46     0.486  O        |        |        |        |     588.74
 18.333    0.00    0.46     0.482  O        |        |        |        |     588.72
 18.417    0.00    0.45     0.479  O        |        |        |        |     588.70
 18.500    0.00    0.45     0.476  O        |        |        |        |     588.67
 18.583    0.00    0.45     0.473  O        |        |        |        |     588.65
 18.667    0.00    0.45     0.470  O        |        |        |        |     588.63
 18.750    0.00    0.45     0.467  O        |        |        |        |     588.61
 18.833    0.00    0.45     0.464  O        |        |        |        |     588.59
 18.917    0.00    0.44     0.461  O        |        |        |        |     588.57
 19.000    0.00    0.44     0.458  O        |        |        |        |     588.55
 19.083    0.00    0.44     0.455  O        |        |        |        |     588.53
 19.167    0.00    0.44     0.452  O        |        |        |        |     588.51
 19.250    0.00    0.44     0.449  O        |        |        |        |     588.49
 19.333    0.00    0.44     0.445  O        |        |        |        |     588.47
 19.417    0.00    0.44     0.442  O        |        |        |        |     588.45
 19.500    0.00    0.43     0.439  O        |        |        |        |     588.43
 19.583    0.00    0.43     0.437  O        |        |        |        |     588.41
 19.667    0.00    0.43     0.434  O        |        |        |        |     588.39
 19.750    0.00    0.43     0.431  O        |        |        |        |     588.37
 19.833    0.00    0.43     0.428  O        |        |        |        |     588.35
 19.917    0.00    0.43     0.425  O        |        |        |        |     588.33
 20.000    0.00    0.42     0.422  O        |        |        |        |     588.31
 20.083    0.00    0.42     0.419  O        |        |        |        |     588.29
 20.167    0.00    0.42     0.416  O        |        |        |        |     588.27
 20.250    0.00    0.42     0.413  O        |        |        |        |     588.25
 20.333    0.00    0.42     0.410  O        |        |        |        |     588.23
 20.417    0.00    0.42     0.407  O        |        |        |        |     588.21
 20.500    0.00    0.42     0.404  O        |        |        |        |     588.20
 20.583    0.00    0.41     0.402  O        |        |        |        |     588.18
 20.667    0.00    0.41     0.399  O        |        |        |        |     588.16
 20.750    0.00    0.41     0.396  O        |        |        |        |     588.14
 20.833    0.00    0.41     0.393  O        |        |        |        |     588.12
 20.917    0.00    0.41     0.390  O        |        |        |        |     588.10
 21.000    0.00    0.41     0.387  O        |        |        |        |     588.08
 21.083    0.00    0.41     0.385  O        |        |        |        |     588.06
 21.167    0.00    0.40     0.382  O        |        |        |        |     588.05
 21.250    0.00    0.40     0.379  O        |        |        |        |     588.03
 21.333    0.00    0.40     0.376  O        |        |        |        |     588.01
 21.417    0.00    0.40     0.374  O        |        |        |        |     587.99
 21.500    0.00    0.40     0.371  O        |        |        |        |     587.97
 21.583    0.00    0.40     0.368  O        |        |        |        |     587.95
 21.667    0.00    0.39     0.365  O        |        |        |        |     587.94
 21.750    0.00    0.39     0.363  O        |        |        |        |     587.92
 21.833    0.00    0.39     0.360  O        |        |        |        |     587.90
 21.917    0.00    0.39     0.357  O        |        |        |        |     587.88
 22.000    0.00    0.39     0.355  O        |        |        |        |     587.86
 22.083    0.00    0.39     0.352  O        |        |        |        |     587.85
 22.167    0.00    0.39     0.349  O        |        |        |        |     587.83
 22.250    0.00    0.38     0.347  O        |        |        |        |     587.81
 22.333    0.00    0.38     0.344  O        |        |        |        |     587.79
 22.417    0.00    0.38     0.341  O        |        |        |        |     587.77
 22.500    0.00    0.38     0.339  O        |        |        |        |     587.76
```

```
22.583    0.00    0.38      0.336  O       |       |       |       |   587.74
22.667    0.00    0.38      0.333  O       |       |       |       |   587.72
22.750    0.00    0.38      0.331  O       |       |       |       |   587.71
22.833    0.00    0.38      0.328  O       |       |       |       |   587.69
22.917    0.00    0.37      0.326  O       |       |       |       |   587.67
23.000    0.00    0.37      0.323  O       |       |       |       |   587.65
23.083    0.00    0.37      0.320  O       |       |       |       |   587.64
23.167    0.00    0.37      0.318  O       |       |       |       |   587.62
23.250    0.00    0.37      0.315  O       |       |       |       |   587.60
23.333    0.00    0.37      0.313  O       |       |       |       |   587.59
23.417    0.00    0.37      0.310  O       |       |       |       |   587.57
23.500    0.00    0.36      0.308  O       |       |       |       |   587.55
23.583    0.00    0.36      0.305  O       |       |       |       |   587.54
23.667    0.00    0.36      0.303  O       |       |       |       |   587.52
23.750    0.00    0.36      0.300  O       |       |       |       |   587.50
23.833    0.00    0.36      0.298  O       |       |       |       |   587.49
23.917    0.00    0.36      0.295  O       |       |       |       |   587.47
24.000    0.00    0.35      0.293  O       |       |       |       |   587.45
24.083    0.00    0.35      0.291  O       |       |       |       |   587.44
24.167    0.00    0.35      0.288  O       |       |       |       |   587.42
24.250    0.00    0.35      0.286  O       |       |       |       |   587.40
24.333    0.00    0.35      0.283  O       |       |       |       |   587.39
24.417    0.00    0.34      0.281  O       |       |       |       |   587.37
24.500    0.00    0.34      0.279  O       |       |       |       |   587.36
24.583    0.00    0.34      0.276  O       |       |       |       |   587.34
24.667    0.00    0.34      0.274  O       |       |       |       |   587.33
24.750    0.00    0.34      0.272  O       |       |       |       |   587.31
24.833    0.00    0.34      0.269  O       |       |       |       |   587.29
24.917    0.00    0.33      0.267  O       |       |       |       |   587.28
25.000    0.00    0.33      0.265  O       |       |       |       |   587.26
25.083    0.00    0.33      0.262  O       |       |       |       |   587.25
25.167    0.00    0.33      0.260  O       |       |       |       |   587.23
25.250    0.00    0.33      0.258  O       |       |       |       |   587.22
25.333    0.00    0.32      0.256  O       |       |       |       |   587.20
25.417    0.00    0.32      0.253  O       |       |       |       |   587.19
25.500    0.00    0.32      0.251  O       |       |       |       |   587.17
25.583    0.00    0.32      0.249  O       |       |       |       |   587.16
25.667    0.00    0.32      0.247  O       |       |       |       |   587.14
25.750    0.00    0.32      0.245  O       |       |       |       |   587.13
25.833    0.00    0.31      0.242  O       |       |       |       |   587.12
25.917    0.00    0.31      0.240  O       |       |       |       |   587.10
26.000    0.00    0.31      0.238  O       |       |       |       |   587.09
26.083    0.00    0.31      0.236  O       |       |       |       |   587.07
26.167    0.00    0.31      0.234  O       |       |       |       |   587.06
26.250    0.00    0.31      0.232  O       |       |       |       |   587.04
26.333    0.00    0.30      0.230  O       |       |       |       |   587.03
26.417    0.00    0.30      0.228  O       |       |       |       |   587.02
26.500    0.00    0.30      0.225  O       |       |       |       |   587.00
26.583    0.00    0.30      0.223  O       |       |       |       |   586.99
26.667    0.00    0.30      0.221  O       |       |       |       |   586.98
26.750    0.00    0.30      0.219  O       |       |       |       |   586.96
26.833    0.00    0.29      0.217  O       |       |       |       |   586.95
26.917    0.00    0.29      0.215  O       |       |       |       |   586.94
27.000    0.00    0.29      0.213  O       |       |       |       |   586.92
27.083    0.00    0.29      0.211  O       |       |       |       |   586.91
27.167    0.00    0.29      0.209  O       |       |       |       |   586.90
27.250    0.00    0.29      0.207  O       |       |       |       |   586.88
```

```
27.333    0.00    0.28      0.205  O        |       |       |       |   586.87
27.417    0.00    0.28      0.203  O        |       |       |       |   586.86
27.500    0.00    0.28      0.201  O        |       |       |       |   586.84
27.583    0.00    0.28      0.200  O        |       |       |       |   586.83
27.667    0.00    0.28      0.198  O        |       |       |       |   586.82
27.750    0.00    0.28      0.196  O        |       |       |       |   586.80
27.833    0.00    0.28      0.194  O        |       |       |       |   586.79
27.917    0.00    0.27      0.192  O        |       |       |       |   586.78
28.000    0.00    0.27      0.190  O        |       |       |       |   586.77
28.083    0.00    0.27      0.188  O        |       |       |       |   586.75
28.167    0.00    0.27      0.186  O        |       |       |       |   586.74
28.250    0.00    0.27      0.184  O        |       |       |       |   586.73
28.333    0.00    0.27      0.183  O        |       |       |       |   586.72
28.417    0.00    0.26      0.181  O        |       |       |       |   586.71
28.500    0.00    0.26      0.179  O        |       |       |       |   586.69
28.583    0.00    0.26      0.177  O        |       |       |       |   586.68
28.667    0.00    0.26      0.175  O        |       |       |       |   586.67
28.750    0.00    0.26      0.174  O        |       |       |       |   586.66
28.833    0.00    0.26      0.172  O        |       |       |       |   586.65
28.917    0.00    0.26      0.170  O        |       |       |       |   586.63
29.000    0.00    0.25      0.168  O        |       |       |       |   586.62
29.083    0.00    0.25      0.167  O        |       |       |       |   586.61
29.167    0.00    0.25      0.165  O        |       |       |       |   586.60
29.250    0.00    0.25      0.163  O        |       |       |       |   586.59
29.333    0.00    0.25      0.161  O        |       |       |       |   586.58
29.417    0.00    0.25      0.160  O        |       |       |       |   586.56
29.500    0.00    0.25      0.158  O        |       |       |       |   586.55
29.583    0.00    0.24      0.156  O        |       |       |       |   586.54
29.667    0.00    0.24      0.155  O        |       |       |       |   586.53
29.750    0.00    0.24      0.153  O        |       |       |       |   586.52
29.833    0.00    0.24      0.151  O        |       |       |       |   586.51
29.917    0.00    0.24      0.150  O        |       |       |       |   586.50
30.000    0.00    0.24      0.148  O        |       |       |       |   586.49
30.083    0.00    0.23      0.146  O        |       |       |       |   586.48
30.167    0.00    0.23      0.145  O        |       |       |       |   586.46
30.250    0.00    0.23      0.143  O        |       |       |       |   586.45
30.333    0.00    0.23      0.142  O        |       |       |       |   586.44
30.417    0.00    0.22      0.140  O        |       |       |       |   586.43
30.500    0.00    0.22      0.138  O        |       |       |       |   586.42
30.583    0.00    0.22      0.137  O        |       |       |       |   586.41
30.667    0.00    0.22      0.135  O        |       |       |       |   586.40
30.750    0.00    0.21      0.134  O        |       |       |       |   586.39
30.833    0.00    0.21      0.132  O        |       |       |       |   586.38
30.917    0.00    0.21      0.131  O        |       |       |       |   586.37
31.000    0.00    0.21      0.130  O        |       |       |       |   586.36
31.083    0.00    0.21      0.128  O        |       |       |       |   586.35
31.167    0.00    0.20      0.127  O        |       |       |       |   586.34
31.250    0.00    0.20      0.125  O        |       |       |       |   586.33
31.333    0.00    0.20      0.124  O        |       |       |       |   586.33
31.417    0.00    0.20      0.123  O        |       |       |       |   586.32
31.500    0.00    0.19      0.121  O        |       |       |       |   586.31
31.583    0.00    0.19      0.120  O        |       |       |       |   586.30
31.667    0.00    0.19      0.119  O        |       |       |       |   586.29
31.750    0.00    0.19      0.117  O        |       |       |       |   586.28
31.833    0.00    0.19      0.116  O        |       |       |       |   586.27
31.917    0.00    0.18      0.115  O        |       |       |       |   586.26
32.000    0.00    0.18      0.114  O        |       |       |       |   586.26
```

```
32.083    0.00    0.18     0.112  O       |       |       |       |   586.25
32.167    0.00    0.18     0.111  O       |       |       |       |   586.24
32.250    0.00    0.18     0.110  O       |       |       |       |   586.23
32.333    0.00    0.17     0.109  O       |       |       |       |   586.22
32.417    0.00    0.17     0.107  O       |       |       |       |   586.21
32.500    0.00    0.17     0.106  O       |       |       |       |   586.21
32.583    0.00    0.17     0.105  O       |       |       |       |   586.20
32.667    0.00    0.17     0.104  O       |       |       |       |   586.19
32.750    0.00    0.16     0.103  O       |       |       |       |   586.18
32.833    0.00    0.16     0.102  O       |       |       |       |   586.18
32.917    0.00    0.16     0.101  O       |       |       |       |   586.17
33.000    0.00    0.16     0.100  O       |       |       |       |   586.16
33.083    0.00    0.16     0.098  O       |       |       |       |   586.15
33.167    0.00    0.16     0.097  O       |       |       |       |   586.15
33.250    0.00    0.15     0.096  O       |       |       |       |   586.14
33.333    0.00    0.15     0.095  O       |       |       |       |   586.13
33.417    0.00    0.15     0.094  O       |       |       |       |   586.13
33.500    0.00    0.15     0.093  O       |       |       |       |   586.12
33.583    0.00    0.15     0.092  O       |       |       |       |   586.11
33.667    0.00    0.15     0.091  O       |       |       |       |   586.10
33.750    0.00    0.14     0.090  O       |       |       |       |   586.10
33.833    0.00    0.14     0.089  O       |       |       |       |   586.09
33.917    0.00    0.14     0.088  O       |       |       |       |   586.08
34.000    0.00    0.14     0.087  O       |       |       |       |   586.08
34.083    0.00    0.14     0.086  O       |       |       |       |   586.07
34.167    0.00    0.14     0.085  O       |       |       |       |   586.07
34.250    0.00    0.13     0.084  O       |       |       |       |   586.06
34.333    0.00    0.13     0.083  O       |       |       |       |   586.05
34.417    0.00    0.13     0.083  O       |       |       |       |   586.05
34.500    0.00    0.13     0.082  O       |       |       |       |   586.04
34.583    0.00    0.13     0.081  O       |       |       |       |   586.04
34.667    0.00    0.13     0.080  O       |       |       |       |   586.03
34.750    0.00    0.13     0.079  O       |       |       |       |   586.02
34.833    0.00    0.12     0.078  O       |       |       |       |   586.02
34.917    0.00    0.12     0.077  O       |       |       |       |   586.01
35.000    0.00    0.12     0.076  O       |       |       |       |   586.01
35.083    0.00    0.12     0.076  O       |       |       |       |   586.00
35.167    0.00    0.12     0.075  O       |       |       |       |   586.00
35.250    0.00    0.12     0.074  O       |       |       |       |   585.99
35.333    0.00    0.12     0.073  O       |       |       |       |   585.98
35.417    0.00    0.12     0.072  O       |       |       |       |   585.98
35.500    0.00    0.11     0.072  O       |       |       |       |   585.97
35.583    0.00    0.11     0.071  O       |       |       |       |   585.97
35.667    0.00    0.11     0.070  O       |       |       |       |   585.96
35.750    0.00    0.11     0.069  O       |       |       |       |   585.96
35.833    0.00    0.11     0.068  O       |       |       |       |   585.95
35.917    0.00    0.11     0.068  O       |       |       |       |   585.95
36.000    0.00    0.11     0.067  O       |       |       |       |   585.94
36.083    0.00    0.11     0.066  O       |       |       |       |   585.94
36.167    0.00    0.10     0.066  O       |       |       |       |   585.93
36.250    0.00    0.10     0.065  O       |       |       |       |   585.93
36.333    0.00    0.10     0.064  O       |       |       |       |   585.92
36.417    0.00    0.10     0.063  O       |       |       |       |   585.92
36.500    0.00    0.10     0.063  O       |       |       |       |   585.91
36.583    0.00    0.10     0.062  O       |       |       |       |   585.91
36.667    0.00    0.10     0.061  O       |       |       |       |   585.91
36.750    0.00    0.10     0.061  O       |       |       |       |   585.90
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  36.833    0.00    0.10      0.060  O        |         |         |         |    585.90
  36.917    0.00    0.09      0.059  O        |         |         |         |    585.89
  37.000    0.00    0.09      0.059  O        |         |         |         |    585.89
  37.083    0.00    0.09      0.058  O        |         |         |         |    585.88
  37.167    0.00    0.09      0.057  O        |         |         |         |    585.88
  37.250    0.00    0.09      0.057  O        |         |         |         |    585.87
  37.333    0.00    0.09      0.056  O        |         |         |         |    585.87
  37.417    0.00    0.09      0.056  O        |         |         |         |    585.87
  37.500    0.00    0.09      0.055  O        |         |         |         |    585.86
  37.583    0.00    0.09      0.054  O        |         |         |         |    585.86
  37.667    0.00    0.09      0.054  O        |         |         |         |    585.85
  37.750    0.00    0.08      0.053  O        |         |         |         |    585.85
  37.833    0.00    0.08      0.053  O        |         |         |         |    585.85
  37.917    0.00    0.08      0.052  O        |         |         |         |    585.84
  38.000    0.00    0.08      0.051  O        |         |         |         |    585.84
  38.083    0.00    0.08      0.051  O        |         |         |         |    585.83
  38.167    0.00    0.08      0.050  O        |         |         |         |    585.83
  38.250    0.00    0.08      0.050  O        |         |         |         |    585.83
  38.333    0.00    0.08      0.049  O        |         |         |         |    585.82
  38.417    0.00    0.08      0.049  O        |         |         |         |    585.82
  38.500    0.00    0.08      0.048  O        |         |         |         |    585.82
  38.583    0.00    0.08      0.048  O        |         |         |         |    585.81
  38.667    0.00    0.08      0.047  O        |         |         |         |    585.81
  38.750    0.00    0.07      0.047  O        |         |         |         |    585.81
  38.833    0.00    0.07      0.046  O        |         |         |         |    585.80
  38.917    0.00    0.07      0.046  O        |         |         |         |    585.80
  39.000    0.00    0.07      0.045  O        |         |         |         |    585.80
  39.083    0.00    0.07      0.045  O        |         |         |         |    585.79
  39.167    0.00    0.07      0.044  O        |         |         |         |    585.79
  39.250    0.00    0.07      0.044  O        |         |         |         |    585.79
  39.333    0.00    0.07      0.043  O        |         |         |         |    585.78
  39.417    0.00    0.07      0.043  O        |         |         |         |    585.78
  39.500    0.00    0.07      0.042  O        |         |         |         |    585.78
  39.583    0.00    0.07      0.042  O        |         |         |         |    585.77
  39.667    0.00    0.07      0.041  O        |         |         |         |    585.77
  39.750    0.00    0.06      0.041  O        |         |         |         |    585.77
  39.833    0.00    0.06      0.040  O        |         |         |         |    585.76
  39.917    0.00    0.06      0.040  O        |         |         |         |    585.76
  40.000    0.00    0.06      0.040  O        |         |         |         |    585.76
  40.083    0.00    0.06      0.039  O        |         |         |         |    585.76
  40.167    0.00    0.06      0.039  O        |         |         |         |    585.75
  40.250    0.00    0.06      0.038  O        |         |         |         |    585.75
  40.333    0.00    0.06      0.038  O        |         |         |         |    585.75
  40.417    0.00    0.06      0.037  O        |         |         |         |    585.74
  40.500    0.00    0.06      0.037  O        |         |         |         |    585.74
  40.583    0.00    0.06      0.037  O        |         |         |         |    585.74
  40.667    0.00    0.06      0.036  O        |         |         |         |    585.74
  40.750    0.00    0.06      0.036  O        |         |         |         |    585.73
  40.833    0.00    0.06      0.035  O        |         |         |         |    585.73
  40.917    0.00    0.06      0.035  O        |         |         |         |    585.73
  41.000    0.00    0.06      0.035  O        |         |         |         |    585.73
  41.083    0.00    0.05      0.034  O        |         |         |         |    585.72
  41.167    0.00    0.05      0.034  O        |         |         |         |    585.72
  41.250    0.00    0.05      0.034  O        |         |         |         |    585.72
  41.333    0.00    0.05      0.033  O        |         |         |         |    585.72
  41.417    0.00    0.05      0.033  O        |         |         |         |    585.71
  41.500    0.00    0.05      0.033  O        |         |         |         |    585.71
```

```
 41.583    0.00    0.05      0.032  O         |         |         |         |    585.71
 41.667    0.00    0.05      0.032  O         |         |         |         |    585.71
 41.750    0.00    0.05      0.031  O         |         |         |         |    585.70
 41.833    0.00    0.05      0.031  O         |         |         |         |    585.70
 41.917    0.00    0.05      0.031  O         |         |         |         |    585.70
 42.000    0.00    0.05      0.030  O         |         |         |         |    585.70
 42.083    0.00    0.05      0.030  O         |         |         |         |    585.70
 42.167    0.00    0.05      0.030  O         |         |         |         |    585.69
 42.250    0.00    0.05      0.029  O         |         |         |         |    585.69
 42.333    0.00    0.05      0.029  O         |         |         |         |    585.69
 42.417    0.00    0.05      0.029  O         |         |         |         |    585.69
 42.500    0.00    0.05      0.029  O         |         |         |         |    585.68
 42.583    0.00    0.04      0.028  O         |         |         |         |    585.68
 42.667    0.00    0.04      0.028  O         |         |         |         |    585.68
 42.750    0.00    0.04      0.028  O         |         |         |         |    585.68
 42.833    0.00    0.04      0.027  O         |         |         |         |    585.68
 42.917    0.00    0.04      0.027  O         |         |         |         |    585.67
 43.000    0.00    0.04      0.027  O         |         |         |         |    585.67
 43.083    0.00    0.04      0.026  O         |         |         |         |    585.67
 43.167    0.00    0.04      0.026  O         |         |         |         |    585.67
 43.250    0.00    0.04      0.026  O         |         |         |         |    585.67
 43.333    0.00    0.04      0.026  O         |         |         |         |    585.66
 43.417    0.00    0.04      0.025  O         |         |         |         |    585.66
 43.500    0.00    0.04      0.025  O         |         |         |         |    585.66
 43.583    0.00    0.04      0.025  O         |         |         |         |    585.66
 43.667    0.00    0.04      0.024  O         |         |         |         |    585.66
 43.750    0.00    0.04      0.024  O         |         |         |         |    585.66
 43.833    0.00    0.04      0.024  O         |         |         |         |    585.65
 43.917    0.00    0.04      0.024  O         |         |         |         |    585.65
 44.000    0.00    0.04      0.023  O         |         |         |         |    585.65
 44.083    0.00    0.04      0.023  O         |         |         |         |    585.65
 44.167    0.00    0.04      0.023  O         |         |         |         |    585.65
 44.250    0.00    0.04      0.023  O         |         |         |         |    585.65
 44.333    0.00    0.04      0.022  O         |         |         |         |    585.64
 44.417    0.00    0.04      0.022  O         |         |         |         |    585.64
 44.500    0.00    0.03      0.022  O         |         |         |         |    585.64
 44.583    0.00    0.03      0.022  O         |         |         |         |    585.64
 44.667    0.00    0.03      0.021  O         |         |         |         |    585.64
 44.750    0.00    0.03      0.021  O         |         |         |         |    585.64
 44.833    0.00    0.03      0.021  O         |         |         |         |    585.63
 44.917    0.00    0.03      0.021  O         |         |         |         |    585.63
 45.000    0.00    0.03      0.021  O         |         |         |         |    585.63
 45.083    0.00    0.03      0.020  O         |         |         |         |    585.63
 45.167    0.00    0.03      0.020  O         |         |         |         |    585.63
 45.250    0.00    0.03      0.020  O         |         |         |         |    585.63
 45.333    0.00    0.03      0.020  O         |         |         |         |    585.63
 45.417    0.00    0.03      0.019  O         |         |         |         |    585.62
 45.500    0.00    0.03      0.019  O         |         |         |         |    585.62
 45.583    0.00    0.03      0.019  O         |         |         |         |    585.62
 45.667    0.00    0.03      0.019  O         |         |         |         |    585.62
 45.750    0.00    0.03      0.019  O         |         |         |         |    585.62
 45.833    0.00    0.03      0.018  O         |         |         |         |    585.62
 45.917    0.00    0.03      0.018  O         |         |         |         |    585.62
 46.000    0.00    0.03      0.018  O         |         |         |         |    585.61
 46.083    0.00    0.03      0.018  O         |         |         |         |    585.61
 46.167    0.00    0.03      0.018  O         |         |         |         |    585.61
 46.250    0.00    0.03      0.017  O         |         |         |         |    585.61
```

```
  46.333    0.00    0.03      0.017  O       |       |       |       |    585.61
  46.417    0.00    0.03      0.017  O       |       |       |       |    585.61
  46.500    0.00    0.03      0.017  O       |       |       |       |    585.61
  46.583    0.00    0.03      0.017  O       |       |       |       |    585.61
  46.667    0.00    0.03      0.017  O       |       |       |       |    585.60
  46.750    0.00    0.03      0.016  O       |       |       |       |    585.60
  46.833    0.00    0.03      0.016  O       |       |       |       |    585.60
  46.917    0.00    0.03      0.016  O       |       |       |       |    585.60
  47.000    0.00    0.02      0.016  O       |       |       |       |    585.60
  47.083    0.00    0.02      0.016  O       |       |       |       |    585.60
  47.167    0.00    0.02      0.016  O       |       |       |       |    585.60
  47.250    0.00    0.02      0.015  O       |       |       |       |    585.60
  47.333    0.00    0.02      0.015  O       |       |       |       |    585.60
  47.417    0.00    0.02      0.015  O       |       |       |       |    585.59
  47.500    0.00    0.02      0.015  O       |       |       |       |    585.59
  47.583    0.00    0.02      0.015  O       |       |       |       |    585.59
  47.667    0.00    0.02      0.015  O       |       |       |       |    585.59
  47.750    0.00    0.02      0.014  O       |       |       |       |    585.59
  47.833    0.00    0.02      0.014  O       |       |       |       |    585.59
  47.917    0.00    0.02      0.014  O       |       |       |       |    585.59
  48.000    0.00    0.02      0.014  O       |       |       |       |    585.59
  48.083    0.00    0.02      0.014  O       |       |       |       |    585.59
  48.167    0.00    0.02      0.014  O       |       |       |       |    585.58
  48.250    0.00    0.02      0.014  O       |       |       |       |    585.58
  48.333    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.417    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.500    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.583    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.667    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.750    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.833    0.00    0.02      0.013  O       |       |       |       |    585.58
  48.917    0.00    0.02      0.012  O       |       |       |       |    585.58
  49.000    0.00    0.02      0.012  O       |       |       |       |    585.58
  49.083    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.167    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.250    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.333    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.417    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.500    0.00    0.02      0.012  O       |       |       |       |    585.57
  49.583    0.00    0.02      0.011  O       |       |       |       |    585.57
  49.667    0.00    0.02      0.011  O       |       |       |       |    585.57
  49.750    0.00    0.02      0.011  O       |       |       |       |    585.57
  49.833    0.00    0.02      0.011  O       |       |       |       |    585.57
  49.917    0.00    0.02      0.011  O       |       |       |       |    585.57
  50.000    0.00    0.02      0.011  O       |       |       |       |    585.57
  50.083    0.00    0.02      0.011  O       |       |       |       |    585.56
  50.167    0.00    0.02      0.011  O       |       |       |       |    585.56
  50.250    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.333    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.417    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.500    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.583    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.667    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.750    0.00    0.02      0.010  O       |       |       |       |    585.56
  50.833    0.00    0.01      0.010  O       |       |       |       |    585.56
  50.917    0.00    0.01      0.010  O       |       |       |       |    585.56
  51.000    0.00    0.01      0.009  O       |       |       |       |    585.56
```

```
51.083     0.00     0.01       0.009  O        |        |        |        |    585.56
51.167     0.00     0.01       0.009  O        |        |        |        |    585.56
51.250     0.00     0.01       0.009  O        |        |        |        |    585.56
51.333     0.00     0.01       0.009  O        |        |        |        |    585.55
51.417     0.00     0.01       0.009  O        |        |        |        |    585.55
51.500     0.00     0.01       0.009  O        |        |        |        |    585.55
51.583     0.00     0.01       0.009  O        |        |        |        |    585.55
51.667     0.00     0.01       0.009  O        |        |        |        |    585.55
51.750     0.00     0.01       0.009  O        |        |        |        |    585.55
51.833     0.00     0.01       0.009  O        |        |        |        |    585.55
51.917     0.00     0.01       0.008  O        |        |        |        |    585.55
52.000     0.00     0.01       0.008  O        |        |        |        |    585.55
52.083     0.00     0.01       0.008  O        |        |        |        |    585.55
52.167     0.00     0.01       0.008  O        |        |        |        |    585.55
52.250     0.00     0.01       0.008  O        |        |        |        |    585.55
52.333     0.00     0.01       0.008  O        |        |        |        |    585.55
52.417     0.00     0.01       0.008  O        |        |        |        |    585.55
52.500     0.00     0.01       0.008  O        |        |        |        |    585.55
52.583     0.00     0.01       0.008  O        |        |        |        |    585.55
52.667     0.00     0.01       0.008  O        |        |        |        |    585.54
52.750     0.00     0.01       0.008  O        |        |        |        |    585.54
52.833     0.00     0.01       0.008  O        |        |        |        |    585.54
52.917     0.00     0.01       0.007  O        |        |        |        |    585.54
53.000     0.00     0.01       0.007  O        |        |        |        |    585.54
53.083     0.00     0.01       0.007  O        |        |        |        |    585.54
53.167     0.00     0.01       0.007  O        |        |        |        |    585.54
53.250     0.00     0.01       0.007  O        |        |        |        |    585.54
53.333     0.00     0.01       0.007  O        |        |        |        |    585.54
53.417     0.00     0.01       0.007  O        |        |        |        |    585.54
53.500     0.00     0.01       0.007  O        |        |        |        |    585.54
53.583     0.00     0.01       0.007  O        |        |        |        |    585.54
53.667     0.00     0.01       0.007  O        |        |        |        |    585.54
53.750     0.00     0.01       0.007  O        |        |        |        |    585.54
53.833     0.00     0.01       0.007  O        |        |        |        |    585.54
53.917     0.00     0.01       0.007  O        |        |        |        |    585.54
54.000     0.00     0.01       0.007  O        |        |        |        |    585.54
54.083     0.00     0.01       0.006  O        |        |        |        |    585.54
54.167     0.00     0.01       0.006  O        |        |        |        |    585.54
54.250     0.00     0.01       0.006  O        |        |        |        |    585.54
54.333     0.00     0.01       0.006  O        |        |        |        |    585.54
54.417     0.00     0.01       0.006  O        |        |        |        |    585.53
54.500     0.00     0.01       0.006  O        |        |        |        |    585.53
54.583     0.00     0.01       0.006  O        |        |        |        |    585.53
54.667     0.00     0.01       0.006  O        |        |        |        |    585.53
54.750     0.00     0.01       0.006  O        |        |        |        |    585.53
54.833     0.00     0.01       0.006  O        |        |        |        |    585.53
54.917     0.00     0.01       0.006  O        |        |        |        |    585.53
55.000     0.00     0.01       0.006  O        |        |        |        |    585.53
55.083     0.00     0.01       0.006  O        |        |        |        |    585.53
55.167     0.00     0.01       0.006  O        |        |        |        |    585.53
55.250     0.00     0.01       0.006  O        |        |        |        |    585.53
55.333     0.00     0.01       0.006  O        |        |        |        |    585.53
55.417     0.00     0.01       0.005  O        |        |        |        |    585.53
55.500     0.00     0.01       0.005  O        |        |        |        |    585.53
55.583     0.00     0.01       0.005  O        |        |        |        |    585.53
55.667     0.00     0.01       0.005  O        |        |        |        |    585.53
55.750     0.00     0.01       0.005  O        |        |        |        |    585.53
```

```
55.833    0.00    0.01      0.005  O        |       |       |       |   585.53
55.917    0.00    0.01      0.005  O        |       |       |       |   585.53
56.000    0.00    0.01      0.005  O        |       |       |       |   585.53
56.083    0.00    0.01      0.005  O        |       |       |       |   585.53
56.167    0.00    0.01      0.005  O        |       |       |       |   585.53
56.250    0.00    0.01      0.005  O        |       |       |       |   585.53
56.333    0.00    0.01      0.005  O        |       |       |       |   585.53
56.417    0.00    0.01      0.005  O        |       |       |       |   585.53
56.500    0.00    0.01      0.005  O        |       |       |       |   585.53
56.583    0.00    0.01      0.005  O        |       |       |       |   585.53
56.667    0.00    0.01      0.005  O        |       |       |       |   585.52
56.750    0.00    0.01      0.005  O        |       |       |       |   585.52
56.833    0.00    0.01      0.005  O        |       |       |       |   585.52
56.917    0.00    0.01      0.005  O        |       |       |       |   585.52
57.000    0.00    0.01      0.004  O        |       |       |       |   585.52
57.083    0.00    0.01      0.004  O        |       |       |       |   585.52
57.167    0.00    0.01      0.004  O        |       |       |       |   585.52
57.250    0.00    0.01      0.004  O        |       |       |       |   585.52
57.333    0.00    0.01      0.004  O        |       |       |       |   585.52
57.417    0.00    0.01      0.004  O        |       |       |       |   585.52
57.500    0.00    0.01      0.004  O        |       |       |       |   585.52
57.583    0.00    0.01      0.004  O        |       |       |       |   585.52
57.667    0.00    0.01      0.004  O        |       |       |       |   585.52
57.750    0.00    0.01      0.004  O        |       |       |       |   585.52
57.833    0.00    0.01      0.004  O        |       |       |       |   585.52
57.917    0.00    0.01      0.004  O        |       |       |       |   585.52
58.000    0.00    0.01      0.004  O        |       |       |       |   585.52
58.083    0.00    0.01      0.004  O        |       |       |       |   585.52
58.167    0.00    0.01      0.004  O        |       |       |       |   585.52
58.250    0.00    0.01      0.004  O        |       |       |       |   585.52
58.333    0.00    0.01      0.004  O        |       |       |       |   585.52
58.417    0.00    0.01      0.004  O        |       |       |       |   585.52
58.500    0.00    0.01      0.004  O        |       |       |       |   585.52
58.583    0.00    0.01      0.004  O        |       |       |       |   585.52
58.667    0.00    0.01      0.004  O        |       |       |       |   585.52
58.750    0.00    0.01      0.004  O        |       |       |       |   585.52
58.833    0.00    0.01      0.004  O        |       |       |       |   585.52
58.917    0.00    0.01      0.004  O        |       |       |       |   585.52
59.000    0.00    0.01      0.004  O        |       |       |       |   585.52
59.083    0.00    0.01      0.003  O        |       |       |       |   585.52
59.167    0.00    0.00      0.003  O        |       |       |       |   585.52
59.250    0.00    0.00      0.003  O        |       |       |       |   585.52
59.333    0.00    0.00      0.003  O        |       |       |       |   585.52
59.417    0.00    0.00      0.003  O        |       |       |       |   585.52
59.500    0.00    0.00      0.003  O        |       |       |       |   585.52
59.583    0.00    0.00      0.003  O        |       |       |       |   585.52
59.667    0.00    0.00      0.003  O        |       |       |       |   585.52
59.750    0.00    0.00      0.003  O        |       |       |       |   585.52
59.833    0.00    0.00      0.003  O        |       |       |       |   585.51
59.917    0.00    0.00      0.003  O        |       |       |       |   585.51
60.000    0.00    0.00      0.003  O        |       |       |       |   585.51
60.083    0.00    0.00      0.003  O        |       |       |       |   585.51
60.167    0.00    0.00      0.003  O        |       |       |       |   585.51
60.250    0.00    0.00      0.003  O        |       |       |       |   585.51
60.333    0.00    0.00      0.003  O        |       |       |       |   585.51
60.417    0.00    0.00      0.003  O        |       |       |       |   585.51
60.500    0.00    0.00      0.003  O        |       |       |       |   585.51
```

```
 60.583     0.00     0.00       0.003  O         |         |         |         |    585.51
 60.667     0.00     0.00       0.003  O         |         |         |         |    585.51
 60.750     0.00     0.00       0.003  O         |         |         |         |    585.51
 60.833     0.00     0.00       0.003  O         |         |         |         |    585.51
 60.917     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.000     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.083     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.167     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.250     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.333     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.417     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.500     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.583     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.667     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.750     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.833     0.00     0.00       0.003  O         |         |         |         |    585.51
 61.917     0.00     0.00       0.003  O         |         |         |         |    585.51
 62.000     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.083     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.167     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.250     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.333     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.417     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.500     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.583     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.667     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.750     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.833     0.00     0.00       0.002  O         |         |         |         |    585.51
 62.917     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.000     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.083     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.167     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.250     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.333     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.417     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.500     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.583     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.667     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.750     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.833     0.00     0.00       0.002  O         |         |         |         |    585.51
 63.917     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.000     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.083     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.167     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.250     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.333     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.417     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.500     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.583     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.667     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.750     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.833     0.00     0.00       0.002  O         |         |         |         |    585.51
 64.917     0.00     0.00       0.002  O         |         |         |         |    585.51
 65.000     0.00     0.00       0.002  O         |         |         |         |    585.51
 65.083     0.00     0.00       0.002  O         |         |         |         |    585.51
 65.167     0.00     0.00       0.002  O         |         |         |         |    585.51
 65.250     0.00     0.00       0.002  O         |         |         |         |    585.51
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 65.333     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.417     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.500     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.583     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.667     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.750     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.833     0.00     0.00       0.002  O       |       |       |       |     585.50
 65.917     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.000     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.083     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.167     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.250     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.333     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.417     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.500     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.583     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.667     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.750     0.00     0.00       0.002  O       |       |       |       |     585.50
 66.833     0.00     0.00       0.001  O       |       |       |       |     585.50
 66.917     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.000     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.083     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.167     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.250     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.333     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.417     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.500     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.583     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.667     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.750     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.833     0.00     0.00       0.001  O       |       |       |       |     585.50
 67.917     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.000     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.083     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.167     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.250     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.333     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.417     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.500     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.583     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.667     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.750     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.833     0.00     0.00       0.001  O       |       |       |       |     585.50
 68.917     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.000     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.083     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.167     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.250     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.333     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.417     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.500     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.583     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.667     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.750     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.833     0.00     0.00       0.001  O       |       |       |       |     585.50
 69.917     0.00     0.00       0.001  O       |       |       |       |     585.50
 70.000     0.00     0.00       0.001  O       |       |       |       |     585.50
```

```
70.083    0.00    0.00      0.001  O       |       |       |       |   585.50
70.167    0.00    0.00      0.001  O       |       |       |       |   585.50
70.250    0.00    0.00      0.001  O       |       |       |       |   585.50
70.333    0.00    0.00      0.001  O       |       |       |       |   585.50
70.417    0.00    0.00      0.001  O       |       |       |       |   585.50
70.500    0.00    0.00      0.001  O       |       |       |       |   585.50
70.583    0.00    0.00      0.001  O       |       |       |       |   585.50
70.667    0.00    0.00      0.001  O       |       |       |       |   585.50
70.750    0.00    0.00      0.001  O       |       |       |       |   585.50
70.833    0.00    0.00      0.001  O       |       |       |       |   585.50
70.917    0.00    0.00      0.001  O       |       |       |       |   585.50
71.000    0.00    0.00      0.001  O       |       |       |       |   585.50
71.083    0.00    0.00      0.001  O       |       |       |       |   585.50
71.167    0.00    0.00      0.001  O       |       |       |       |   585.50
71.250    0.00    0.00      0.001  O       |       |       |       |   584.89

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   855
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.715 (CFS)
                 Total volume =       1.357 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
               Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                          Study date: 10/28/21

--------------------------------------------------------------------
```

TTM 31589
10-Year 3-Hour Flood Hydrograph Basin Routing
Developed Condition

```
-------------------------------------------------------------------


Program License Serial Number 6194

-------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop310.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    44
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       24.534 (CFS)
            Total volume =       1.846 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
-------------------------------------------------------------------
Total number of inflow hydrograph intervals = 44
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
-------------------------------------------------------------------
-------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =     0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
--------------------------------------------------------------------
-------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
--------------------------------------------------------------------
    0.000      0.000      0.000      0.000       0.000
  585.500      0.001      0.001      0.001       0.001
  586.500      0.150      0.240      0.149       0.151
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
       587.500      0.300      0.360      0.299       0.301
       588.500      0.450      0.440      0.448       0.452
       589.500      0.600      0.510      0.598       0.602
       590.500      1.120      0.680      1.118       1.122
       591.500      1.700      0.790      1.697       1.703
       592.500      2.340      0.990      2.337       2.343
       593.500      3.040    101.020      2.692       3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                 Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       6.1   12.27   18.40   24.53 (Ft.)
 0.083    0.58    0.00      0.002  O       |       |       |       |   585.51
 0.167    2.04    0.02      0.011  O I     |       |       |       |   585.57
 0.250    2.42    0.04      0.026  O  I    |       |       |       |   585.67
 0.333    2.59    0.07      0.043  O  I    |       |       |       |   585.78
 0.417    3.08    0.10      0.062  O   I   |       |       |       |   585.91
 0.500    3.41    0.13      0.083  O   I   |       |       |       |   586.05
 0.583    3.71    0.17      0.107  O   I   |       |       |       |   586.21
 0.667    3.67    0.21      0.131  O   I   |       |       |       |   586.37
 0.750    3.98    0.24      0.156  O    I  |       |       |       |   586.54
 0.833    3.94    0.27      0.181  O    I  |       |       |       |   586.71
 0.917    3.70    0.28      0.206  O   I   |       |       |       |   586.87
 1.000    3.82    0.30      0.230  O   I   |       |       |       |   587.03
 1.083    4.22    0.32      0.255  O    I  |       |       |       |   587.20
 1.167    4.74    0.35      0.284  O     I |       |       |       |   587.39
 1.250    4.91    0.37      0.314  O     I |       |       |       |   587.60
 1.333    4.90    0.38      0.346  O     I |       |       |       |   587.80
 1.417    4.99    0.40      0.377  O     I |       |       |       |   588.01
 1.500    5.67    0.42      0.411  O      I|       |       |       |   588.24
 1.583    5.85    0.44      0.448  O      I|       |       |       |   588.48
 1.667    5.78    0.46      0.485  O      I|       |       |       |   588.73
 1.750    6.34    0.47      0.523  O       I       |       |       |   588.99
 1.833    7.02    0.49      0.566  O       |I      |       |       |   589.27
 1.917    6.97    0.51      0.610  O       |I      |       |       |   589.52
 2.000    6.84    0.53      0.654  O       I       |       |       |   589.60
 2.083    6.96    0.54      0.698  O       |I      |       |       |   589.69
 2.167    7.83    0.56      0.745  O       | I     |       |       |   589.78
 2.250   10.44    0.58      0.804  O       |    I  |       |       |   589.89
 2.333   11.59    0.60      0.876  O       |      I|       |       |   590.03
 2.417   12.12    0.63      0.954  O       |      I|       |       |   590.18
 2.500   19.19    0.66      1.057  O       |       |       |I      |   590.38
 2.583   23.24    0.69      1.199  O       |       |       |     I |   590.64
 2.667   24.53    0.73      1.358  O       |       |       |       I   590.91
 2.750   17.98    0.75      1.499  O       |       |      I|       |   591.15
 2.833   10.05    0.77      1.591  |O      |    I  |       |       |   591.31
 2.917    7.25    0.78      1.645  |O      |I      |       |       |   591.41
 3.000    5.48    0.79      1.683  |O     I|       |       |       |   591.47
 3.083    3.16    0.79      1.708  |O  I   |       |       |       |   591.51
 3.167    1.55    0.80      1.718  |OI     |       |       |       |   591.53
 3.250    0.80    0.80      1.721  |O      |       |       |       |   591.53
 3.333    0.38    0.80      1.720  IO      |       |       |       |   591.53
 3.417    0.17    0.80      1.716  IO      |       |       |       |   591.53
 3.500    0.09    0.79      1.711  IO      |       |       |       |   591.52
```

```
  3.583     0.04     0.79       1.706  IO       |        |        |        |    591.51
  3.667     0.01     0.79       1.701  IO       |        |        |        |    591.50
  3.750     0.00     0.79       1.696  IO       |        |        |        |    591.49
  3.833     0.00     0.79       1.690  IO       |        |        |        |    591.48
  3.917     0.00     0.79       1.685  IO       |        |        |        |    591.47
  4.000     0.00     0.79       1.679  IO       |        |        |        |    591.46
  4.083     0.00     0.79       1.674  IO       |        |        |        |    591.46
  4.167     0.00     0.78       1.669  IO       |        |        |        |    591.45
  4.250     0.00     0.78       1.663  IO       |        |        |        |    591.44
  4.333     0.00     0.78       1.658  IO       |        |        |        |    591.43
  4.417     0.00     0.78       1.652  IO       |        |        |        |    591.42
  4.500     0.00     0.78       1.647  IO       |        |        |        |    591.41
  4.583     0.00     0.78       1.642  IO       |        |        |        |    591.40
  4.667     0.00     0.78       1.636  IO       |        |        |        |    591.39
  4.750     0.00     0.78       1.631  IO       |        |        |        |    591.38
  4.833     0.00     0.78       1.626  IO       |        |        |        |    591.37
  4.917     0.00     0.77       1.620  IO       |        |        |        |    591.36
  5.000     0.00     0.77       1.615  IO       |        |        |        |    591.35
  5.083     0.00     0.77       1.610  IO       |        |        |        |    591.34
  5.167     0.00     0.77       1.604  IO       |        |        |        |    591.34
  5.250     0.00     0.77       1.599  IO       |        |        |        |    591.33
  5.333     0.00     0.77       1.594  IO       |        |        |        |    591.32
  5.417     0.00     0.77       1.588  IO       |        |        |        |    591.31
  5.500     0.00     0.77       1.583  IO       |        |        |        |    591.30
  5.583     0.00     0.77       1.578  IO       |        |        |        |    591.29
  5.667     0.00     0.77       1.573  O        |        |        |        |    591.28
  5.750     0.00     0.76       1.567  O        |        |        |        |    591.27
  5.833     0.00     0.76       1.562  O        |        |        |        |    591.26
  5.917     0.00     0.76       1.557  O        |        |        |        |    591.25
  6.000     0.00     0.76       1.552  O        |        |        |        |    591.24
  6.083     0.00     0.76       1.546  O        |        |        |        |    591.23
  6.167     0.00     0.76       1.541  O        |        |        |        |    591.23
  6.250     0.00     0.76       1.536  O        |        |        |        |    591.22
  6.333     0.00     0.76       1.531  O        |        |        |        |    591.21
  6.417     0.00     0.76       1.525  O        |        |        |        |    591.20
  6.500     0.00     0.76       1.520  O        |        |        |        |    591.19
  6.583     0.00     0.75       1.515  O        |        |        |        |    591.18
  6.667     0.00     0.75       1.510  O        |        |        |        |    591.17
  6.750     0.00     0.75       1.505  O        |        |        |        |    591.16
  6.833     0.00     0.75       1.499  O        |        |        |        |    591.15
  6.917     0.00     0.75       1.494  O        |        |        |        |    591.15
  7.000     0.00     0.75       1.489  O        |        |        |        |    591.14
  7.083     0.00     0.75       1.484  O        |        |        |        |    591.13
  7.167     0.00     0.75       1.479  O        |        |        |        |    591.12
  7.250     0.00     0.75       1.474  O        |        |        |        |    591.11
  7.333     0.00     0.75       1.468  O        |        |        |        |    591.10
  7.417     0.00     0.75       1.463  O        |        |        |        |    591.09
  7.500     0.00     0.74       1.458  O        |        |        |        |    591.08
  7.583     0.00     0.74       1.453  O        |        |        |        |    591.07
  7.667     0.00     0.74       1.448  O        |        |        |        |    591.07
  7.750     0.00     0.74       1.443  O        |        |        |        |    591.06
  7.833     0.00     0.74       1.438  O        |        |        |        |    591.05
  7.917     0.00     0.74       1.433  O        |        |        |        |    591.04
  8.000     0.00     0.74       1.428  O        |        |        |        |    591.03
  8.083     0.00     0.74       1.422  O        |        |        |        |    591.02
  8.167     0.00     0.74       1.417  O        |        |        |        |    591.01
  8.250     0.00     0.74       1.412  O        |        |        |        |    591.00
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
    8.333     0.00     0.73       1.407  O         |         |         |         |    591.00
    8.417     0.00     0.73       1.402  O         |         |         |         |    590.99
    8.500     0.00     0.73       1.397  O         |         |         |         |    590.98
    8.583     0.00     0.73       1.392  O         |         |         |         |    590.97
    8.667     0.00     0.73       1.387  O         |         |         |         |    590.96
    8.750     0.00     0.73       1.382  O         |         |         |         |    590.95
    8.833     0.00     0.73       1.377  O         |         |         |         |    590.94
    8.917     0.00     0.73       1.372  O         |         |         |         |    590.93
    9.000     0.00     0.73       1.367  O         |         |         |         |    590.93
    9.083     0.00     0.73       1.362  O         |         |         |         |    590.92
    9.167     0.00     0.72       1.357  O         |         |         |         |    590.91
    9.250     0.00     0.72       1.352  O         |         |         |         |    590.90
    9.333     0.00     0.72       1.347  O         |         |         |         |    590.89
    9.417     0.00     0.72       1.342  O         |         |         |         |    590.88
    9.500     0.00     0.72       1.337  O         |         |         |         |    590.87
    9.583     0.00     0.72       1.332  O         |         |         |         |    590.87
    9.667     0.00     0.72       1.327  O         |         |         |         |    590.86
    9.750     0.00     0.72       1.322  O         |         |         |         |    590.85
    9.833     0.00     0.72       1.317  O         |         |         |         |    590.84
    9.917     0.00     0.72       1.312  O         |         |         |         |    590.83
   10.000     0.00     0.72       1.307  O         |         |         |         |    590.82
   10.083     0.00     0.71       1.302  O         |         |         |         |    590.81
   10.167     0.00     0.71       1.298  O         |         |         |         |    590.81
   10.250     0.00     0.71       1.293  O         |         |         |         |    590.80
   10.333     0.00     0.71       1.288  O         |         |         |         |    590.79
   10.417     0.00     0.71       1.283  O         |         |         |         |    590.78
   10.500     0.00     0.71       1.278  O         |         |         |         |    590.77
   10.583     0.00     0.71       1.273  O         |         |         |         |    590.76
   10.667     0.00     0.71       1.268  O         |         |         |         |    590.76
   10.750     0.00     0.71       1.263  O         |         |         |         |    590.75
   10.833     0.00     0.71       1.258  O         |         |         |         |    590.74
   10.917     0.00     0.71       1.254  O         |         |         |         |    590.73
   11.000     0.00     0.70       1.249  O         |         |         |         |    590.72
   11.083     0.00     0.70       1.244  O         |         |         |         |    590.71
   11.167     0.00     0.70       1.239  O         |         |         |         |    590.71
   11.250     0.00     0.70       1.234  O         |         |         |         |    590.70
   11.333     0.00     0.70       1.229  O         |         |         |         |    590.69
   11.417     0.00     0.70       1.225  O         |         |         |         |    590.68
   11.500     0.00     0.70       1.220  O         |         |         |         |    590.67
   11.583     0.00     0.70       1.215  O         |         |         |         |    590.66
   11.667     0.00     0.70       1.210  O         |         |         |         |    590.66
   11.750     0.00     0.70       1.205  O         |         |         |         |    590.65
   11.833     0.00     0.70       1.201  O         |         |         |         |    590.64
   11.917     0.00     0.69       1.196  O         |         |         |         |    590.63
   12.000     0.00     0.69       1.191  O         |         |         |         |    590.62
   12.083     0.00     0.69       1.186  O         |         |         |         |    590.61
   12.167     0.00     0.69       1.181  O         |         |         |         |    590.61
   12.250     0.00     0.69       1.177  O         |         |         |         |    590.60
   12.333     0.00     0.69       1.172  O         |         |         |         |    590.59
   12.417     0.00     0.69       1.167  O         |         |         |         |    590.58
   12.500     0.00     0.69       1.162  O         |         |         |         |    590.57
   12.583     0.00     0.69       1.158  O         |         |         |         |    590.56
   12.667     0.00     0.69       1.153  O         |         |         |         |    590.56
   12.750     0.00     0.69       1.148  O         |         |         |         |    590.55
   12.833     0.00     0.68       1.144  O         |         |         |         |    590.54
   12.917     0.00     0.68       1.139  O         |         |         |         |    590.53
   13.000     0.00     0.68       1.134  O         |         |         |         |    590.52
```

```
  13.083     0.00     0.68       1.129  O         |         |         |         |    590.52
  13.167     0.00     0.68       1.125  O         |         |         |         |    590.51
  13.250     0.00     0.68       1.120  O         |         |         |         |    590.50
  13.333     0.00     0.68       1.115  O         |         |         |         |    590.49
  13.417     0.00     0.68       1.111  O         |         |         |         |    590.48
  13.500     0.00     0.68       1.106  O         |         |         |         |    590.47
  13.583     0.00     0.67       1.101  O         |         |         |         |    590.46
  13.667     0.00     0.67       1.097  O         |         |         |         |    590.46
  13.750     0.00     0.67       1.092  O         |         |         |         |    590.45
  13.833     0.00     0.67       1.087  O         |         |         |         |    590.44
  13.917     0.00     0.67       1.083  O         |         |         |         |    590.43
  14.000     0.00     0.67       1.078  O         |         |         |         |    590.42
  14.083     0.00     0.66       1.074  O         |         |         |         |    590.41
  14.167     0.00     0.66       1.069  O         |         |         |         |    590.40
  14.250     0.00     0.66       1.065  O         |         |         |         |    590.39
  14.333     0.00     0.66       1.060  O         |         |         |         |    590.38
  14.417     0.00     0.66       1.055  O         |         |         |         |    590.38
  14.500     0.00     0.66       1.051  O         |         |         |         |    590.37
  14.583     0.00     0.66       1.046  O         |         |         |         |    590.36
  14.667     0.00     0.65       1.042  O         |         |         |         |    590.35
  14.750     0.00     0.65       1.037  O         |         |         |         |    590.34
  14.833     0.00     0.65       1.033  O         |         |         |         |    590.33
  14.917     0.00     0.65       1.028  O         |         |         |         |    590.32
  15.000     0.00     0.65       1.024  O         |         |         |         |    590.32
  15.083     0.00     0.65       1.020  O         |         |         |         |    590.31
  15.167     0.00     0.65       1.015  O         |         |         |         |    590.30
  15.250     0.00     0.64       1.011  O         |         |         |         |    590.29
  15.333     0.00     0.64       1.006  O         |         |         |         |    590.28
  15.417     0.00     0.64       1.002  O         |         |         |         |    590.27
  15.500     0.00     0.64       0.997  O         |         |         |         |    590.26
  15.583     0.00     0.64       0.993  O         |         |         |         |    590.26
  15.667     0.00     0.64       0.989  O         |         |         |         |    590.25
  15.750     0.00     0.64       0.984  O         |         |         |         |    590.24
  15.833     0.00     0.63       0.980  O         |         |         |         |    590.23
  15.917     0.00     0.63       0.975  O         |         |         |         |    590.22
  16.000     0.00     0.63       0.971  O         |         |         |         |    590.21
  16.083     0.00     0.63       0.967  O         |         |         |         |    590.21
  16.167     0.00     0.63       0.962  O         |         |         |         |    590.20
  16.250     0.00     0.63       0.958  O         |         |         |         |    590.19
  16.333     0.00     0.63       0.954  O         |         |         |         |    590.18
  16.417     0.00     0.62       0.949  O         |         |         |         |    590.17
  16.500     0.00     0.62       0.945  O         |         |         |         |    590.16
  16.583     0.00     0.62       0.941  O         |         |         |         |    590.16
  16.667     0.00     0.62       0.937  O         |         |         |         |    590.15
  16.750     0.00     0.62       0.932  O         |         |         |         |    590.14
  16.833     0.00     0.62       0.928  O         |         |         |         |    590.13
  16.917     0.00     0.62       0.924  O         |         |         |         |    590.12
  17.000     0.00     0.61       0.920  O         |         |         |         |    590.11
  17.083     0.00     0.61       0.915  O         |         |         |         |    590.11
  17.167     0.00     0.61       0.911  O         |         |         |         |    590.10
  17.250     0.00     0.61       0.907  O         |         |         |         |    590.09
  17.333     0.00     0.61       0.903  O         |         |         |         |    590.08
  17.417     0.00     0.61       0.899  O         |         |         |         |    590.07
  17.500     0.00     0.61       0.894  O         |         |         |         |    590.07
  17.583     0.00     0.60       0.890  O         |         |         |         |    590.06
  17.667     0.00     0.60       0.886  O         |         |         |         |    590.05
  17.750     0.00     0.60       0.882  O         |         |         |         |    590.04
```

```
17.833    0.00    0.60      0.878  O        |        |        |        |   590.03
17.917    0.00    0.60      0.874  O        |        |        |        |   590.03
18.000    0.00    0.60      0.869  O        |        |        |        |   590.02
18.083    0.00    0.60      0.865  O        |        |        |        |   590.01
18.167    0.00    0.60      0.861  O        |        |        |        |   590.00
18.250    0.00    0.59      0.857  O        |        |        |        |   589.99
18.333    0.00    0.59      0.853  O        |        |        |        |   589.99
18.417    0.00    0.59      0.849  O        |        |        |        |   589.98
18.500    0.00    0.59      0.845  O        |        |        |        |   589.97
18.583    0.00    0.59      0.841  O        |        |        |        |   589.96
18.667    0.00    0.59      0.837  O        |        |        |        |   589.96
18.750    0.00    0.59      0.833  O        |        |        |        |   589.95
18.833    0.00    0.58      0.829  O        |        |        |        |   589.94
18.917    0.00    0.58      0.825  O        |        |        |        |   589.93
19.000    0.00    0.58      0.821  O        |        |        |        |   589.92
19.083    0.00    0.58      0.817  O        |        |        |        |   589.92
19.167    0.00    0.58      0.813  O        |        |        |        |   589.91
19.250    0.00    0.58      0.809  O        |        |        |        |   589.90
19.333    0.00    0.58      0.805  O        |        |        |        |   589.89
19.417    0.00    0.58      0.801  O        |        |        |        |   589.89
19.500    0.00    0.57      0.797  O        |        |        |        |   589.88
19.583    0.00    0.57      0.793  O        |        |        |        |   589.87
19.667    0.00    0.57      0.789  O        |        |        |        |   589.86
19.750    0.00    0.57      0.785  O        |        |        |        |   589.86
19.833    0.00    0.57      0.781  O        |        |        |        |   589.85
19.917    0.00    0.57      0.777  O        |        |        |        |   589.84
20.000    0.00    0.57      0.773  O        |        |        |        |   589.83
20.083    0.00    0.57      0.769  O        |        |        |        |   589.83
20.167    0.00    0.56      0.765  O        |        |        |        |   589.82
20.250    0.00    0.56      0.762  O        |        |        |        |   589.81
20.333    0.00    0.56      0.758  O        |        |        |        |   589.80
20.417    0.00    0.56      0.754  O        |        |        |        |   589.80
20.500    0.00    0.56      0.750  O        |        |        |        |   589.79
20.583    0.00    0.56      0.746  O        |        |        |        |   589.78
20.667    0.00    0.56      0.742  O        |        |        |        |   589.77
20.750    0.00    0.56      0.738  O        |        |        |        |   589.77
20.833    0.00    0.55      0.735  O        |        |        |        |   589.76
20.917    0.00    0.55      0.731  O        |        |        |        |   589.75
21.000    0.00    0.55      0.727  O        |        |        |        |   589.74
21.083    0.00    0.55      0.723  O        |        |        |        |   589.74
21.167    0.00    0.55      0.719  O        |        |        |        |   589.73
21.250    0.00    0.55      0.716  O        |        |        |        |   589.72
21.333    0.00    0.55      0.712  O        |        |        |        |   589.72
21.417    0.00    0.55      0.708  O        |        |        |        |   589.71
21.500    0.00    0.54      0.704  O        |        |        |        |   589.70
21.583    0.00    0.54      0.701  O        |        |        |        |   589.69
21.667    0.00    0.54      0.697  O        |        |        |        |   589.69
21.750    0.00    0.54      0.693  O        |        |        |        |   589.68
21.833    0.00    0.54      0.689  O        |        |        |        |   589.67
21.917    0.00    0.54      0.686  O        |        |        |        |   589.66
22.000    0.00    0.54      0.682  O        |        |        |        |   589.66
22.083    0.00    0.54      0.678  O        |        |        |        |   589.65
22.167    0.00    0.53      0.675  O        |        |        |        |   589.64
22.250    0.00    0.53      0.671  O        |        |        |        |   589.64
22.333    0.00    0.53      0.667  O        |        |        |        |   589.63
22.417    0.00    0.53      0.664  O        |        |        |        |   589.62
22.500    0.00    0.53      0.660  O        |        |        |        |   589.62
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  22.583    0.00    0.53     0.656  O       |       |       |       |    589.61
  22.667    0.00    0.53     0.653  O       |       |       |       |    589.60
  22.750    0.00    0.53     0.649  O       |       |       |       |    589.59
  22.833    0.00    0.52     0.646  O       |       |       |       |    589.59
  22.917    0.00    0.52     0.642  O       |       |       |       |    589.58
  23.000    0.00    0.52     0.638  O       |       |       |       |    589.57
  23.083    0.00    0.52     0.635  O       |       |       |       |    589.57
  23.167    0.00    0.52     0.631  O       |       |       |       |    589.56
  23.250    0.00    0.52     0.628  O       |       |       |       |    589.55
  23.333    0.00    0.52     0.624  O       |       |       |       |    589.55
  23.417    0.00    0.52     0.620  O       |       |       |       |    589.54
  23.500    0.00    0.52     0.617  O       |       |       |       |    589.53
  23.583    0.00    0.51     0.613  O       |       |       |       |    589.53
  23.667    0.00    0.51     0.610  O       |       |       |       |    589.52
  23.750    0.00    0.51     0.606  O       |       |       |       |    589.51
  23.833    0.00    0.51     0.603  O       |       |       |       |    589.51
  23.917    0.00    0.51     0.599  O       |       |       |       |    589.49
  24.000    0.00    0.51     0.596  O       |       |       |       |    589.47
  24.083    0.00    0.51     0.592  O       |       |       |       |    589.45
  24.167    0.00    0.50     0.589  O       |       |       |       |    589.42
  24.250    0.00    0.50     0.585  O       |       |       |       |    589.40
  24.333    0.00    0.50     0.582  O       |       |       |       |    589.38
  24.417    0.00    0.50     0.578  O       |       |       |       |    589.36
  24.500    0.00    0.50     0.575  O       |       |       |       |    589.33
  24.583    0.00    0.50     0.571  O       |       |       |       |    589.31
  24.667    0.00    0.50     0.568  O       |       |       |       |    589.29
  24.750    0.00    0.49     0.565  O       |       |       |       |    589.26
  24.833    0.00    0.49     0.561  O       |       |       |       |    589.24
  24.917    0.00    0.49     0.558  O       |       |       |       |    589.22
  25.000    0.00    0.49     0.555  O       |       |       |       |    589.20
  25.083    0.00    0.49     0.551  O       |       |       |       |    589.17
  25.167    0.00    0.49     0.548  O       |       |       |       |    589.15
  25.250    0.00    0.48     0.544  O       |       |       |       |    589.13
  25.333    0.00    0.48     0.541  O       |       |       |       |    589.11
  25.417    0.00    0.48     0.538  O       |       |       |       |    589.09
  25.500    0.00    0.48     0.535  O       |       |       |       |    589.06
  25.583    0.00    0.48     0.531  O       |       |       |       |    589.04
  25.667    0.00    0.48     0.528  O       |       |       |       |    589.02
  25.750    0.00    0.47     0.525  O       |       |       |       |    589.00
  25.833    0.00    0.47     0.521  O       |       |       |       |    588.98
  25.917    0.00    0.47     0.518  O       |       |       |       |    588.95
  26.000    0.00    0.47     0.515  O       |       |       |       |    588.93
  26.083    0.00    0.47     0.512  O       |       |       |       |    588.91
  26.167    0.00    0.47     0.508  O       |       |       |       |    588.89
  26.250    0.00    0.47     0.505  O       |       |       |       |    588.87
  26.333    0.00    0.46     0.502  O       |       |       |       |    588.85
  26.417    0.00    0.46     0.499  O       |       |       |       |    588.83
  26.500    0.00    0.46     0.496  O       |       |       |       |    588.80
  26.583    0.00    0.46     0.492  O       |       |       |       |    588.78
  26.667    0.00    0.46     0.489  O       |       |       |       |    588.76
  26.750    0.00    0.46     0.486  O       |       |       |       |    588.74
  26.833    0.00    0.46     0.483  O       |       |       |       |    588.72
  26.917    0.00    0.45     0.480  O       |       |       |       |    588.70
  27.000    0.00    0.45     0.477  O       |       |       |       |    588.68
  27.083    0.00    0.45     0.474  O       |       |       |       |    588.66
  27.167    0.00    0.45     0.471  O       |       |       |       |    588.64
  27.250    0.00    0.45     0.467  O       |       |       |       |    588.62
```

```
27.333    0.00    0.45      0.464  O        |       |       |       |  588.60
27.417    0.00    0.45      0.461  O        |       |       |       |  588.58
27.500    0.00    0.44      0.458  O        |       |       |       |  588.56
27.583    0.00    0.44      0.455  O        |       |       |       |  588.53
27.667    0.00    0.44      0.452  O        |       |       |       |  588.51
27.750    0.00    0.44      0.449  O        |       |       |       |  588.49
27.833    0.00    0.44      0.446  O        |       |       |       |  588.47
27.917    0.00    0.44      0.443  O        |       |       |       |  588.45
28.000    0.00    0.43      0.440  O        |       |       |       |  588.43
28.083    0.00    0.43      0.437  O        |       |       |       |  588.41
28.167    0.00    0.43      0.434  O        |       |       |       |  588.39
28.250    0.00    0.43      0.431  O        |       |       |       |  588.37
28.333    0.00    0.43      0.428  O        |       |       |       |  588.35
28.417    0.00    0.43      0.425  O        |       |       |       |  588.34
28.500    0.00    0.43      0.422  O        |       |       |       |  588.32
28.583    0.00    0.42      0.419  O        |       |       |       |  588.30
28.667    0.00    0.42      0.416  O        |       |       |       |  588.28
28.750    0.00    0.42      0.414  O        |       |       |       |  588.26
28.833    0.00    0.42      0.411  O        |       |       |       |  588.24
28.917    0.00    0.42      0.408  O        |       |       |       |  588.22
29.000    0.00    0.42      0.405  O        |       |       |       |  588.20
29.083    0.00    0.41      0.402  O        |       |       |       |  588.18
29.167    0.00    0.41      0.399  O        |       |       |       |  588.16
29.250    0.00    0.41      0.396  O        |       |       |       |  588.14
29.333    0.00    0.41      0.394  O        |       |       |       |  588.12
29.417    0.00    0.41      0.391  O        |       |       |       |  588.11
29.500    0.00    0.41      0.388  O        |       |       |       |  588.09
29.583    0.00    0.41      0.385  O        |       |       |       |  588.07
29.667    0.00    0.40      0.382  O        |       |       |       |  588.05
29.750    0.00    0.40      0.380  O        |       |       |       |  588.03
29.833    0.00    0.40      0.377  O        |       |       |       |  588.01
29.917    0.00    0.40      0.374  O        |       |       |       |  587.99
30.000    0.00    0.40      0.371  O        |       |       |       |  587.98
30.083    0.00    0.40      0.369  O        |       |       |       |  587.96
30.167    0.00    0.40      0.366  O        |       |       |       |  587.94
30.250    0.00    0.39      0.363  O        |       |       |       |  587.92
30.333    0.00    0.39      0.360  O        |       |       |       |  587.90
30.417    0.00    0.39      0.358  O        |       |       |       |  587.88
30.500    0.00    0.39      0.355  O        |       |       |       |  587.87
30.583    0.00    0.39      0.352  O        |       |       |       |  587.85
30.667    0.00    0.39      0.350  O        |       |       |       |  587.83
30.750    0.00    0.39      0.347  O        |       |       |       |  587.81
30.833    0.00    0.38      0.344  O        |       |       |       |  587.80
30.917    0.00    0.38      0.342  O        |       |       |       |  587.78
31.000    0.00    0.38      0.339  O        |       |       |       |  587.76
31.083    0.00    0.38      0.337  O        |       |       |       |  587.74
31.167    0.00    0.38      0.334  O        |       |       |       |  587.73
31.250    0.00    0.38      0.331  O        |       |       |       |  587.71
31.333    0.00    0.38      0.329  O        |       |       |       |  587.69
31.417    0.00    0.37      0.326  O        |       |       |       |  587.67
31.500    0.00    0.37      0.324  O        |       |       |       |  587.66
31.583    0.00    0.37      0.321  O        |       |       |       |  587.64
31.667    0.00    0.37      0.318  O        |       |       |       |  587.62
31.750    0.00    0.37      0.316  O        |       |       |       |  587.61
31.833    0.00    0.37      0.313  O        |       |       |       |  587.59
31.917    0.00    0.37      0.311  O        |       |       |       |  587.57
32.000    0.00    0.36      0.308  O        |       |       |       |  587.56
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  32.083     0.00     0.36      0.306  O         |         |         |         |    587.54
  32.167     0.00     0.36      0.303  O         |         |         |         |    587.52
  32.250     0.00     0.36      0.301  O         |         |         |         |    587.51
  32.333     0.00     0.36      0.298  O         |         |         |         |    587.49
  32.417     0.00     0.36      0.296  O         |         |         |         |    587.47
  32.500     0.00     0.35      0.293  O         |         |         |         |    587.46
  32.583     0.00     0.35      0.291  O         |         |         |         |    587.44
  32.667     0.00     0.35      0.289  O         |         |         |         |    587.42
  32.750     0.00     0.35      0.286  O         |         |         |         |    587.41
  32.833     0.00     0.35      0.284  O         |         |         |         |    587.39
  32.917     0.00     0.35      0.281  O         |         |         |         |    587.38
  33.000     0.00     0.34      0.279  O         |         |         |         |    587.36
  33.083     0.00     0.34      0.277  O         |         |         |         |    587.34
  33.167     0.00     0.34      0.274  O         |         |         |         |    587.33
  33.250     0.00     0.34      0.272  O         |         |         |         |    587.31
  33.333     0.00     0.34      0.270  O         |         |         |         |    587.30
  33.417     0.00     0.33      0.267  O         |         |         |         |    587.28
  33.500     0.00     0.33      0.265  O         |         |         |         |    587.27
  33.583     0.00     0.33      0.263  O         |         |         |         |    587.25
  33.667     0.00     0.33      0.261  O         |         |         |         |    587.24
  33.750     0.00     0.33      0.258  O         |         |         |         |    587.22
  33.833     0.00     0.32      0.256  O         |         |         |         |    587.21
  33.917     0.00     0.32      0.254  O         |         |         |         |    587.19
  34.000     0.00     0.32      0.252  O         |         |         |         |    587.18
  34.083     0.00     0.32      0.249  O         |         |         |         |    587.16
  34.167     0.00     0.32      0.247  O         |         |         |         |    587.15
  34.250     0.00     0.32      0.245  O         |         |         |         |    587.13
  34.333     0.00     0.31      0.243  O         |         |         |         |    587.12
  34.417     0.00     0.31      0.241  O         |         |         |         |    587.10
  34.500     0.00     0.31      0.239  O         |         |         |         |    587.09
  34.583     0.00     0.31      0.236  O         |         |         |         |    587.08
  34.667     0.00     0.31      0.234  O         |         |         |         |    587.06
  34.750     0.00     0.31      0.232  O         |         |         |         |    587.05
  34.833     0.00     0.30      0.230  O         |         |         |         |    587.03
  34.917     0.00     0.30      0.228  O         |         |         |         |    587.02
  35.000     0.00     0.30      0.226  O         |         |         |         |    587.01
  35.083     0.00     0.30      0.224  O         |         |         |         |    586.99
  35.167     0.00     0.30      0.222  O         |         |         |         |    586.98
  35.250     0.00     0.30      0.220  O         |         |         |         |    586.96
  35.333     0.00     0.29      0.218  O         |         |         |         |    586.95
  35.417     0.00     0.29      0.216  O         |         |         |         |    586.94
  35.500     0.00     0.29      0.214  O         |         |         |         |    586.92
  35.583     0.00     0.29      0.212  O         |         |         |         |    586.91
  35.667     0.00     0.29      0.210  O         |         |         |         |    586.90
  35.750     0.00     0.29      0.208  O         |         |         |         |    586.88
  35.833     0.00     0.28      0.206  O         |         |         |         |    586.87
  35.917     0.00     0.28      0.204  O         |         |         |         |    586.86
  36.000     0.00     0.28      0.202  O         |         |         |         |    586.85
  36.083     0.00     0.28      0.200  O         |         |         |         |    586.83
  36.167     0.00     0.28      0.198  O         |         |         |         |    586.82
  36.250     0.00     0.28      0.196  O         |         |         |         |    586.81
  36.333     0.00     0.28      0.194  O         |         |         |         |    586.79
  36.417     0.00     0.27      0.192  O         |         |         |         |    586.78
  36.500     0.00     0.27      0.190  O         |         |         |         |    586.77
  36.583     0.00     0.27      0.189  O         |         |         |         |    586.76
  36.667     0.00     0.27      0.187  O         |         |         |         |    586.74
  36.750     0.00     0.27      0.185  O         |         |         |         |    586.73
```

```
 36.833    0.00    0.27      0.183  O        |         |         |         |    586.72
 36.917    0.00    0.26      0.181  O        |         |         |         |    586.71
 37.000    0.00    0.26      0.179  O        |         |         |         |    586.70
 37.083    0.00    0.26      0.178  O        |         |         |         |    586.68
 37.167    0.00    0.26      0.176  O        |         |         |         |    586.67
 37.250    0.00    0.26      0.174  O        |         |         |         |    586.66
 37.333    0.00    0.26      0.172  O        |         |         |         |    586.65
 37.417    0.00    0.26      0.170  O        |         |         |         |    586.64
 37.500    0.00    0.25      0.169  O        |         |         |         |    586.62
 37.583    0.00    0.25      0.167  O        |         |         |         |    586.61
 37.667    0.00    0.25      0.165  O        |         |         |         |    586.60
 37.750    0.00    0.25      0.163  O        |         |         |         |    586.59
 37.833    0.00    0.25      0.162  O        |         |         |         |    586.58
 37.917    0.00    0.25      0.160  O        |         |         |         |    586.57
 38.000    0.00    0.25      0.158  O        |         |         |         |    586.56
 38.083    0.00    0.25      0.157  O        |         |         |         |    586.54
 38.167    0.00    0.24      0.155  O        |         |         |         |    586.53
 38.250    0.00    0.24      0.153  O        |         |         |         |    586.52
 38.333    0.00    0.24      0.152  O        |         |         |         |    586.51
 38.417    0.00    0.24      0.150  O        |         |         |         |    586.50
 38.500    0.00    0.24      0.148  O        |         |         |         |    586.49
 38.583    0.00    0.23      0.147  O        |         |         |         |    586.48
 38.667    0.00    0.23      0.145  O        |         |         |         |    586.47
 38.750    0.00    0.23      0.143  O        |         |         |         |    586.46
 38.833    0.00    0.23      0.142  O        |         |         |         |    586.45
 38.917    0.00    0.22      0.140  O        |         |         |         |    586.43
 39.000    0.00    0.22      0.139  O        |         |         |         |    586.42
 39.083    0.00    0.22      0.137  O        |         |         |         |    586.41
 39.167    0.00    0.22      0.136  O        |         |         |         |    586.40
 39.250    0.00    0.21      0.134  O        |         |         |         |    586.39
 39.333    0.00    0.21      0.133  O        |         |         |         |    586.38
 39.417    0.00    0.21      0.131  O        |         |         |         |    586.37
 39.500    0.00    0.21      0.130  O        |         |         |         |    586.37
 39.583    0.00    0.21      0.128  O        |         |         |         |    586.36
 39.667    0.00    0.20      0.127  O        |         |         |         |    586.35
 39.750    0.00    0.20      0.126  O        |         |         |         |    586.34
 39.833    0.00    0.20      0.124  O        |         |         |         |    586.33
 39.917    0.00    0.20      0.123  O        |         |         |         |    586.32
 40.000    0.00    0.19      0.122  O        |         |         |         |    586.31
 40.083    0.00    0.19      0.120  O        |         |         |         |    586.30
 40.167    0.00    0.19      0.119  O        |         |         |         |    586.29
 40.250    0.00    0.19      0.118  O        |         |         |         |    586.28
 40.333    0.00    0.19      0.116  O        |         |         |         |    586.27
 40.417    0.00    0.18      0.115  O        |         |         |         |    586.27
 40.500    0.00    0.18      0.114  O        |         |         |         |    586.26
 40.583    0.00    0.18      0.113  O        |         |         |         |    586.25
 40.667    0.00    0.18      0.111  O        |         |         |         |    586.24
 40.750    0.00    0.18      0.110  O        |         |         |         |    586.23
 40.833    0.00    0.17      0.109  O        |         |         |         |    586.22
 40.917    0.00    0.17      0.108  O        |         |         |         |    586.22
 41.000    0.00    0.17      0.107  O        |         |         |         |    586.21
 41.083    0.00    0.17      0.105  O        |         |         |         |    586.20
 41.167    0.00    0.17      0.104  O        |         |         |         |    586.19
 41.250    0.00    0.16      0.103  O        |         |         |         |    586.19
 41.333    0.00    0.16      0.102  O        |         |         |         |    586.18
 41.417    0.00    0.16      0.101  O        |         |         |         |    586.17
 41.500    0.00    0.16      0.100  O        |         |         |         |    586.16
```

```
41.583    0.00    0.16      0.099  O       |       |       |       |   586.16
41.667    0.00    0.16      0.098  O       |       |       |       |   586.15
41.750    0.00    0.15      0.096  O       |       |       |       |   586.14
41.833    0.00    0.15      0.095  O       |       |       |       |   586.13
41.917    0.00    0.15      0.094  O       |       |       |       |   586.13
42.000    0.00    0.15      0.093  O       |       |       |       |   586.12
42.083    0.00    0.15      0.092  O       |       |       |       |   586.11
42.167    0.00    0.15      0.091  O       |       |       |       |   586.11
42.250    0.00    0.14      0.090  O       |       |       |       |   586.10
42.333    0.00    0.14      0.089  O       |       |       |       |   586.09
42.417    0.00    0.14      0.088  O       |       |       |       |   586.09
42.500    0.00    0.14      0.087  O       |       |       |       |   586.08
42.583    0.00    0.14      0.086  O       |       |       |       |   586.07
42.667    0.00    0.14      0.085  O       |       |       |       |   586.07
42.750    0.00    0.14      0.085  O       |       |       |       |   586.06
42.833    0.00    0.13      0.084  O       |       |       |       |   586.05
42.917    0.00    0.13      0.083  O       |       |       |       |   586.05
43.000    0.00    0.13      0.082  O       |       |       |       |   586.04
43.083    0.00    0.13      0.081  O       |       |       |       |   586.04
43.167    0.00    0.13      0.080  O       |       |       |       |   586.03
43.250    0.00    0.13      0.079  O       |       |       |       |   586.02
43.333    0.00    0.12      0.078  O       |       |       |       |   586.02
43.417    0.00    0.12      0.077  O       |       |       |       |   586.01
43.500    0.00    0.12      0.077  O       |       |       |       |   586.01
43.583    0.00    0.12      0.076  O       |       |       |       |   586.00
43.667    0.00    0.12      0.075  O       |       |       |       |   586.00
43.750    0.00    0.12      0.074  O       |       |       |       |   585.99
43.833    0.00    0.12      0.073  O       |       |       |       |   585.99
43.917    0.00    0.12      0.072  O       |       |       |       |   585.98
44.000    0.00    0.11      0.072  O       |       |       |       |   585.97
44.083    0.00    0.11      0.071  O       |       |       |       |   585.97
44.167    0.00    0.11      0.070  O       |       |       |       |   585.96
44.250    0.00    0.11      0.069  O       |       |       |       |   585.96
44.333    0.00    0.11      0.069  O       |       |       |       |   585.95
44.417    0.00    0.11      0.068  O       |       |       |       |   585.95
44.500    0.00    0.11      0.067  O       |       |       |       |   585.94
44.583    0.00    0.11      0.066  O       |       |       |       |   585.94
44.667    0.00    0.10      0.066  O       |       |       |       |   585.93
44.750    0.00    0.10      0.065  O       |       |       |       |   585.93
44.833    0.00    0.10      0.064  O       |       |       |       |   585.92
44.917    0.00    0.10      0.064  O       |       |       |       |   585.92
45.000    0.00    0.10      0.063  O       |       |       |       |   585.92
45.083    0.00    0.10      0.062  O       |       |       |       |   585.91
45.167    0.00    0.10      0.061  O       |       |       |       |   585.91
45.250    0.00    0.10      0.061  O       |       |       |       |   585.90
45.333    0.00    0.10      0.060  O       |       |       |       |   585.90
45.417    0.00    0.09      0.059  O       |       |       |       |   585.89
45.500    0.00    0.09      0.059  O       |       |       |       |   585.89
45.583    0.00    0.09      0.058  O       |       |       |       |   585.88
45.667    0.00    0.09      0.058  O       |       |       |       |   585.88
45.750    0.00    0.09      0.057  O       |       |       |       |   585.88
45.833    0.00    0.09      0.056  O       |       |       |       |   585.87
45.917    0.00    0.09      0.056  O       |       |       |       |   585.87
46.000    0.00    0.09      0.055  O       |       |       |       |   585.86
46.083    0.00    0.09      0.054  O       |       |       |       |   585.86
46.167    0.00    0.09      0.054  O       |       |       |       |   585.86
46.250    0.00    0.08      0.053  O       |       |       |       |   585.85
```

```
  46.333     0.00     0.08       0.053  O         |         |         |         |     585.85
  46.417     0.00     0.08       0.052  O         |         |         |         |     585.84
  46.500     0.00     0.08       0.052  O         |         |         |         |     585.84
  46.583     0.00     0.08       0.051  O         |         |         |         |     585.84
  46.667     0.00     0.08       0.050  O         |         |         |         |     585.83
  46.750     0.00     0.08       0.050  O         |         |         |         |     585.83
  46.833     0.00     0.08       0.049  O         |         |         |         |     585.82
  46.917     0.00     0.08       0.049  O         |         |         |         |     585.82
  47.000     0.00     0.08       0.048  O         |         |         |         |     585.82
  47.083     0.00     0.08       0.048  O         |         |         |         |     585.81
  47.167     0.00     0.08       0.047  O         |         |         |         |     585.81
  47.250     0.00     0.07       0.047  O         |         |         |         |     585.81
  47.333     0.00     0.07       0.046  O         |         |         |         |     585.80
  47.417     0.00     0.07       0.046  O         |         |         |         |     585.80
  47.500     0.00     0.07       0.045  O         |         |         |         |     585.80
  47.583     0.00     0.07       0.045  O         |         |         |         |     585.79
  47.667     0.00     0.07       0.044  O         |         |         |         |     585.79
  47.750     0.00     0.07       0.044  O         |         |         |         |     585.79
  47.833     0.00     0.07       0.043  O         |         |         |         |     585.78
  47.917     0.00     0.07       0.043  O         |         |         |         |     585.78
  48.000     0.00     0.07       0.042  O         |         |         |         |     585.78
  48.083     0.00     0.07       0.042  O         |         |         |         |     585.77
  48.167     0.00     0.07       0.041  O         |         |         |         |     585.77
  48.250     0.00     0.07       0.041  O         |         |         |         |     585.77
  48.333     0.00     0.06       0.041  O         |         |         |         |     585.77
  48.417     0.00     0.06       0.040  O         |         |         |         |     585.76
  48.500     0.00     0.06       0.040  O         |         |         |         |     585.76
  48.583     0.00     0.06       0.039  O         |         |         |         |     585.76
  48.667     0.00     0.06       0.039  O         |         |         |         |     585.75
  48.750     0.00     0.06       0.038  O         |         |         |         |     585.75
  48.833     0.00     0.06       0.038  O         |         |         |         |     585.75
  48.917     0.00     0.06       0.038  O         |         |         |         |     585.75
  49.000     0.00     0.06       0.037  O         |         |         |         |     585.74
  49.083     0.00     0.06       0.037  O         |         |         |         |     585.74
  49.167     0.00     0.06       0.036  O         |         |         |         |     585.74
  49.250     0.00     0.06       0.036  O         |         |         |         |     585.73
  49.333     0.00     0.06       0.036  O         |         |         |         |     585.73
  49.417     0.00     0.06       0.035  O         |         |         |         |     585.73
  49.500     0.00     0.06       0.035  O         |         |         |         |     585.73
  49.583     0.00     0.05       0.034  O         |         |         |         |     585.72
  49.667     0.00     0.05       0.034  O         |         |         |         |     585.72
  49.750     0.00     0.05       0.034  O         |         |         |         |     585.72
  49.833     0.00     0.05       0.033  O         |         |         |         |     585.72
  49.917     0.00     0.05       0.033  O         |         |         |         |     585.71
  50.000     0.00     0.05       0.033  O         |         |         |         |     585.71
  50.083     0.00     0.05       0.032  O         |         |         |         |     585.71
  50.167     0.00     0.05       0.032  O         |         |         |         |     585.71
  50.250     0.00     0.05       0.032  O         |         |         |         |     585.70
  50.333     0.00     0.05       0.031  O         |         |         |         |     585.70
  50.417     0.00     0.05       0.031  O         |         |         |         |     585.70
  50.500     0.00     0.05       0.031  O         |         |         |         |     585.70
  50.583     0.00     0.05       0.030  O         |         |         |         |     585.70
  50.667     0.00     0.05       0.030  O         |         |         |         |     585.69
  50.750     0.00     0.05       0.030  O         |         |         |         |     585.69
  50.833     0.00     0.05       0.029  O         |         |         |         |     585.69
  50.917     0.00     0.05       0.029  O         |         |         |         |     585.69
  51.000     0.00     0.05       0.029  O         |         |         |         |     585.69
```

```
 51.083    0.00    0.04     0.028  O       |       |       |       |   585.68
 51.167    0.00    0.04     0.028  O       |       |       |       |   585.68
 51.250    0.00    0.04     0.028  O       |       |       |       |   585.68
 51.333    0.00    0.04     0.027  O       |       |       |       |   585.68
 51.417    0.00    0.04     0.027  O       |       |       |       |   585.67
 51.500    0.00    0.04     0.027  O       |       |       |       |   585.67
 51.583    0.00    0.04     0.026  O       |       |       |       |   585.67
 51.667    0.00    0.04     0.026  O       |       |       |       |   585.67
 51.750    0.00    0.04     0.026  O       |       |       |       |   585.67
 51.833    0.00    0.04     0.026  O       |       |       |       |   585.67
 51.917    0.00    0.04     0.025  O       |       |       |       |   585.66
 52.000    0.00    0.04     0.025  O       |       |       |       |   585.66
 52.083    0.00    0.04     0.025  O       |       |       |       |   585.66
 52.167    0.00    0.04     0.025  O       |       |       |       |   585.66
 52.250    0.00    0.04     0.024  O       |       |       |       |   585.66
 52.333    0.00    0.04     0.024  O       |       |       |       |   585.65
 52.417    0.00    0.04     0.024  O       |       |       |       |   585.65
 52.500    0.00    0.04     0.023  O       |       |       |       |   585.65
 52.583    0.00    0.04     0.023  O       |       |       |       |   585.65
 52.667    0.00    0.04     0.023  O       |       |       |       |   585.65
 52.750    0.00    0.04     0.023  O       |       |       |       |   585.65
 52.833    0.00    0.04     0.022  O       |       |       |       |   585.64
 52.917    0.00    0.04     0.022  O       |       |       |       |   585.64
 53.000    0.00    0.03     0.022  O       |       |       |       |   585.64
 53.083    0.00    0.03     0.022  O       |       |       |       |   585.64
 53.167    0.00    0.03     0.022  O       |       |       |       |   585.64
 53.250    0.00    0.03     0.021  O       |       |       |       |   585.64
 53.333    0.00    0.03     0.021  O       |       |       |       |   585.63
 53.417    0.00    0.03     0.021  O       |       |       |       |   585.63
 53.500    0.00    0.03     0.021  O       |       |       |       |   585.63
 53.583    0.00    0.03     0.020  O       |       |       |       |   585.63
 53.667    0.00    0.03     0.020  O       |       |       |       |   585.63
 53.750    0.00    0.03     0.020  O       |       |       |       |   585.63
 53.833    0.00    0.03     0.020  O       |       |       |       |   585.63
 53.917    0.00    0.03     0.020  O       |       |       |       |   585.62
 54.000    0.00    0.03     0.019  O       |       |       |       |   585.62
 54.083    0.00    0.03     0.019  O       |       |       |       |   585.62
 54.167    0.00    0.03     0.019  O       |       |       |       |   585.62
 54.250    0.00    0.03     0.019  O       |       |       |       |   585.62
 54.333    0.00    0.03     0.019  O       |       |       |       |   585.62
 54.417    0.00    0.03     0.018  O       |       |       |       |   585.62
 54.500    0.00    0.03     0.018  O       |       |       |       |   585.61
 54.583    0.00    0.03     0.018  O       |       |       |       |   585.61
 54.667    0.00    0.03     0.018  O       |       |       |       |   585.61
 54.750    0.00    0.03     0.018  O       |       |       |       |   585.61
 54.833    0.00    0.03     0.017  O       |       |       |       |   585.61
 54.917    0.00    0.03     0.017  O       |       |       |       |   585.61
 55.000    0.00    0.03     0.017  O       |       |       |       |   585.61
 55.083    0.00    0.03     0.017  O       |       |       |       |   585.61
 55.167    0.00    0.03     0.017  O       |       |       |       |   585.60
 55.250    0.00    0.03     0.016  O       |       |       |       |   585.60
 55.333    0.00    0.03     0.016  O       |       |       |       |   585.60
 55.417    0.00    0.03     0.016  O       |       |       |       |   585.60
 55.500    0.00    0.02     0.016  O       |       |       |       |   585.60
 55.583    0.00    0.02     0.016  O       |       |       |       |   585.60
 55.667    0.00    0.02     0.016  O       |       |       |       |   585.60
 55.750    0.00    0.02     0.015  O       |       |       |       |   585.60
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 55.833    0.00    0.02      0.015  O       |         |         |         |    585.60
 55.917    0.00    0.02      0.015  O       |         |         |         |    585.59
 56.000    0.00    0.02      0.015  O       |         |         |         |    585.59
 56.083    0.00    0.02      0.015  O       |         |         |         |    585.59
 56.167    0.00    0.02      0.015  O       |         |         |         |    585.59
 56.250    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.333    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.417    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.500    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.583    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.667    0.00    0.02      0.014  O       |         |         |         |    585.59
 56.750    0.00    0.02      0.014  O       |         |         |         |    585.58
 56.833    0.00    0.02      0.013  O       |         |         |         |    585.58
 56.917    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.000    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.083    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.167    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.250    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.333    0.00    0.02      0.013  O       |         |         |         |    585.58
 57.417    0.00    0.02      0.012  O       |         |         |         |    585.58
 57.500    0.00    0.02      0.012  O       |         |         |         |    585.58
 57.583    0.00    0.02      0.012  O       |         |         |         |    585.57
 57.667    0.00    0.02      0.012  O       |         |         |         |    585.57
 57.750    0.00    0.02      0.012  O       |         |         |         |    585.57
 57.833    0.00    0.02      0.012  O       |         |         |         |    585.57
 57.917    0.00    0.02      0.012  O       |         |         |         |    585.57
 58.000    0.00    0.02      0.012  O       |         |         |         |    585.57
 58.083    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.167    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.250    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.333    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.417    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.500    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.583    0.00    0.02      0.011  O       |         |         |         |    585.57
 58.667    0.00    0.02      0.011  O       |         |         |         |    585.56
 58.750    0.00    0.02      0.010  O       |         |         |         |    585.56
 58.833    0.00    0.02      0.010  O       |         |         |         |    585.56
 58.917    0.00    0.02      0.010  O       |         |         |         |    585.56
 59.000    0.00    0.02      0.010  O       |         |         |         |    585.56
 59.083    0.00    0.02      0.010  O       |         |         |         |    585.56
 59.167    0.00    0.02      0.010  O       |         |         |         |    585.56
 59.250    0.00    0.02      0.010  O       |         |         |         |    585.56
 59.333    0.00    0.01      0.010  O       |         |         |         |    585.56
 59.417    0.00    0.01      0.010  O       |         |         |         |    585.56
 59.500    0.00    0.01      0.010  O       |         |         |         |    585.56
 59.583    0.00    0.01      0.009  O       |         |         |         |    585.56
 59.667    0.00    0.01      0.009  O       |         |         |         |    585.56
 59.750    0.00    0.01      0.009  O       |         |         |         |    585.56
 59.833    0.00    0.01      0.009  O       |         |         |         |    585.55
 59.917    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.000    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.083    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.167    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.250    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.333    0.00    0.01      0.009  O       |         |         |         |    585.55
 60.417    0.00    0.01      0.008  O       |         |         |         |    585.55
 60.500    0.00    0.01      0.008  O       |         |         |         |    585.55
```

```
 60.583     0.00     0.01       0.008  O         |         |         |         |      585.55
 60.667     0.00     0.01       0.008  O         |         |         |         |      585.55
 60.750     0.00     0.01       0.008  O         |         |         |         |      585.55
 60.833     0.00     0.01       0.008  O         |         |         |         |      585.55
 60.917     0.00     0.01       0.008  O         |         |         |         |      585.55
 61.000     0.00     0.01       0.008  O         |         |         |         |      585.55
 61.083     0.00     0.01       0.008  O         |         |         |         |      585.55
 61.167     0.00     0.01       0.008  O         |         |         |         |      585.54
 61.250     0.00     0.01       0.008  O         |         |         |         |      585.54
 61.333     0.00     0.01       0.008  O         |         |         |         |      585.54
 61.417     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.500     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.583     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.667     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.750     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.833     0.00     0.01       0.007  O         |         |         |         |      585.54
 61.917     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.000     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.083     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.167     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.250     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.333     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.417     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.500     0.00     0.01       0.007  O         |         |         |         |      585.54
 62.583     0.00     0.01       0.006  O         |         |         |         |      585.54
 62.667     0.00     0.01       0.006  O         |         |         |         |      585.54
 62.750     0.00     0.01       0.006  O         |         |         |         |      585.54
 62.833     0.00     0.01       0.006  O         |         |         |         |      585.54
 62.917     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.000     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.083     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.167     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.250     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.333     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.417     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.500     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.583     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.667     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.750     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.833     0.00     0.01       0.006  O         |         |         |         |      585.53
 63.917     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.000     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.083     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.167     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.250     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.333     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.417     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.500     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.583     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.667     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.750     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.833     0.00     0.01       0.005  O         |         |         |         |      585.53
 64.917     0.00     0.01       0.005  O         |         |         |         |      585.53
 65.000     0.00     0.01       0.005  O         |         |         |         |      585.53
 65.083     0.00     0.01       0.005  O         |         |         |         |      585.53
 65.167     0.00     0.01       0.005  O         |         |         |         |      585.52
 65.250     0.00     0.01       0.005  O         |         |         |         |      585.52
```

```
 65.333     0.00     0.01      0.005  O        |        |        |        |     585.52
 65.417     0.00     0.01      0.005  O        |        |        |        |     585.52
 65.500     0.00     0.01      0.005  O        |        |        |        |     585.52
 65.583     0.00     0.01      0.004  O        |        |        |        |     585.52
 65.667     0.00     0.01      0.004  O        |        |        |        |     585.52
 65.750     0.00     0.01      0.004  O        |        |        |        |     585.52
 65.833     0.00     0.01      0.004  O        |        |        |        |     585.52
 65.917     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.000     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.083     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.167     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.250     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.333     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.417     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.500     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.583     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.667     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.750     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.833     0.00     0.01      0.004  O        |        |        |        |     585.52
 66.917     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.000     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.083     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.167     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.250     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.333     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.417     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.500     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.583     0.00     0.01      0.004  O        |        |        |        |     585.52
 67.667     0.00     0.00      0.003  O        |        |        |        |     585.52
 67.750     0.00     0.00      0.003  O        |        |        |        |     585.52
 67.833     0.00     0.00      0.003  O        |        |        |        |     585.52
 67.917     0.00     0.00      0.003  O        |        |        |        |     585.52
 68.000     0.00     0.00      0.003  O        |        |        |        |     585.52
 68.083     0.00     0.00      0.003  O        |        |        |        |     585.52
 68.167     0.00     0.00      0.003  O        |        |        |        |     585.52
 68.250     0.00     0.00      0.003  O        |        |        |        |     585.52
 68.333     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.417     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.500     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.583     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.667     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.750     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.833     0.00     0.00      0.003  O        |        |        |        |     585.51
 68.917     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.000     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.083     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.167     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.250     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.333     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.417     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.500     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.583     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.667     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.750     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.833     0.00     0.00      0.003  O        |        |        |        |     585.51
 69.917     0.00     0.00      0.003  O        |        |        |        |     585.51
 70.000     0.00     0.00      0.003  O        |        |        |        |     585.51
```

```
 70.083     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.167     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.250     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.333     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.417     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.500     0.00      0.00        0.003  O          |         |         |         |     585.51
 70.583     0.00      0.00        0.002  O          |         |         |         |     585.51
 70.667     0.00      0.00        0.002  O          |         |         |         |     585.51
 70.750     0.00      0.00        0.002  O          |         |         |         |     585.51
 70.833     0.00      0.00        0.002  O          |         |         |         |     585.51
 70.917     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.000     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.083     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.167     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.250     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.333     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.417     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.500     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.583     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.667     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.750     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.833     0.00      0.00        0.002  O          |         |         |         |     585.51
 71.917     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.000     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.083     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.167     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.250     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.333     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.417     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.500     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.583     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.667     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.750     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.833     0.00      0.00        0.002  O          |         |         |         |     585.51
 72.917     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.000     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.083     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.167     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.250     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.333     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.417     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.500     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.583     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.667     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.750     0.00      0.00        0.002  O          |         |         |         |     585.51
 73.833     0.00      0.00        0.002  O          |         |         |         |     585.50
 73.917     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.000     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.083     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.167     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.250     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.333     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.417     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.500     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.583     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.667     0.00      0.00        0.002  O          |         |         |         |     585.50
 74.750     0.00      0.00        0.002  O          |         |         |         |     585.50
```

```
 74.833     0.00     0.00       0.002  O        |        |        |        |    585.50
 74.917     0.00     0.00       0.002  O        |        |        |        |    585.50
 75.000     0.00     0.00       0.002  O        |        |        |        |    585.50
 75.083     0.00     0.00       0.002  O        |        |        |        |    585.50
 75.167     0.00     0.00       0.002  O        |        |        |        |    585.50
 75.250     0.00     0.00       0.002  O        |        |        |        |    585.50
 75.333     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.417     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.500     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.583     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.667     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.750     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.833     0.00     0.00       0.001  O        |        |        |        |    585.50
 75.917     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.000     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.083     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.167     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.250     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.333     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.417     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.500     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.583     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.667     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.750     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.833     0.00     0.00       0.001  O        |        |        |        |    585.50
 76.917     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.000     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.083     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.167     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.250     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.333     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.417     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.500     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.583     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.667     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.750     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.833     0.00     0.00       0.001  O        |        |        |        |    585.50
 77.917     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.000     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.083     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.167     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.250     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.333     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.417     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.500     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.583     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.667     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.750     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.833     0.00     0.00       0.001  O        |        |        |        |    585.50
 78.917     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.000     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.083     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.167     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.250     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.333     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.417     0.00     0.00       0.001  O        |        |        |        |    585.50
 79.500     0.00     0.00       0.001  O        |        |        |        |    585.50
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
79.583    0.00    0.00      0.001  O       |       |       |       |   585.50
79.667    0.00    0.00      0.001  O       |       |       |       |   585.50
79.750    0.00    0.00      0.001  O       |       |       |       |   585.50
79.833    0.00    0.00      0.001  O       |       |       |       |   581.69

     ****************************HYDROGRAPH DATA****************************
                 Number of intervals =   958
                 Time interval =    5.0 (Min.)
                 Maximum/Peak flow rate =        0.797 (CFS)
                 Total volume =       1.845 (Ac.Ft)
           Status of hydrographs being held in storage
                      Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
           Peak (CFS)      0.000     0.000     0.000     0.000     0.000
           Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
     ***********************************************************************

     --------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
               Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                          Study date: 10/28/21

---------------------------------------------------------------------
```

TTM 31589
10-Year 6-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop610.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =    80
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =       20.612 (CFS)
            Total volume =       2.383 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       1.000 to Point/Station       2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 80
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
  585.500      0.001      0.001      0.001        0.001
```

```
       586.500      0.150      0.243      0.149        0.151
       587.500      0.300      0.356      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       5.2    10.31    15.46    20.61 (Ft.)
 0.083    0.30    0.00      0.001  O       |       |       |       |   585.50
 0.167    1.13    0.01      0.006  OI      |       |       |       |   585.53
 0.250    1.53    0.02      0.015  O I     |       |       |       |   585.59
 0.333    1.70    0.04      0.026  O I     |       |       |       |   585.67
 0.417    1.78    0.06      0.038  O I     |       |       |       |   585.75
 0.500    1.90    0.08      0.050  O I     |       |       |       |   585.83
 0.583    2.08    0.10      0.063  O  I    |       |       |       |   585.91
 0.667    2.15    0.12      0.077  O  I    |       |       |       |   586.01
 0.750    2.19    0.15      0.091  O  I    |       |       |       |   586.10
 0.833    2.20    0.17      0.105  O  I    |       |       |       |   586.20
 0.917    2.21    0.19      0.119  O  I    |       |       |       |   586.29
 1.000    2.28    0.21      0.133  O  I    |       |       |       |   586.38
 1.083    2.43    0.24      0.147  O  I    |       |       |       |   586.48
 1.167    2.49    0.25      0.163  O  I    |       |       |       |   586.58
 1.250    2.51    0.26      0.178  O  I    |       |       |       |   586.69
 1.333    2.52    0.28      0.193  O  I    |       |       |       |   586.79
 1.417    2.53    0.29      0.209  O  I    |       |       |       |   586.89
 1.500    2.53    0.30      0.224  O  I    |       |       |       |   587.00
 1.583    2.54    0.31      0.240  O  I    |       |       |       |   587.10
 1.667    2.54    0.32      0.255  O  I    |       |       |       |   587.20
 1.750    2.54    0.33      0.270  O  I    |       |       |       |   587.30
 1.833    2.54    0.34      0.285  O  I    |       |       |       |   587.40
 1.917    2.54    0.36      0.300  O  I    |       |       |       |   587.50
 2.000    2.60    0.36      0.316  O   I   |       |       |       |   587.60
 2.083    2.69    0.37      0.331  O   I   |       |       |       |   587.71
 2.167    2.65    0.38      0.347  O   I   |       |       |       |   587.81
 2.250    2.78    0.39      0.363  O   I   |       |       |       |   587.92
 2.333    2.82    0.40      0.380  O   I   |       |       |       |   588.03
 2.417    2.83    0.41      0.396  O   I   |       |       |       |   588.14
 2.500    2.84    0.42      0.413  O   I   |       |       |       |   588.25
 2.583    2.85    0.43      0.430  O   I   |       |       |       |   588.36
 2.667    2.85    0.44      0.446  O   I   |       |       |       |   588.48
 2.750    2.92    0.45      0.463  O   I   |       |       |       |   588.59
 2.833    3.07    0.45      0.481  O   I   |       |       |       |   588.70
 2.917    3.12    0.46      0.499  O   I   |       |       |       |   588.83
 3.000    3.14    0.47      0.517  O   I   |       |       |       |   588.95
 3.083    3.16    0.48      0.536  O   I   |       |       |       |   589.07
 3.167    3.22    0.49      0.554  O    I  |       |       |       |   589.19
 3.250    3.38    0.50      0.574  O    I  |       |       |       |   589.32
 3.333    3.44    0.51      0.594  O    I  |       |       |       |   589.46
 3.417    3.52    0.51      0.614  O    I  |       |       |       |   589.53
```

```
3.500    3.75    0.52      0.635  O    I  |       |       |       |   589.57
3.583    4.02    0.53      0.659  O     I |       |       |       |   589.61
3.667    4.25    0.54      0.683  O     I |       |       |       |   589.66
3.750    4.40    0.55      0.709  O     I |       |       |       |   589.71
3.833    4.60    0.55      0.737  O      I|       |       |       |   589.76
3.917    4.73    0.56      0.765  O      I|       |       |       |   589.82
4.000    4.93    0.57      0.794  O      I|       |       |       |   589.87
4.083    5.06    0.58      0.825  O      I|       |       |       |   589.93
4.167    5.31    0.59      0.856  O       I       |       |       |   589.99
4.250    5.59    0.60      0.890  O       I       |       |       |   590.06
4.333    5.89    0.62      0.925  O       |I      |       |       |   590.13
4.417    6.20    0.63      0.962  O       |I      |       |       |   590.20
4.500    6.45    0.64      1.002  O       | I     |       |       |   590.27
4.583    6.61    0.65      1.042  |O      | I     |       |       |   590.35
4.667    6.87    0.67      1.084  |O      | I     |       |       |   590.43
4.750    7.17    0.68      1.128  |O      |  I    |       |       |   590.51
4.833    7.41    0.69      1.173  |O      |  I    |       |       |   590.59
4.917    7.57    0.70      1.220  |O      |  I    |       |       |   590.67
5.000    7.83    0.71      1.268  |O      |   I   |       |       |   590.76
5.083    8.62    0.72      1.320  |O      |    I  |       |       |   590.84
5.167   10.74    0.73      1.382  |O      |       I       |       |   590.95
5.250   13.14    0.74      1.459  |O      |       |   I   |       |   591.08
5.333   15.16    0.76      1.551  |O      |       |      I|       |   591.24
5.417   17.34    0.78      1.658  |O      |       |       | I     |   591.43
5.500   20.61    0.82      1.783  |O      |       |       |      I|   591.63
5.583   20.20    0.86      1.918  |O      |       |       |      I|   591.84
5.667   10.75    0.89      2.018  |O      |       I       |       |   592.00
5.750    6.39    0.91      2.071  |O      |I      |       |       |   592.08
5.833    4.26    0.92      2.101  |O    I |       |       |       |   592.13
5.917    3.01    0.92      2.120  |O  I   |       |       |       |   592.16
6.000    1.99    0.92      2.131  |O I    |       |       |       |   592.17
6.083    1.21    0.93      2.135  |O      |       |       |       |   592.18
6.167    0.53    0.93      2.135  IO      |       |       |       |   592.18
6.250    0.22    0.92      2.131  IO      |       |       |       |   592.17
6.333    0.11    0.92      2.126  IO      |       |       |       |   592.17
6.417    0.06    0.92      2.120  IO      |       |       |       |   592.16
6.500    0.03    0.92      2.114  IO      |       |       |       |   592.15
6.583    0.01    0.92      2.108  IO      |       |       |       |   592.14
6.667    0.00    0.92      2.102  IO      |       |       |       |   592.13
6.750    0.00    0.91      2.095  IO      |       |       |       |   592.12
6.833    0.00    0.91      2.089  IO      |       |       |       |   592.11
6.917    0.00    0.91      2.083  IO      |       |       |       |   592.10
7.000    0.00    0.91      2.077  IO      |       |       |       |   592.09
7.083    0.00    0.91      2.070  IO      |       |       |       |   592.08
7.167    0.00    0.90      2.064  IO      |       |       |       |   592.07
7.250    0.00    0.90      2.058  IO      |       |       |       |   592.06
7.333    0.00    0.90      2.052  IO      |       |       |       |   592.05
7.417    0.00    0.90      2.046  IO      |       |       |       |   592.04
7.500    0.00    0.90      2.039  IO      |       |       |       |   592.03
7.583    0.00    0.89      2.033  IO      |       |       |       |   592.02
7.667    0.00    0.89      2.027  IO      |       |       |       |   592.01
7.750    0.00    0.89      2.021  IO      |       |       |       |   592.00
7.833    0.00    0.89      2.015  IO      |       |       |       |   591.99
7.917    0.00    0.89      2.009  IO      |       |       |       |   591.98
8.000    0.00    0.88      2.003  IO      |       |       |       |   591.97
8.083    0.00    0.88      1.997  IO      |       |       |       |   591.96
8.167    0.00    0.88      1.990  IO      |       |       |       |   591.95
```

```
   8.250    0.00    0.88      1.984  IO       |         |         |         |    591.94
   8.333    0.00    0.88      1.978  IO       |         |         |         |    591.93
   8.417    0.00    0.88      1.972  IO       |         |         |         |    591.93
   8.500    0.00    0.87      1.966  IO       |         |         |         |    591.92
   8.583    0.00    0.87      1.960  IO       |         |         |         |    591.91
   8.667    0.00    0.87      1.954  IO       |         |         |         |    591.90
   8.750    0.00    0.87      1.948  IO       |         |         |         |    591.89
   8.833    0.00    0.87      1.942  IO       |         |         |         |    591.88
   8.917    0.00    0.86      1.936  IO       |         |         |         |    591.87
   9.000    0.00    0.86      1.930  IO       |         |         |         |    591.86
   9.083    0.00    0.86      1.925  IO       |         |         |         |    591.85
   9.167    0.00    0.86      1.919  IO       |         |         |         |    591.84
   9.250    0.00    0.86      1.913  IO       |         |         |         |    591.83
   9.333    0.00    0.85      1.907  IO       |         |         |         |    591.82
   9.417    0.00    0.85      1.901  IO       |         |         |         |    591.81
   9.500    0.00    0.85      1.895  IO       |         |         |         |    591.80
   9.583    0.00    0.85      1.889  IO       |         |         |         |    591.80
   9.667    0.00    0.85      1.883  IO       |         |         |         |    591.79
   9.750    0.00    0.85      1.878  IO       |         |         |         |    591.78
   9.833    0.00    0.84      1.872  IO       |         |         |         |    591.77
   9.917    0.00    0.84      1.866  IO       |         |         |         |    591.76
  10.000    0.00    0.84      1.860  IO       |         |         |         |    591.75
  10.083    0.00    0.84      1.854  IO       |         |         |         |    591.74
  10.167    0.00    0.84      1.849  IO       |         |         |         |    591.73
  10.250    0.00    0.83      1.843  IO       |         |         |         |    591.72
  10.333    0.00    0.83      1.837  IO       |         |         |         |    591.71
  10.417    0.00    0.83      1.831  IO       |         |         |         |    591.71
  10.500    0.00    0.83      1.826  IO       |         |         |         |    591.70
  10.583    0.00    0.83      1.820  IO       |         |         |         |    591.69
  10.667    0.00    0.83      1.814  IO       |         |         |         |    591.68
  10.750    0.00    0.82      1.809  IO       |         |         |         |    591.67
  10.833    0.00    0.82      1.803  IO       |         |         |         |    591.66
  10.917    0.00    0.82      1.797  IO       |         |         |         |    591.65
  11.000    0.00    0.82      1.792  IO       |         |         |         |    591.64
  11.083    0.00    0.82      1.786  IO       |         |         |         |    591.63
  11.167    0.00    0.82      1.780  IO       |         |         |         |    591.63
  11.250    0.00    0.81      1.775  IO       |         |         |         |    591.62
  11.333    0.00    0.81      1.769  IO       |         |         |         |    591.61
  11.417    0.00    0.81      1.764  IO       |         |         |         |    591.60
  11.500    0.00    0.81      1.758  IO       |         |         |         |    591.59
  11.583    0.00    0.81      1.752  IO       |         |         |         |    591.58
  11.667    0.00    0.80      1.747  IO       |         |         |         |    591.57
  11.750    0.00    0.80      1.741  IO       |         |         |         |    591.56
  11.833    0.00    0.80      1.736  IO       |         |         |         |    591.56
  11.917    0.00    0.80      1.730  IO       |         |         |         |    591.55
  12.000    0.00    0.80      1.725  IO       |         |         |         |    591.54
  12.083    0.00    0.80      1.719  IO       |         |         |         |    591.53
  12.167    0.00    0.79      1.714  IO       |         |         |         |    591.52
  12.250    0.00    0.79      1.708  IO       |         |         |         |    591.51
  12.333    0.00    0.79      1.703  IO       |         |         |         |    591.50
  12.417    0.00    0.79      1.697  IO       |         |         |         |    591.50
  12.500    0.00    0.79      1.692  IO       |         |         |         |    591.49
  12.583    0.00    0.79      1.687  IO       |         |         |         |    591.48
  12.667    0.00    0.79      1.681  IO       |         |         |         |    591.47
  12.750    0.00    0.79      1.676  IO       |         |         |         |    591.46
  12.833    0.00    0.78      1.670  IO       |         |         |         |    591.45
  12.917    0.00    0.78      1.665  IO       |         |         |         |    591.44
```

```
13.000    0.00    0.78      1.660  IO       |       |       |       |   591.43
13.083    0.00    0.78      1.654  IO       |       |       |       |   591.42
13.167    0.00    0.78      1.649  IO       |       |       |       |   591.41
13.250    0.00    0.78      1.643  IO       |       |       |       |   591.40
13.333    0.00    0.78      1.638  IO       |       |       |       |   591.39
13.417    0.00    0.78      1.633  IO       |       |       |       |   591.38
13.500    0.00    0.78      1.627  IO       |       |       |       |   591.37
13.583    0.00    0.78      1.622  IO       |       |       |       |   591.37
13.667    0.00    0.77      1.617  IO       |       |       |       |   591.36
13.750    0.00    0.77      1.611  IO       |       |       |       |   591.35
13.833    0.00    0.77      1.606  IO       |       |       |       |   591.34
13.917    0.00    0.77      1.601  IO       |       |       |       |   591.33
14.000    0.00    0.77      1.595  IO       |       |       |       |   591.32
14.083    0.00    0.77      1.590  IO       |       |       |       |   591.31
14.167    0.00    0.77      1.585  IO       |       |       |       |   591.30
14.250    0.00    0.77      1.580  IO       |       |       |       |   591.29
14.333    0.00    0.77      1.574  IO       |       |       |       |   591.28
14.417    0.00    0.77      1.569  IO       |       |       |       |   591.27
14.500    0.00    0.76      1.564  IO       |       |       |       |   591.27
14.583    0.00    0.76      1.558  IO       |       |       |       |   591.26
14.667    0.00    0.76      1.553  IO       |       |       |       |   591.25
14.750    0.00    0.76      1.548  IO       |       |       |       |   591.24
14.833    0.00    0.76      1.543  IO       |       |       |       |   591.23
14.917    0.00    0.76      1.538  IO       |       |       |       |   591.22
15.000    0.00    0.76      1.532  IO       |       |       |       |   591.21
15.083    0.00    0.76      1.527  IO       |       |       |       |   591.20
15.167    0.00    0.76      1.522  IO       |       |       |       |   591.19
15.250    0.00    0.76      1.517  IO       |       |       |       |   591.18
15.333    0.00    0.75      1.511  IO       |       |       |       |   591.17
15.417    0.00    0.75      1.506  IO       |       |       |       |   591.17
15.500    0.00    0.75      1.501  IO       |       |       |       |   591.16
15.583    0.00    0.75      1.496  IO       |       |       |       |   591.15
15.667    0.00    0.75      1.491  IO       |       |       |       |   591.14
15.750    0.00    0.75      1.486  IO       |       |       |       |   591.13
15.833    0.00    0.75      1.480  IO       |       |       |       |   591.12
15.917    0.00    0.75      1.475  IO       |       |       |       |   591.11
16.000    0.00    0.75      1.470  IO       |       |       |       |   591.10
16.083    0.00    0.75      1.465  IO       |       |       |       |   591.09
16.167    0.00    0.74      1.460  IO       |       |       |       |   591.09
16.250    0.00    0.74      1.455  IO       |       |       |       |   591.08
16.333    0.00    0.74      1.450  IO       |       |       |       |   591.07
16.417    0.00    0.74      1.444  IO       |       |       |       |   591.06
16.500    0.00    0.74      1.439  IO       |       |       |       |   591.05
16.583    0.00    0.74      1.434  IO       |       |       |       |   591.04
16.667    0.00    0.74      1.429  IO       |       |       |       |   591.03
16.750    0.00    0.74      1.424  IO       |       |       |       |   591.02
16.833    0.00    0.74      1.419  IO       |       |       |       |   591.02
16.917    0.00    0.74      1.414  IO       |       |       |       |   591.01
17.000    0.00    0.73      1.409  IO       |       |       |       |   591.00
17.083    0.00    0.73      1.404  IO       |       |       |       |   590.99
17.167    0.00    0.73      1.399  IO       |       |       |       |   590.98
17.250    0.00    0.73      1.394  IO       |       |       |       |   590.97
17.333    0.00    0.73      1.389  IO       |       |       |       |   590.96
17.417    0.00    0.73      1.384  IO       |       |       |       |   590.95
17.500    0.00    0.73      1.379  IO       |       |       |       |   590.95
17.583    0.00    0.73      1.374  IO       |       |       |       |   590.94
17.667    0.00    0.73      1.369  IO       |       |       |       |   590.93
```

```
 17.750    0.00    0.73      1.364  IO       |       |       |       |   590.92
 17.833    0.00    0.73      1.359  IO       |       |       |       |   590.91
 17.917    0.00    0.72      1.354  IO       |       |       |       |   590.90
 18.000    0.00    0.72      1.349  IO       |       |       |       |   590.89
 18.083    0.00    0.72      1.344  IO       |       |       |       |   590.89
 18.167    0.00    0.72      1.339  IO       |       |       |       |   590.88
 18.250    0.00    0.72      1.334  IO       |       |       |       |   590.87
 18.333    0.00    0.72      1.329  IO       |       |       |       |   590.86
 18.417    0.00    0.72      1.324  IO       |       |       |       |   590.85
 18.500    0.00    0.72      1.319  IO       |       |       |       |   590.84
 18.583    0.00    0.72      1.314  IO       |       |       |       |   590.83
 18.667    0.00    0.72      1.309  IO       |       |       |       |   590.83
 18.750    0.00    0.71      1.304  IO       |       |       |       |   590.82
 18.833    0.00    0.71      1.299  IO       |       |       |       |   590.81
 18.917    0.00    0.71      1.294  IO       |       |       |       |   590.80
 19.000    0.00    0.71      1.289  IO       |       |       |       |   590.79
 19.083    0.00    0.71      1.284  IO       |       |       |       |   590.78
 19.167    0.00    0.71      1.280  IO       |       |       |       |   590.78
 19.250    0.00    0.71      1.275  IO       |       |       |       |   590.77
 19.333    0.00    0.71      1.270  IO       |       |       |       |   590.76
 19.417    0.00    0.71      1.265  IO       |       |       |       |   590.75
 19.500    0.00    0.71      1.260  IO       |       |       |       |   590.74
 19.583    0.00    0.71      1.255  IO       |       |       |       |   590.73
 19.667    0.00    0.70      1.250  IO       |       |       |       |   590.72
 19.750    0.00    0.70      1.245  IO       |       |       |       |   590.72
 19.833    0.00    0.70      1.241  IO       |       |       |       |   590.71
 19.917    0.00    0.70      1.236  IO       |       |       |       |   590.70
 20.000    0.00    0.70      1.231  IO       |       |       |       |   590.69
 20.083    0.00    0.70      1.226  IO       |       |       |       |   590.68
 20.167    0.00    0.70      1.221  IO       |       |       |       |   590.67
 20.250    0.00    0.70      1.216  IO       |       |       |       |   590.67
 20.333    0.00    0.70      1.212  IO       |       |       |       |   590.66
 20.417    0.00    0.70      1.207  IO       |       |       |       |   590.65
 20.500    0.00    0.70      1.202  IO       |       |       |       |   590.64
 20.583    0.00    0.69      1.197  IO       |       |       |       |   590.63
 20.667    0.00    0.69      1.193  IO       |       |       |       |   590.63
 20.750    0.00    0.69      1.188  IO       |       |       |       |   590.62
 20.833    0.00    0.69      1.183  IO       |       |       |       |   590.61
 20.917    0.00    0.69      1.178  IO       |       |       |       |   590.60
 21.000    0.00    0.69      1.173  IO       |       |       |       |   590.59
 21.083    0.00    0.69      1.169  IO       |       |       |       |   590.58
 21.167    0.00    0.69      1.164  IO       |       |       |       |   590.58
 21.250    0.00    0.69      1.159  IO       |       |       |       |   590.57
 21.333    0.00    0.69      1.154  IO       |       |       |       |   590.56
 21.417    0.00    0.69      1.150  IO       |       |       |       |   590.55
 21.500    0.00    0.68      1.145  IO       |       |       |       |   590.54
 21.583    0.00    0.68      1.140  IO       |       |       |       |   590.54
 21.667    0.00    0.68      1.136  IO       |       |       |       |   590.53
 21.750    0.00    0.68      1.131  IO       |       |       |       |   590.52
 21.833    0.00    0.68      1.126  IO       |       |       |       |   590.51
 21.917    0.00    0.68      1.122  IO       |       |       |       |   590.50
 22.000    0.00    0.68      1.117  IO       |       |       |       |   590.49
 22.083    0.00    0.68      1.112  IO       |       |       |       |   590.48
 22.167    0.00    0.68      1.108  IO       |       |       |       |   590.48
 22.250    0.00    0.67      1.103  IO       |       |       |       |   590.47
 22.333    0.00    0.67      1.098  IO       |       |       |       |   590.46
 22.417    0.00    0.67      1.094  IO       |       |       |       |   590.45
```

```
22.500    0.00    0.67     1.089  IO       |       |       |       |    590.44
22.583    0.00    0.67     1.084  IO       |       |       |       |    590.43
22.667    0.00    0.67     1.080  IO       |       |       |       |    590.42
22.750    0.00    0.67     1.075  IO       |       |       |       |    590.41
22.833    0.00    0.66     1.071  IO       |       |       |       |    590.41
22.917    0.00    0.66     1.066  IO       |       |       |       |    590.40
23.000    0.00    0.66     1.062  IO       |       |       |       |    590.39
23.083    0.00    0.66     1.057  IO       |       |       |       |    590.38
23.167    0.00    0.66     1.052  IO       |       |       |       |    590.37
23.250    0.00    0.66     1.048  IO       |       |       |       |    590.36
23.333    0.00    0.65     1.043  IO       |       |       |       |    590.35
23.417    0.00    0.65     1.039  IO       |       |       |       |    590.34
23.500    0.00    0.65     1.034  IO       |       |       |       |    590.34
23.583    0.00    0.65     1.030  IO       |       |       |       |    590.33
23.667    0.00    0.65     1.025  IO       |       |       |       |    590.32
23.750    0.00    0.65     1.021  IO       |       |       |       |    590.31
23.833    0.00    0.65     1.016  IO       |       |       |       |    590.30
23.917    0.00    0.64     1.012  IO       |       |       |       |    590.29
24.000    0.00    0.64     1.008  O        |       |       |       |    590.28
24.083    0.00    0.64     1.003  O        |       |       |       |    590.28
24.167    0.00    0.64     0.999  O        |       |       |       |    590.27
24.250    0.00    0.64     0.994  O        |       |       |       |    590.26
24.333    0.00    0.64     0.990  O        |       |       |       |    590.25
24.417    0.00    0.64     0.986  O        |       |       |       |    590.24
24.500    0.00    0.63     0.981  O        |       |       |       |    590.23
24.583    0.00    0.63     0.977  O        |       |       |       |    590.22
24.667    0.00    0.63     0.972  O        |       |       |       |    590.22
24.750    0.00    0.63     0.968  O        |       |       |       |    590.21
24.833    0.00    0.63     0.964  O        |       |       |       |    590.20
24.917    0.00    0.63     0.959  O        |       |       |       |    590.19
25.000    0.00    0.63     0.955  O        |       |       |       |    590.18
25.083    0.00    0.62     0.951  O        |       |       |       |    590.17
25.167    0.00    0.62     0.947  O        |       |       |       |    590.17
25.250    0.00    0.62     0.942  O        |       |       |       |    590.16
25.333    0.00    0.62     0.938  O        |       |       |       |    590.15
25.417    0.00    0.62     0.934  O        |       |       |       |    590.14
25.500    0.00    0.62     0.929  O        |       |       |       |    590.13
25.583    0.00    0.62     0.925  O        |       |       |       |    590.13
25.667    0.00    0.61     0.921  O        |       |       |       |    590.12
25.750    0.00    0.61     0.917  O        |       |       |       |    590.11
25.833    0.00    0.61     0.913  O        |       |       |       |    590.10
25.917    0.00    0.61     0.908  O        |       |       |       |    590.09
26.000    0.00    0.61     0.904  O        |       |       |       |    590.08
26.083    0.00    0.61     0.900  O        |       |       |       |    590.08
26.167    0.00    0.61     0.896  O        |       |       |       |    590.07
26.250    0.00    0.61     0.892  O        |       |       |       |    590.06
26.333    0.00    0.60     0.887  O        |       |       |       |    590.05
26.417    0.00    0.60     0.883  O        |       |       |       |    590.04
26.500    0.00    0.60     0.879  O        |       |       |       |    590.04
26.583    0.00    0.60     0.875  O        |       |       |       |    590.03
26.667    0.00    0.60     0.871  O        |       |       |       |    590.02
26.750    0.00    0.60     0.867  O        |       |       |       |    590.01
26.833    0.00    0.60     0.863  O        |       |       |       |    590.01
26.917    0.00    0.59     0.859  O        |       |       |       |    590.00
27.000    0.00    0.59     0.854  O        |       |       |       |    589.99
27.083    0.00    0.59     0.850  O        |       |       |       |    589.98
27.167    0.00    0.59     0.846  O        |       |       |       |    589.97
```

```
27.250    0.00    0.59      0.842  O       |       |       |       |   589.97
27.333    0.00    0.59      0.838  O       |       |       |       |   589.96
27.417    0.00    0.59      0.834  O       |       |       |       |   589.95
27.500    0.00    0.59      0.830  O       |       |       |       |   589.94
27.583    0.00    0.58      0.826  O       |       |       |       |   589.93
27.667    0.00    0.58      0.822  O       |       |       |       |   589.93
27.750    0.00    0.58      0.818  O       |       |       |       |   589.92
27.833    0.00    0.58      0.814  O       |       |       |       |   589.91
27.917    0.00    0.58      0.810  O       |       |       |       |   589.90
28.000    0.00    0.58      0.806  O       |       |       |       |   589.90
28.083    0.00    0.58      0.802  O       |       |       |       |   589.89
28.167    0.00    0.57      0.798  O       |       |       |       |   589.88
28.250    0.00    0.57      0.794  O       |       |       |       |   589.87
28.333    0.00    0.57      0.790  O       |       |       |       |   589.87
28.417    0.00    0.57      0.786  O       |       |       |       |   589.86
28.500    0.00    0.57      0.782  O       |       |       |       |   589.85
28.583    0.00    0.57      0.778  O       |       |       |       |   589.84
28.667    0.00    0.57      0.775  O       |       |       |       |   589.84
28.750    0.00    0.57      0.771  O       |       |       |       |   589.83
28.833    0.00    0.56      0.767  O       |       |       |       |   589.82
28.917    0.00    0.56      0.763  O       |       |       |       |   589.81
29.000    0.00    0.56      0.759  O       |       |       |       |   589.81
29.083    0.00    0.56      0.755  O       |       |       |       |   589.80
29.167    0.00    0.56      0.751  O       |       |       |       |   589.79
29.250    0.00    0.56      0.747  O       |       |       |       |   589.78
29.333    0.00    0.56      0.744  O       |       |       |       |   589.78
29.417    0.00    0.56      0.740  O       |       |       |       |   589.77
29.500    0.00    0.55      0.736  O       |       |       |       |   589.76
29.583    0.00    0.55      0.732  O       |       |       |       |   589.75
29.667    0.00    0.55      0.728  O       |       |       |       |   589.75
29.750    0.00    0.55      0.724  O       |       |       |       |   589.74
29.833    0.00    0.55      0.721  O       |       |       |       |   589.73
29.917    0.00    0.55      0.717  O       |       |       |       |   589.72
30.000    0.00    0.55      0.713  O       |       |       |       |   589.72
30.083    0.00    0.55      0.709  O       |       |       |       |   589.71
30.167    0.00    0.54      0.706  O       |       |       |       |   589.70
30.250    0.00    0.54      0.702  O       |       |       |       |   589.70
30.333    0.00    0.54      0.698  O       |       |       |       |   589.69
30.417    0.00    0.54      0.694  O       |       |       |       |   589.68
30.500    0.00    0.54      0.691  O       |       |       |       |   589.67
30.583    0.00    0.54      0.687  O       |       |       |       |   589.67
30.667    0.00    0.54      0.683  O       |       |       |       |   589.66
30.750    0.00    0.54      0.680  O       |       |       |       |   589.65
30.833    0.00    0.53      0.676  O       |       |       |       |   589.65
30.917    0.00    0.53      0.672  O       |       |       |       |   589.64
31.000    0.00    0.53      0.669  O       |       |       |       |   589.63
31.083    0.00    0.53      0.665  O       |       |       |       |   589.62
31.167    0.00    0.53      0.661  O       |       |       |       |   589.62
31.250    0.00    0.53      0.658  O       |       |       |       |   589.61
31.333    0.00    0.53      0.654  O       |       |       |       |   589.60
31.417    0.00    0.53      0.650  O       |       |       |       |   589.60
31.500    0.00    0.53      0.647  O       |       |       |       |   589.59
31.583    0.00    0.52      0.643  O       |       |       |       |   589.58
31.667    0.00    0.52      0.639  O       |       |       |       |   589.58
31.750    0.00    0.52      0.636  O       |       |       |       |   589.57
31.833    0.00    0.52      0.632  O       |       |       |       |   589.56
31.917    0.00    0.52      0.629  O       |       |       |       |   589.56
```

```
32.000    0.00    0.52     0.625  O         |         |         |         |    589.55
32.083    0.00    0.52     0.622  O         |         |         |         |    589.54
32.167    0.00    0.52     0.618  O         |         |         |         |    589.53
32.250    0.00    0.51     0.614  O         |         |         |         |    589.53
32.333    0.00    0.51     0.611  O         |         |         |         |    589.52
32.417    0.00    0.51     0.607  O         |         |         |         |    589.51
32.500    0.00    0.51     0.604  O         |         |         |         |    589.51
32.583    0.00    0.51     0.600  O         |         |         |         |    589.50
32.667    0.00    0.51     0.597  O         |         |         |         |    589.48
32.750    0.00    0.51     0.593  O         |         |         |         |    589.46
32.833    0.00    0.51     0.590  O         |         |         |         |    589.43
32.917    0.00    0.50     0.586  O         |         |         |         |    589.41
33.000    0.00    0.50     0.583  O         |         |         |         |    589.39
33.083    0.00    0.50     0.579  O         |         |         |         |    589.36
33.167    0.00    0.50     0.576  O         |         |         |         |    589.34
33.250    0.00    0.50     0.573  O         |         |         |         |    589.32
33.333    0.00    0.50     0.569  O         |         |         |         |    589.29
33.417    0.00    0.49     0.566  O         |         |         |         |    589.27
33.500    0.00    0.49     0.562  O         |         |         |         |    589.25
33.583    0.00    0.49     0.559  O         |         |         |         |    589.23
33.667    0.00    0.49     0.556  O         |         |         |         |    589.20
33.750    0.00    0.49     0.552  O         |         |         |         |    589.18
33.833    0.00    0.49     0.549  O         |         |         |         |    589.16
33.917    0.00    0.48     0.546  O         |         |         |         |    589.14
34.000    0.00    0.48     0.542  O         |         |         |         |    589.11
34.083    0.00    0.48     0.539  O         |         |         |         |    589.09
34.167    0.00    0.48     0.536  O         |         |         |         |    589.07
34.250    0.00    0.48     0.532  O         |         |         |         |    589.05
34.333    0.00    0.48     0.529  O         |         |         |         |    589.03
34.417    0.00    0.48     0.526  O         |         |         |         |    589.00
34.500    0.00    0.47     0.522  O         |         |         |         |    588.98
34.583    0.00    0.47     0.519  O         |         |         |         |    588.96
34.667    0.00    0.47     0.516  O         |         |         |         |    588.94
34.750    0.00    0.47     0.513  O         |         |         |         |    588.92
34.833    0.00    0.47     0.509  O         |         |         |         |    588.90
34.917    0.00    0.47     0.506  O         |         |         |         |    588.88
35.000    0.00    0.46     0.503  O         |         |         |         |    588.85
35.083    0.00    0.46     0.500  O         |         |         |         |    588.83
35.167    0.00    0.46     0.497  O         |         |         |         |    588.81
35.250    0.00    0.46     0.494  O         |         |         |         |    588.79
35.333    0.00    0.46     0.490  O         |         |         |         |    588.77
35.417    0.00    0.46     0.487  O         |         |         |         |    588.75
35.500    0.00    0.46     0.484  O         |         |         |         |    588.73
35.583    0.00    0.45     0.481  O         |         |         |         |    588.71
35.667    0.00    0.45     0.478  O         |         |         |         |    588.69
35.750    0.00    0.45     0.475  O         |         |         |         |    588.66
35.833    0.00    0.45     0.472  O         |         |         |         |    588.64
35.917    0.00    0.45     0.468  O         |         |         |         |    588.62
36.000    0.00    0.45     0.465  O         |         |         |         |    588.60
36.083    0.00    0.45     0.462  O         |         |         |         |    588.58
36.167    0.00    0.44     0.459  O         |         |         |         |    588.56
36.250    0.00    0.44     0.456  O         |         |         |         |    588.54
36.333    0.00    0.44     0.453  O         |         |         |         |    588.52
36.417    0.00    0.44     0.450  O         |         |         |         |    588.50
36.500    0.00    0.44     0.447  O         |         |         |         |    588.48
36.583    0.00    0.44     0.444  O         |         |         |         |    588.46
36.667    0.00    0.44     0.441  O         |         |         |         |    588.44
```

```
 36.750    0.00    0.43     0.438  O        |       |       |       |    588.42
 36.833    0.00    0.43     0.435  O        |       |       |       |    588.40
 36.917    0.00    0.43     0.432  O        |       |       |       |    588.38
 37.000    0.00    0.43     0.429  O        |       |       |       |    588.36
 37.083    0.00    0.43     0.426  O        |       |       |       |    588.34
 37.167    0.00    0.43     0.423  O        |       |       |       |    588.32
 37.250    0.00    0.42     0.420  O        |       |       |       |    588.30
 37.333    0.00    0.42     0.417  O        |       |       |       |    588.28
 37.417    0.00    0.42     0.415  O        |       |       |       |    588.26
 37.500    0.00    0.42     0.412  O        |       |       |       |    588.24
 37.583    0.00    0.42     0.409  O        |       |       |       |    588.23
 37.667    0.00    0.42     0.406  O        |       |       |       |    588.21
 37.750    0.00    0.41     0.403  O        |       |       |       |    588.19
 37.833    0.00    0.41     0.400  O        |       |       |       |    588.17
 37.917    0.00    0.41     0.397  O        |       |       |       |    588.15
 38.000    0.00    0.41     0.395  O        |       |       |       |    588.13
 38.083    0.00    0.41     0.392  O        |       |       |       |    588.11
 38.167    0.00    0.41     0.389  O        |       |       |       |    588.09
 38.250    0.00    0.40     0.386  O        |       |       |       |    588.07
 38.333    0.00    0.40     0.383  O        |       |       |       |    588.06
 38.417    0.00    0.40     0.381  O        |       |       |       |    588.04
 38.500    0.00    0.40     0.378  O        |       |       |       |    588.02
 38.583    0.00    0.40     0.375  O        |       |       |       |    588.00
 38.667    0.00    0.40     0.372  O        |       |       |       |    587.98
 38.750    0.00    0.40     0.370  O        |       |       |       |    587.96
 38.833    0.00    0.39     0.367  O        |       |       |       |    587.95
 38.917    0.00    0.39     0.364  O        |       |       |       |    587.93
 39.000    0.00    0.39     0.362  O        |       |       |       |    587.91
 39.083    0.00    0.39     0.359  O        |       |       |       |    587.89
 39.167    0.00    0.39     0.356  O        |       |       |       |    587.87
 39.250    0.00    0.39     0.354  O        |       |       |       |    587.86
 39.333    0.00    0.38     0.351  O        |       |       |       |    587.84
 39.417    0.00    0.38     0.348  O        |       |       |       |    587.82
 39.500    0.00    0.38     0.346  O        |       |       |       |    587.80
 39.583    0.00    0.38     0.343  O        |       |       |       |    587.79
 39.667    0.00    0.38     0.340  O        |       |       |       |    587.77
 39.750    0.00    0.38     0.338  O        |       |       |       |    587.75
 39.833    0.00    0.38     0.335  O        |       |       |       |    587.73
 39.917    0.00    0.37     0.333  O        |       |       |       |    587.72
 40.000    0.00    0.37     0.330  O        |       |       |       |    587.70
 40.083    0.00    0.37     0.327  O        |       |       |       |    587.68
 40.167    0.00    0.37     0.325  O        |       |       |       |    587.67
 40.250    0.00    0.37     0.322  O        |       |       |       |    587.65
 40.333    0.00    0.37     0.320  O        |       |       |       |    587.63
 40.417    0.00    0.37     0.317  O        |       |       |       |    587.62
 40.500    0.00    0.36     0.315  O        |       |       |       |    587.60
 40.583    0.00    0.36     0.312  O        |       |       |       |    587.58
 40.667    0.00    0.36     0.310  O        |       |       |       |    587.57
 40.750    0.00    0.36     0.307  O        |       |       |       |    587.55
 40.833    0.00    0.36     0.305  O        |       |       |       |    587.53
 40.917    0.00    0.36     0.302  O        |       |       |       |    587.52
 41.000    0.00    0.36     0.300  O        |       |       |       |    587.50
 41.083    0.00    0.35     0.297  O        |       |       |       |    587.48
 41.167    0.00    0.35     0.295  O        |       |       |       |    587.47
 41.250    0.00    0.35     0.293  O        |       |       |       |    587.45
 41.333    0.00    0.35     0.290  O        |       |       |       |    587.43
 41.417    0.00    0.35     0.288  O        |       |       |       |    587.42
```

```
 41.500    0.00    0.35      0.285  O        |        |        |        |   587.40
 41.583    0.00    0.34      0.283  O        |        |        |        |   587.39
 41.667    0.00    0.34      0.281  O        |        |        |        |   587.37
 41.750    0.00    0.34      0.278  O        |        |        |        |   587.36
 41.833    0.00    0.34      0.276  O        |        |        |        |   587.34
 41.917    0.00    0.34      0.274  O        |        |        |        |   587.32
 42.000    0.00    0.33      0.271  O        |        |        |        |   587.31
 42.083    0.00    0.33      0.269  O        |        |        |        |   587.29
 42.167    0.00    0.33      0.267  O        |        |        |        |   587.28
 42.250    0.00    0.33      0.265  O        |        |        |        |   587.26
 42.333    0.00    0.33      0.262  O        |        |        |        |   587.25
 42.417    0.00    0.33      0.260  O        |        |        |        |   587.23
 42.500    0.00    0.32      0.258  O        |        |        |        |   587.22
 42.583    0.00    0.32      0.256  O        |        |        |        |   587.20
 42.667    0.00    0.32      0.253  O        |        |        |        |   587.19
 42.750    0.00    0.32      0.251  O        |        |        |        |   587.17
 42.833    0.00    0.32      0.249  O        |        |        |        |   587.16
 42.917    0.00    0.32      0.247  O        |        |        |        |   587.15
 43.000    0.00    0.31      0.245  O        |        |        |        |   587.13
 43.083    0.00    0.31      0.242  O        |        |        |        |   587.12
 43.167    0.00    0.31      0.240  O        |        |        |        |   587.10
 43.250    0.00    0.31      0.238  O        |        |        |        |   587.09
 43.333    0.00    0.31      0.236  O        |        |        |        |   587.07
 43.417    0.00    0.31      0.234  O        |        |        |        |   587.06
 43.500    0.00    0.30      0.232  O        |        |        |        |   587.05
 43.583    0.00    0.30      0.230  O        |        |        |        |   587.03
 43.667    0.00    0.30      0.228  O        |        |        |        |   587.02
 43.750    0.00    0.30      0.226  O        |        |        |        |   587.00
 43.833    0.00    0.30      0.224  O        |        |        |        |   586.99
 43.917    0.00    0.30      0.221  O        |        |        |        |   586.98
 44.000    0.00    0.30      0.219  O        |        |        |        |   586.96
 44.083    0.00    0.29      0.217  O        |        |        |        |   586.95
 44.167    0.00    0.29      0.215  O        |        |        |        |   586.94
 44.250    0.00    0.29      0.213  O        |        |        |        |   586.92
 44.333    0.00    0.29      0.211  O        |        |        |        |   586.91
 44.417    0.00    0.29      0.209  O        |        |        |        |   586.90
 44.500    0.00    0.29      0.207  O        |        |        |        |   586.88
 44.583    0.00    0.28      0.205  O        |        |        |        |   586.87
 44.667    0.00    0.28      0.203  O        |        |        |        |   586.86
 44.750    0.00    0.28      0.202  O        |        |        |        |   586.84
 44.833    0.00    0.28      0.200  O        |        |        |        |   586.83
 44.917    0.00    0.28      0.198  O        |        |        |        |   586.82
 45.000    0.00    0.28      0.196  O        |        |        |        |   586.81
 45.083    0.00    0.28      0.194  O        |        |        |        |   586.79
 45.167    0.00    0.27      0.192  O        |        |        |        |   586.78
 45.250    0.00    0.27      0.190  O        |        |        |        |   586.77
 45.333    0.00    0.27      0.188  O        |        |        |        |   586.75
 45.417    0.00    0.27      0.186  O        |        |        |        |   586.74
 45.500    0.00    0.27      0.184  O        |        |        |        |   586.73
 45.583    0.00    0.27      0.183  O        |        |        |        |   586.72
 45.667    0.00    0.27      0.181  O        |        |        |        |   586.71
 45.750    0.00    0.26      0.179  O        |        |        |        |   586.69
 45.833    0.00    0.26      0.177  O        |        |        |        |   586.68
 45.917    0.00    0.26      0.175  O        |        |        |        |   586.67
 46.000    0.00    0.26      0.174  O        |        |        |        |   586.66
 46.083    0.00    0.26      0.172  O        |        |        |        |   586.64
 46.167    0.00    0.26      0.170  O        |        |        |        |   586.63
```

```
 46.250    0.00    0.26     0.168  O         |         |         |         |    586.62
 46.333    0.00    0.26     0.166  O         |         |         |         |    586.61
 46.417    0.00    0.25     0.165  O         |         |         |         |    586.60
 46.500    0.00    0.25     0.163  O         |         |         |         |    586.59
 46.583    0.00    0.25     0.161  O         |         |         |         |    586.57
 46.667    0.00    0.25     0.159  O         |         |         |         |    586.56
 46.750    0.00    0.25     0.158  O         |         |         |         |    586.55
 46.833    0.00    0.25     0.156  O         |         |         |         |    586.54
 46.917    0.00    0.25     0.154  O         |         |         |         |    586.53
 47.000    0.00    0.24     0.153  O         |         |         |         |    586.52
 47.083    0.00    0.24     0.151  O         |         |         |         |    586.51
 47.167    0.00    0.24     0.149  O         |         |         |         |    586.50
 47.250    0.00    0.24     0.148  O         |         |         |         |    586.48
 47.333    0.00    0.24     0.146  O         |         |         |         |    586.47
 47.417    0.00    0.23     0.144  O         |         |         |         |    586.46
 47.500    0.00    0.23     0.143  O         |         |         |         |    586.45
 47.583    0.00    0.23     0.141  O         |         |         |         |    586.44
 47.667    0.00    0.23     0.140  O         |         |         |         |    586.43
 47.750    0.00    0.22     0.138  O         |         |         |         |    586.42
 47.833    0.00    0.22     0.137  O         |         |         |         |    586.41
 47.917    0.00    0.22     0.135  O         |         |         |         |    586.40
 48.000    0.00    0.22     0.134  O         |         |         |         |    586.39
 48.083    0.00    0.21     0.132  O         |         |         |         |    586.38
 48.167    0.00    0.21     0.131  O         |         |         |         |    586.37
 48.250    0.00    0.21     0.129  O         |         |         |         |    586.36
 48.333    0.00    0.21     0.128  O         |         |         |         |    586.35
 48.417    0.00    0.20     0.126  O         |         |         |         |    586.34
 48.500    0.00    0.20     0.125  O         |         |         |         |    586.33
 48.583    0.00    0.20     0.123  O         |         |         |         |    586.32
 48.667    0.00    0.20     0.122  O         |         |         |         |    586.31
 48.750    0.00    0.20     0.121  O         |         |         |         |    586.30
 48.833    0.00    0.19     0.119  O         |         |         |         |    586.29
 48.917    0.00    0.19     0.118  O         |         |         |         |    586.29
 49.000    0.00    0.19     0.117  O         |         |         |         |    586.28
 49.083    0.00    0.19     0.116  O         |         |         |         |    586.27
 49.167    0.00    0.18     0.114  O         |         |         |         |    586.26
 49.250    0.00    0.18     0.113  O         |         |         |         |    586.25
 49.333    0.00    0.18     0.112  O         |         |         |         |    586.24
 49.417    0.00    0.18     0.110  O         |         |         |         |    586.23
 49.500    0.00    0.18     0.109  O         |         |         |         |    586.23
 49.583    0.00    0.17     0.108  O         |         |         |         |    586.22
 49.667    0.00    0.17     0.107  O         |         |         |         |    586.21
 49.750    0.00    0.17     0.106  O         |         |         |         |    586.20
 49.833    0.00    0.17     0.104  O         |         |         |         |    586.19
 49.917    0.00    0.17     0.103  O         |         |         |         |    586.19
 50.000    0.00    0.17     0.102  O         |         |         |         |    586.18
 50.083    0.00    0.16     0.101  O         |         |         |         |    586.17
 50.167    0.00    0.16     0.100  O         |         |         |         |    586.16
 50.250    0.00    0.16     0.099  O         |         |         |         |    586.16
 50.333    0.00    0.16     0.098  O         |         |         |         |    586.15
 50.417    0.00    0.16     0.097  O         |         |         |         |    586.14
 50.500    0.00    0.15     0.096  O         |         |         |         |    586.13
 50.583    0.00    0.15     0.095  O         |         |         |         |    586.13
 50.667    0.00    0.15     0.093  O         |         |         |         |    586.12
 50.750    0.00    0.15     0.092  O         |         |         |         |    586.11
 50.833    0.00    0.15     0.091  O         |         |         |         |    586.11
 50.917    0.00    0.15     0.090  O         |         |         |         |    586.10
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
   51.000    0.00    0.14      0.089  O        |       |       |       |    586.09
   51.083    0.00    0.14      0.088  O        |       |       |       |    586.09
   51.167    0.00    0.14      0.087  O        |       |       |       |    586.08
   51.250    0.00    0.14      0.086  O        |       |       |       |    586.07
   51.333    0.00    0.14      0.085  O        |       |       |       |    586.07
   51.417    0.00    0.14      0.085  O        |       |       |       |    586.06
   51.500    0.00    0.14      0.084  O        |       |       |       |    586.05
   51.583    0.00    0.13      0.083  O        |       |       |       |    586.05
   51.667    0.00    0.13      0.082  O        |       |       |       |    586.04
   51.750    0.00    0.13      0.081  O        |       |       |       |    586.04
   51.833    0.00    0.13      0.080  O        |       |       |       |    586.03
   51.917    0.00    0.13      0.079  O        |       |       |       |    586.02
   52.000    0.00    0.13      0.078  O        |       |       |       |    586.02
   52.083    0.00    0.12      0.077  O        |       |       |       |    586.01
   52.167    0.00    0.12      0.076  O        |       |       |       |    586.01
   52.250    0.00    0.12      0.076  O        |       |       |       |    586.00
   52.333    0.00    0.12      0.075  O        |       |       |       |    586.00
   52.417    0.00    0.12      0.074  O        |       |       |       |    585.99
   52.500    0.00    0.12      0.073  O        |       |       |       |    585.98
   52.583    0.00    0.12      0.072  O        |       |       |       |    585.98
   52.667    0.00    0.12      0.072  O        |       |       |       |    585.97
   52.750    0.00    0.11      0.071  O        |       |       |       |    585.97
   52.833    0.00    0.11      0.070  O        |       |       |       |    585.96
   52.917    0.00    0.11      0.069  O        |       |       |       |    585.96
   53.000    0.00    0.11      0.068  O        |       |       |       |    585.95
   53.083    0.00    0.11      0.068  O        |       |       |       |    585.95
   53.167    0.00    0.11      0.067  O        |       |       |       |    585.94
   53.250    0.00    0.11      0.066  O        |       |       |       |    585.94
   53.333    0.00    0.11      0.065  O        |       |       |       |    585.93
   53.417    0.00    0.10      0.065  O        |       |       |       |    585.93
   53.500    0.00    0.10      0.064  O        |       |       |       |    585.92
   53.583    0.00    0.10      0.063  O        |       |       |       |    585.92
   53.667    0.00    0.10      0.063  O        |       |       |       |    585.91
   53.750    0.00    0.10      0.062  O        |       |       |       |    585.91
   53.833    0.00    0.10      0.061  O        |       |       |       |    585.90
   53.917    0.00    0.10      0.061  O        |       |       |       |    585.90
   54.000    0.00    0.10      0.060  O        |       |       |       |    585.90
   54.083    0.00    0.10      0.059  O        |       |       |       |    585.89
   54.167    0.00    0.09      0.059  O        |       |       |       |    585.89
   54.250    0.00    0.09      0.058  O        |       |       |       |    585.88
   54.333    0.00    0.09      0.057  O        |       |       |       |    585.88
   54.417    0.00    0.09      0.057  O        |       |       |       |    585.87
   54.500    0.00    0.09      0.056  O        |       |       |       |    585.87
   54.583    0.00    0.09      0.055  O        |       |       |       |    585.87
   54.667    0.00    0.09      0.055  O        |       |       |       |    585.86
   54.750    0.00    0.09      0.054  O        |       |       |       |    585.86
   54.833    0.00    0.09      0.054  O        |       |       |       |    585.85
   54.917    0.00    0.09      0.053  O        |       |       |       |    585.85
   55.000    0.00    0.08      0.052  O        |       |       |       |    585.85
   55.083    0.00    0.08      0.052  O        |       |       |       |    585.84
   55.167    0.00    0.08      0.051  O        |       |       |       |    585.84
   55.250    0.00    0.08      0.051  O        |       |       |       |    585.83
   55.333    0.00    0.08      0.050  O        |       |       |       |    585.83
   55.417    0.00    0.08      0.050  O        |       |       |       |    585.83
   55.500    0.00    0.08      0.049  O        |       |       |       |    585.82
   55.583    0.00    0.08      0.048  O        |       |       |       |    585.82
   55.667    0.00    0.08      0.048  O        |       |       |       |    585.82
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 55.750     0.00     0.08       0.047  O        |        |        |        |     585.81
 55.833     0.00     0.08       0.047  O        |        |        |        |     585.81
 55.917     0.00     0.07       0.046  O        |        |        |        |     585.80
 56.000     0.00     0.07       0.046  O        |        |        |        |     585.80
 56.083     0.00     0.07       0.045  O        |        |        |        |     585.80
 56.167     0.00     0.07       0.045  O        |        |        |        |     585.79
 56.250     0.00     0.07       0.044  O        |        |        |        |     585.79
 56.333     0.00     0.07       0.044  O        |        |        |        |     585.79
 56.417     0.00     0.07       0.043  O        |        |        |        |     585.78
 56.500     0.00     0.07       0.043  O        |        |        |        |     585.78
 56.583     0.00     0.07       0.042  O        |        |        |        |     585.78
 56.667     0.00     0.07       0.042  O        |        |        |        |     585.78
 56.750     0.00     0.07       0.042  O        |        |        |        |     585.77
 56.833     0.00     0.07       0.041  O        |        |        |        |     585.77
 56.917     0.00     0.07       0.041  O        |        |        |        |     585.77
 57.000     0.00     0.06       0.040  O        |        |        |        |     585.76
 57.083     0.00     0.06       0.040  O        |        |        |        |     585.76
 57.167     0.00     0.06       0.039  O        |        |        |        |     585.76
 57.250     0.00     0.06       0.039  O        |        |        |        |     585.75
 57.333     0.00     0.06       0.038  O        |        |        |        |     585.75
 57.417     0.00     0.06       0.038  O        |        |        |        |     585.75
 57.500     0.00     0.06       0.038  O        |        |        |        |     585.75
 57.583     0.00     0.06       0.037  O        |        |        |        |     585.74
 57.667     0.00     0.06       0.037  O        |        |        |        |     585.74
 57.750     0.00     0.06       0.036  O        |        |        |        |     585.74
 57.833     0.00     0.06       0.036  O        |        |        |        |     585.73
 57.917     0.00     0.06       0.036  O        |        |        |        |     585.73
 58.000     0.00     0.06       0.035  O        |        |        |        |     585.73
 58.083     0.00     0.06       0.035  O        |        |        |        |     585.73
 58.167     0.00     0.06       0.034  O        |        |        |        |     585.72
 58.250     0.00     0.05       0.034  O        |        |        |        |     585.72
 58.333     0.00     0.05       0.034  O        |        |        |        |     585.72
 58.417     0.00     0.05       0.033  O        |        |        |        |     585.72
 58.500     0.00     0.05       0.033  O        |        |        |        |     585.71
 58.583     0.00     0.05       0.033  O        |        |        |        |     585.71
 58.667     0.00     0.05       0.032  O        |        |        |        |     585.71
 58.750     0.00     0.05       0.032  O        |        |        |        |     585.71
 58.833     0.00     0.05       0.031  O        |        |        |        |     585.70
 58.917     0.00     0.05       0.031  O        |        |        |        |     585.70
 59.000     0.00     0.05       0.031  O        |        |        |        |     585.70
 59.083     0.00     0.05       0.030  O        |        |        |        |     585.70
 59.167     0.00     0.05       0.030  O        |        |        |        |     585.70
 59.250     0.00     0.05       0.030  O        |        |        |        |     585.69
 59.333     0.00     0.05       0.029  O        |        |        |        |     585.69
 59.417     0.00     0.05       0.029  O        |        |        |        |     585.69
 59.500     0.00     0.05       0.029  O        |        |        |        |     585.69
 59.583     0.00     0.05       0.029  O        |        |        |        |     585.68
 59.667     0.00     0.05       0.028  O        |        |        |        |     585.68
 59.750     0.00     0.04       0.028  O        |        |        |        |     585.68
 59.833     0.00     0.04       0.028  O        |        |        |        |     585.68
 59.917     0.00     0.04       0.027  O        |        |        |        |     585.68
 60.000     0.00     0.04       0.027  O        |        |        |        |     585.67
 60.083     0.00     0.04       0.027  O        |        |        |        |     585.67
 60.167     0.00     0.04       0.026  O        |        |        |        |     585.67
 60.250     0.00     0.04       0.026  O        |        |        |        |     585.67
 60.333     0.00     0.04       0.026  O        |        |        |        |     585.67
 60.417     0.00     0.04       0.026  O        |        |        |        |     585.66
```

```
 60.500    0.00    0.04     0.025  O        |       |       |       |    585.66
 60.583    0.00    0.04     0.025  O        |       |       |       |    585.66
 60.667    0.00    0.04     0.025  O        |       |       |       |    585.66
 60.750    0.00    0.04     0.024  O        |       |       |       |    585.66
 60.833    0.00    0.04     0.024  O        |       |       |       |    585.66
 60.917    0.00    0.04     0.024  O        |       |       |       |    585.65
 61.000    0.00    0.04     0.024  O        |       |       |       |    585.65
 61.083    0.00    0.04     0.023  O        |       |       |       |    585.65
 61.167    0.00    0.04     0.023  O        |       |       |       |    585.65
 61.250    0.00    0.04     0.023  O        |       |       |       |    585.65
 61.333    0.00    0.04     0.023  O        |       |       |       |    585.65
 61.417    0.00    0.04     0.022  O        |       |       |       |    585.64
 61.500    0.00    0.04     0.022  O        |       |       |       |    585.64
 61.583    0.00    0.03     0.022  O        |       |       |       |    585.64
 61.667    0.00    0.03     0.022  O        |       |       |       |    585.64
 61.750    0.00    0.03     0.021  O        |       |       |       |    585.64
 61.833    0.00    0.03     0.021  O        |       |       |       |    585.64
 61.917    0.00    0.03     0.021  O        |       |       |       |    585.63
 62.000    0.00    0.03     0.021  O        |       |       |       |    585.63
 62.083    0.00    0.03     0.020  O        |       |       |       |    585.63
 62.167    0.00    0.03     0.020  O        |       |       |       |    585.63
 62.250    0.00    0.03     0.020  O        |       |       |       |    585.63
 62.333    0.00    0.03     0.020  O        |       |       |       |    585.63
 62.417    0.00    0.03     0.020  O        |       |       |       |    585.62
 62.500    0.00    0.03     0.019  O        |       |       |       |    585.62
 62.583    0.00    0.03     0.019  O        |       |       |       |    585.62
 62.667    0.00    0.03     0.019  O        |       |       |       |    585.62
 62.750    0.00    0.03     0.019  O        |       |       |       |    585.62
 62.833    0.00    0.03     0.019  O        |       |       |       |    585.62
 62.917    0.00    0.03     0.018  O        |       |       |       |    585.62
 63.000    0.00    0.03     0.018  O        |       |       |       |    585.62
 63.083    0.00    0.03     0.018  O        |       |       |       |    585.61
 63.167    0.00    0.03     0.018  O        |       |       |       |    585.61
 63.250    0.00    0.03     0.018  O        |       |       |       |    585.61
 63.333    0.00    0.03     0.017  O        |       |       |       |    585.61
 63.417    0.00    0.03     0.017  O        |       |       |       |    585.61
 63.500    0.00    0.03     0.017  O        |       |       |       |    585.61
 63.583    0.00    0.03     0.017  O        |       |       |       |    585.61
 63.667    0.00    0.03     0.017  O        |       |       |       |    585.60
 63.750    0.00    0.03     0.016  O        |       |       |       |    585.60
 63.833    0.00    0.03     0.016  O        |       |       |       |    585.60
 63.917    0.00    0.03     0.016  O        |       |       |       |    585.60
 64.000    0.00    0.03     0.016  O        |       |       |       |    585.60
 64.083    0.00    0.02     0.016  O        |       |       |       |    585.60
 64.167    0.00    0.02     0.016  O        |       |       |       |    585.60
 64.250    0.00    0.02     0.015  O        |       |       |       |    585.60
 64.333    0.00    0.02     0.015  O        |       |       |       |    585.60
 64.417    0.00    0.02     0.015  O        |       |       |       |    585.59
 64.500    0.00    0.02     0.015  O        |       |       |       |    585.59
 64.583    0.00    0.02     0.015  O        |       |       |       |    585.59
 64.667    0.00    0.02     0.015  O        |       |       |       |    585.59
 64.750    0.00    0.02     0.014  O        |       |       |       |    585.59
 64.833    0.00    0.02     0.014  O        |       |       |       |    585.59
 64.917    0.00    0.02     0.014  O        |       |       |       |    585.59
 65.000    0.00    0.02     0.014  O        |       |       |       |    585.59
 65.083    0.00    0.02     0.014  O        |       |       |       |    585.59
 65.167    0.00    0.02     0.014  O        |       |       |       |    585.59
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
  65.250     0.00     0.02      0.014  O        |        |        |        |    585.58
  65.333     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.417     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.500     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.583     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.667     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.750     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.833     0.00     0.02      0.013  O        |        |        |        |    585.58
  65.917     0.00     0.02      0.012  O        |        |        |        |    585.58
  66.000     0.00     0.02      0.012  O        |        |        |        |    585.58
  66.083     0.00     0.02      0.012  O        |        |        |        |    585.57
  66.167     0.00     0.02      0.012  O        |        |        |        |    585.57
  66.250     0.00     0.02      0.012  O        |        |        |        |    585.57
  66.333     0.00     0.02      0.012  O        |        |        |        |    585.57
  66.417     0.00     0.02      0.012  O        |        |        |        |    585.57
  66.500     0.00     0.02      0.011  O        |        |        |        |    585.57
  66.583     0.00     0.02      0.011  O        |        |        |        |    585.57
  66.667     0.00     0.02      0.011  O        |        |        |        |    585.57
  66.750     0.00     0.02      0.011  O        |        |        |        |    585.57
  66.833     0.00     0.02      0.011  O        |        |        |        |    585.57
  66.917     0.00     0.02      0.011  O        |        |        |        |    585.57
  67.000     0.00     0.02      0.011  O        |        |        |        |    585.57
  67.083     0.00     0.02      0.011  O        |        |        |        |    585.56
  67.167     0.00     0.02      0.011  O        |        |        |        |    585.56
  67.250     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.333     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.417     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.500     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.583     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.667     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.750     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.833     0.00     0.02      0.010  O        |        |        |        |    585.56
  67.917     0.00     0.01      0.010  O        |        |        |        |    585.56
  68.000     0.00     0.01      0.009  O        |        |        |        |    585.56
  68.083     0.00     0.01      0.009  O        |        |        |        |    585.56
  68.167     0.00     0.01      0.009  O        |        |        |        |    585.56
  68.250     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.333     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.417     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.500     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.583     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.667     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.750     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.833     0.00     0.01      0.009  O        |        |        |        |    585.55
  68.917     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.000     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.083     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.167     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.250     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.333     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.417     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.500     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.583     0.00     0.01      0.008  O        |        |        |        |    585.55
  69.667     0.00     0.01      0.008  O        |        |        |        |    585.54
  69.750     0.00     0.01      0.008  O        |        |        |        |    585.54
  69.833     0.00     0.01      0.007  O        |        |        |        |    585.54
  69.917     0.00     0.01      0.007  O        |        |        |        |    585.54
```

```
 70.000    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.083    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.167    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.250    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.333    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.417    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.500    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.583    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.667    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.750    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.833    0.00    0.01      0.007  O          |         |         |         |    585.54
 70.917    0.00    0.01      0.007  O          |         |         |         |    585.54
 71.000    0.00    0.01      0.006  O          |         |         |         |    585.54
 71.083    0.00    0.01      0.006  O          |         |         |         |    585.54
 71.167    0.00    0.01      0.006  O          |         |         |         |    585.54
 71.250    0.00    0.01      0.006  O          |         |         |         |    585.54
 71.333    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.417    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.500    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.583    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.667    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.750    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.833    0.00    0.01      0.006  O          |         |         |         |    585.53
 71.917    0.00    0.01      0.006  O          |         |         |         |    585.53
 72.000    0.00    0.01      0.006  O          |         |         |         |    585.53
 72.083    0.00    0.01      0.006  O          |         |         |         |    585.53
 72.167    0.00    0.01      0.006  O          |         |         |         |    585.53
 72.250    0.00    0.01      0.006  O          |         |         |         |    585.53
 72.333    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.417    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.500    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.583    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.667    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.750    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.833    0.00    0.01      0.005  O          |         |         |         |    585.53
 72.917    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.000    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.083    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.167    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.250    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.333    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.417    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.500    0.00    0.01      0.005  O          |         |         |         |    585.53
 73.583    0.00    0.01      0.005  O          |         |         |         |    585.52
 73.667    0.00    0.01      0.005  O          |         |         |         |    585.52
 73.750    0.00    0.01      0.005  O          |         |         |         |    585.52
 73.833    0.00    0.01      0.005  O          |         |         |         |    585.52
 73.917    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.000    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.083    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.167    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.250    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.333    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.417    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.500    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.583    0.00    0.01      0.004  O          |         |         |         |    585.52
 74.667    0.00    0.01      0.004  O          |         |         |         |    585.52
```

```
 74.750     0.00     0.01       0.004  O        |        |        |        |   585.52
 74.833     0.00     0.01       0.004  O        |        |        |        |   585.52
 74.917     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.000     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.083     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.167     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.250     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.333     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.417     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.500     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.583     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.667     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.750     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.833     0.00     0.01       0.004  O        |        |        |        |   585.52
 75.917     0.00     0.01       0.004  O        |        |        |        |   585.52
 76.000     0.00     0.01       0.003  O        |        |        |        |   585.52
 76.083     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.167     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.250     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.333     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.417     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.500     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.583     0.00     0.00       0.003  O        |        |        |        |   585.52
 76.667     0.00     0.00       0.003  O        |        |        |        |   585.51
 76.750     0.00     0.00       0.003  O        |        |        |        |   585.51
 76.833     0.00     0.00       0.003  O        |        |        |        |   585.51
 76.917     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.000     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.083     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.167     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.250     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.333     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.417     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.500     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.583     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.667     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.750     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.833     0.00     0.00       0.003  O        |        |        |        |   585.51
 77.917     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.000     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.083     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.167     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.250     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.333     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.417     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.500     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.583     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.667     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.750     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.833     0.00     0.00       0.003  O        |        |        |        |   585.51
 78.917     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.000     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.083     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.167     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.250     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.333     0.00     0.00       0.002  O        |        |        |        |   585.51
 79.417     0.00     0.00       0.002  O        |        |        |        |   585.51
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 79.500    0.00    0.00      0.002  O        |        |        |        |    585.51
 79.583    0.00    0.00      0.002  O        |        |        |        |    585.51
 79.667    0.00    0.00      0.002  O        |        |        |        |    585.51
 79.750    0.00    0.00      0.002  O        |        |        |        |    585.51
 79.833    0.00    0.00      0.002  O        |        |        |        |    585.51
 79.917    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.000    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.083    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.167    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.250    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.333    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.417    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.500    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.583    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.667    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.750    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.833    0.00    0.00      0.002  O        |        |        |        |    585.51
 80.917    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.000    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.083    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.167    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.250    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.333    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.417    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.500    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.583    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.667    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.750    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.833    0.00    0.00      0.002  O        |        |        |        |    585.51
 81.917    0.00    0.00      0.002  O        |        |        |        |    585.51
 82.000    0.00    0.00      0.002  O        |        |        |        |    585.51
 82.083    0.00    0.00      0.002  O        |        |        |        |    585.51
 82.167    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.250    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.333    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.417    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.500    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.583    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.667    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.750    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.833    0.00    0.00      0.002  O        |        |        |        |    585.50
 82.917    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.000    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.083    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.167    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.250    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.333    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.417    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.500    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.583    0.00    0.00      0.002  O        |        |        |        |    585.50
 83.667    0.00    0.00      0.001  O        |        |        |        |    585.50
 83.750    0.00    0.00      0.001  O        |        |        |        |    585.50
 83.833    0.00    0.00      0.001  O        |        |        |        |    585.50
 83.917    0.00    0.00      0.001  O        |        |        |        |    585.50
 84.000    0.00    0.00      0.001  O        |        |        |        |    585.50
 84.083    0.00    0.00      0.001  O        |        |        |        |    585.50
 84.167    0.00    0.00      0.001  O        |        |        |        |    585.50
```

```
   84.250    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.333    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.417    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.500    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.583    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.667    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.750    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.833    0.00    0.00     0.001  O       |       |       |       |   585.50
   84.917    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.000    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.083    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.167    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.250    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.333    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.417    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.500    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.583    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.667    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.750    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.833    0.00    0.00     0.001  O       |       |       |       |   585.50
   85.917    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.000    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.083    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.167    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.250    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.333    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.417    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.500    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.583    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.667    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.750    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.833    0.00    0.00     0.001  O       |       |       |       |   585.50
   86.917    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.000    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.083    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.167    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.250    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.333    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.417    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.500    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.583    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.667    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.750    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.833    0.00    0.00     0.001  O       |       |       |       |   585.50
   87.917    0.00    0.00     0.001  O       |       |       |       |   585.50
   88.000    0.00    0.00     0.001  O       |       |       |       |   585.50
   88.083    0.00    0.00     0.001  O       |       |       |       |   584.06

        ****************************HYDROGRAPH DATA****************************
                    Number of intervals =  1057
                    Time interval =    5.0 (Min.)
                    Maximum/Peak flow rate =        0.926 (CFS)
                    Total volume =       2.382 (Ac.Ft)
              Status of hydrographs being held in storage
                         Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
              Peak (CFS)      0.000     0.000     0.000     0.000     0.000
              Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
```

```
                  FLOOD HYDROGRAPH ROUTING PROGRAM
         Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
                     Study date: 10/28/21

---------------------------------------------------------------------
```

TTM 31589
10-Year 24-Hour Flood Hydrograph Basin Routing
Developed Condition

```
--------------------------------------------------------------------


Program License Serial Number 6194

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

            From study/file name: tr31589prop2410.rte
****************************HYDROGRAPH DATA****************************
            Number of intervals =   296
            Time interval =    5.0 (Min.)
            Maximum/Peak flow rate =        5.916 (CFS)
            Total volume =       3.612 (Ac.Ft)
      Status of hydrographs being held in storage
                 Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
      Peak (CFS)      0.000     0.000     0.000     0.000     0.000
      Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.000 to Point/Station        2.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 296
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
    0.000      0.000      0.000      0.000        0.000
```

```
       585.500      0.001      0.001      0.001        0.001
       586.500      0.150      0.240      0.149        0.151
       587.500      0.300      0.360      0.299        0.301
       588.500      0.450      0.440      0.448        0.452
       589.500      0.600      0.510      0.598        0.602
       590.500      1.120      0.680      1.118        1.122
       591.500      1.700      0.790      1.697        1.703
       592.500      2.340      0.990      2.337        2.343
       593.500      3.040    101.020      2.692        3.388
     --------------------------------------------------------------------
                 Hydrograph Detention Basin Routing
     ---------------------------------------------------------------------

     Graph values: 'I'= unit inflow; 'O'=outflow at time shown
     ---------------------------------------------------------------------
 Time      Inflow  Outflow    Storage                                     Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       1.5    2.96    4.44    5.92 (Ft.)
 0.083    0.07    0.00      0.000  O        |       |       |       |   134.42
 0.167    0.24    0.00      0.001  OI       |       |       |       |   585.50
 0.250    0.29    0.00      0.003  OI       |       |       |       |   585.51
 0.333    0.35    0.01      0.005  OI       |       |       |       |   585.53
 0.417    0.45    0.01      0.008  O I      |       |       |       |   585.55
 0.500    0.48    0.02      0.011  O I      |       |       |       |   585.57
 0.583    0.50    0.02      0.014  O I      |       |       |       |   585.59
 0.667    0.51    0.03      0.018  O I      |       |       |       |   585.61
 0.750    0.52    0.03      0.021  O I      |       |       |       |   585.63
 0.833    0.56    0.04      0.024  O  I     |       |       |       |   585.66
 0.917    0.64    0.04      0.028  O  I     |       |       |       |   585.68
 1.000    0.67    0.05      0.032  O  I     |       |       |       |   585.71
 1.083    0.65    0.06      0.037  O  I     |       |       |       |   585.74
 1.167    0.57    0.06      0.040  O  I     |       |       |       |   585.76
 1.250    0.55    0.07      0.044  O I      |       |       |       |   585.79
 1.333    0.54    0.07      0.047  O I      |       |       |       |   585.81
 1.417    0.53    0.08      0.050  O I      |       |       |       |   585.83
 1.500    0.53    0.08      0.053  O I      |       |       |       |   585.85
 1.583    0.53    0.09      0.056  O I      |       |       |       |   585.87
 1.667    0.53    0.09      0.059  O I      |       |       |       |   585.89
 1.750    0.52    0.10      0.062  O I      |       |       |       |   585.91
 1.833    0.56    0.10      0.065  O  I     |       |       |       |   585.93
 1.917    0.64    0.11      0.069  O  I     |       |       |       |   585.95
 2.000    0.67    0.12      0.072  O  I     |       |       |       |   585.98
 2.083    0.68    0.12      0.076  O  I     |       |       |       |   586.00
 2.167    0.69    0.13      0.080  O  I     |       |       |       |   586.03
 2.250    0.69    0.13      0.084  O  I     |       |       |       |   586.06
 2.333    0.70    0.14      0.088  O  I     |       |       |       |   586.08
 2.417    0.70    0.15      0.092  O  I     |       |       |       |   586.11
 2.500    0.70    0.15      0.095  O  I     |       |       |       |   586.13
 2.583    0.73    0.16      0.099  O  I     |       |       |       |   586.16
 2.667    0.82    0.17      0.103  O   I    |       |       |       |   586.19
 2.750    0.84    0.17      0.108  O   I    |       |       |       |   586.22
 2.833    0.86    0.18      0.113  O   I    |       |       |       |   586.25
 2.917    0.86    0.19      0.117  |O  I    |       |       |       |   586.28
 3.000    0.87    0.20      0.122  |O  I    |       |       |       |   586.31
 3.083    0.87    0.20      0.127  |O  I    |       |       |       |   586.34
 3.167    0.87    0.21      0.131  |O  I    |       |       |       |   586.37
 3.250    0.87    0.22      0.136  |O  I    |       |       |       |   586.40
 3.333    0.87    0.22      0.140  |O  I    |       |       |       |   586.43
```

```
3.417    0.87    0.23      0.145  |O  I   |       |       |       |   586.46
3.500    0.87    0.24      0.149  |O  I   |       |       |       |   586.49
3.583    0.87    0.24      0.153  |O  I   |       |       |       |   586.52
3.667    0.87    0.25      0.158  |O  I   |       |       |       |   586.55
3.750    0.87    0.25      0.162  |O  I   |       |       |       |   586.58
3.833    0.91    0.25      0.167  |O  I   |       |       |       |   586.61
3.917    0.99    0.26      0.171  |O   I  |       |       |       |   586.64
4.000    1.02    0.26      0.176  |O   I  |       |       |       |   586.68
4.083    1.03    0.27      0.182  |O   I  |       |       |       |   586.71
4.167    1.04    0.27      0.187  |O   I  |       |       |       |   586.75
4.250    1.04    0.27      0.192  |O   I  |       |       |       |   586.78
4.333    1.08    0.28      0.198  |O   I  |       |       |       |   586.82
4.417    1.17    0.28      0.203  |O    I |       |       |       |   586.86
4.500    1.19    0.29      0.210  |O    I |       |       |       |   586.90
4.583    1.21    0.29      0.216  |O    I |       |       |       |   586.94
4.667    1.21    0.30      0.222  |O    I |       |       |       |   586.98
4.750    1.22    0.30      0.229  |O    I |       |       |       |   587.02
4.833    1.25    0.31      0.235  |O    I |       |       |       |   587.07
4.917    1.34    0.31      0.242  |O     I|       |       |       |   587.11
5.000    1.37    0.32      0.249  |O     I|       |       |       |   587.16
5.083    1.31    0.32      0.256  |O     I|       |       |       |   587.21
5.167    1.15    0.33      0.262  |O    I |       |       |       |   587.25
5.250    1.10    0.33      0.268  |O   I  |       |       |       |   587.28
5.333    1.11    0.34      0.273  |O    I |       |       |       |   587.32
5.417    1.19    0.34      0.279  |O    I |       |       |       |   587.36
5.500    1.21    0.35      0.284  |O    I |       |       |       |   587.40
5.583    1.25    0.35      0.290  |O    I |       |       |       |   587.44
5.667    1.33    0.36      0.297  |O     I|       |       |       |   587.48
5.750    1.36    0.36      0.304  |O     I|       |       |       |   587.52
5.833    1.38    0.37      0.311  |O     I|       |       |       |   587.57
5.917    1.39    0.37      0.318  |O     I|       |       |       |   587.62
6.000    1.39    0.37      0.325  | O    I|       |       |       |   587.66
6.083    1.43    0.38      0.332  | O    I|       |       |       |   587.71
6.167    1.52    0.38      0.339  | O     I       |       |       |   587.76
6.250    1.54    0.39      0.347  | O     I       |       |       |   587.81
6.333    1.56    0.39      0.355  | O     I       |       |       |   587.87
6.417    1.56    0.39      0.363  | O     I       |       |       |   587.92
6.500    1.57    0.40      0.371  | O     I       |       |       |   587.98
6.583    1.60    0.40      0.379  | O     I       |       |       |   588.03
6.667    1.69    0.41      0.388  | O     |I      |       |       |   588.09
6.750    1.72    0.41      0.397  | O     |I      |       |       |   588.15
6.833    1.73    0.42      0.406  | O     |I      |       |       |   588.21
6.917    1.74    0.42      0.415  | O     |I      |       |       |   588.27
7.000    1.74    0.43      0.424  | O     |I      |       |       |   588.33
7.083    1.75    0.43      0.433  | O     |I      |       |       |   588.39
7.167    1.75    0.44      0.442  | O     |I      |       |       |   588.45
7.250    1.75    0.44      0.451  | O     |I      |       |       |   588.51
7.333    1.78    0.44      0.460  | O     |I      |       |       |   588.57
7.417    1.87    0.45      0.470  | O     | I     |       |       |   588.63
7.500    1.89    0.45      0.480  | O     | I     |       |       |   588.70
7.583    1.94    0.46      0.490  | O     | I     |       |       |   588.76
7.667    2.03    0.46      0.500  | O     | I     |       |       |   588.83
7.750    2.06    0.47      0.511  | O     |  I    |       |       |   588.91
7.833    2.11    0.47      0.522  | O     |  I    |       |       |   588.98
7.917    2.20    0.48      0.534  | O     |  I    |       |       |   589.06
8.000    2.24    0.48      0.546  | O     |   I   |       |       |   589.14
8.083    2.32    0.49      0.558  | O     |   I   |       |       |   589.22
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
 8.167    2.50    0.50      0.571  | O     |    I  |       |       |   589.31
 8.250    2.56    0.50      0.585  | O     |    I  |       |       |   589.40
 8.333    2.59    0.51      0.599  | O     |    I  |       |       |   589.50
 8.417    2.60    0.51      0.614  | O     |     I |       |       |   589.53
 8.500    2.61    0.52      0.628  | O     |     I |       |       |   589.55
 8.583    2.65    0.52      0.643  | O     |     I |       |       |   589.58
 8.667    2.74    0.53      0.658  | O     |     I |       |       |   589.61
 8.750    2.77    0.53      0.673  | O     |     I |       |       |   589.64
 8.833    2.81    0.54      0.688  | O     |      I|       |       |   589.67
 8.917    2.91    0.54      0.704  | O     |      I|       |       |   589.70
 9.000    2.94    0.55      0.721  | O     |      I|       |       |   589.73
 9.083    3.02    0.55      0.737  |  O    |       I       |       |   589.76
 9.167    3.20    0.56      0.755  |  O    |       |I      |       |   589.80
 9.250    3.26    0.57      0.773  |  O    |       |I      |       |   589.83
 9.333    3.32    0.57      0.792  |  O    |       |I      |       |   589.87
 9.417    3.42    0.58      0.811  |  O    |       | I     |       |   589.91
 9.500    3.46    0.59      0.831  |  O    |       | I     |       |   589.94
 9.583    3.51    0.59      0.851  |  O    |       | I     |       |   589.98
 9.667    3.60    0.60      0.871  |  O    |       |  I    |       |   590.02
 9.750    3.64    0.61      0.892  |  O    |       |  I    |       |   590.06
 9.833    3.68    0.61      0.913  |  O    |       |  I    |       |   590.10
 9.917    3.78    0.62      0.935  |  O    |       |   I   |       |   590.14
10.000    3.81    0.63      0.956  |  O    |       |   I   |       |   590.19
10.083    3.59    0.63      0.978  |  O    |       |  I    |       |   590.23
10.167    3.01    0.64      0.996  |  O    |       I       |       |   590.26
10.250    2.82    0.64      1.012  |  O    |      I|       |       |   590.29
10.333    2.74    0.65      1.026  |  O    |     I |       |       |   590.32
10.417    2.69    0.65      1.040  |  O    |     I |       |       |   590.35
10.500    2.66    0.66      1.054  |  O    |     I |       |       |   590.37
10.583    2.81    0.66      1.069  |  O    |      I|       |       |   590.40
10.667    3.22    0.67      1.085  |  O    |       |I      |       |   590.43
10.750    3.35    0.67      1.103  |  O    |       | I     |       |   590.47
10.833    3.41    0.68      1.121  |  O    |       | I     |       |   590.50
10.917    3.45    0.68      1.140  |  O    |       | I     |       |   590.54
11.000    3.47    0.69      1.159  |  O    |       | I     |       |   590.57
11.083    3.45    0.69      1.179  |  O    |       | I     |       |   590.60
11.167    3.37    0.69      1.197  |  O    |       | I     |       |   590.63
11.250    3.35    0.70      1.216  |  O    |       | I     |       |   590.66
11.333    3.34    0.70      1.234  |  O    |       | I     |       |   590.70
11.417    3.33    0.71      1.252  |  O    |       | I     |       |   590.73
11.500    3.33    0.71      1.270  |  O    |       |I      |       |   590.76
11.583    3.26    0.71      1.288  |  O    |       |I      |       |   590.79
11.667    3.09    0.72      1.305  |  O    |       I       |       |   590.82
11.750    3.03    0.72      1.321  |  O    |       I       |       |   590.85
11.833    3.04    0.72      1.337  |  O    |       I       |       |   590.87
11.917    3.11    0.72      1.353  |  O    |       I       |       |   590.90
12.000    3.13    0.73      1.369  |  O    |       I       |       |   590.93
12.083    3.37    0.73      1.387  |  O    |       | I     |       |   590.96
12.167    3.96    0.73      1.407  |  O    |       |    I  |       |   590.99
12.250    4.16    0.74      1.430  |  O    |       |     I |       |   591.03
12.333    4.28    0.74      1.454  |   O   |       |      I|       |   591.08
12.417    4.42    0.75      1.479  |   O   |       |      I|       |   591.12
12.500    4.48    0.75      1.504  |   O   |       |       I       |   591.16
12.583    4.58    0.76      1.530  |   O   |       |       I       |   591.21
12.667    4.76    0.76      1.557  |   O   |       |       |I      |   591.25
12.750    4.83    0.77      1.585  |   O   |       |       | I     |   591.30
12.833    4.89    0.77      1.613  |   O   |       |       | I     |   591.35
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
12.917    4.99    0.78      1.642  |   O   |       |       |  I    |   591.40
13.000    5.03    0.78      1.671  |   O   |       |       |  I    |   591.45
13.083    5.21    0.79      1.701  |   O   |       |       |   I   |   591.50
13.167    5.65    0.80      1.733  |   O   |       |       |     I |   591.55
13.250    5.79    0.81      1.766  |   O   |       |       |      I|   591.60
13.333    5.86    0.82      1.801  |   O   |       |       |      I|   591.66
13.417    5.89    0.83      1.836  |   O   |       |       |      I|   591.71
13.500    5.92    0.84      1.871  |   O   |       |       |       I   591.77
13.583    5.56    0.85      1.904  |   O   |       |       |     I |   591.82
13.667    4.64    0.86      1.934  |   O   |       |       |I      |   591.86
13.750    4.34    0.87      1.958  |   O   |       |      I|       |   591.90
13.833    4.21    0.88      1.982  |   O   |       |     I |       |   591.94
13.917    4.13    0.89      2.005  |   O   |       |     I |       |   591.98
14.000    4.08    0.89      2.027  |   O   |       |     I |       |   592.01
14.083    4.18    0.90      2.049  |   O   |       |     I |       |   592.05
14.167    4.50    0.91      2.073  |   O   |       |       I       |   592.08
14.250    4.60    0.91      2.098  |   O   |       |       I       |   592.12
14.333    4.62    0.92      2.123  |   O   |       |       I       |   592.16
14.417    4.56    0.93      2.148  |    O  |       |       I       |   592.20
14.500    4.55    0.94      2.173  |    O  |       |       I       |   592.24
14.583    4.55    0.95      2.198  |    O  |       |       I       |   592.28
14.667    4.55    0.95      2.223  |    O  |       |       I       |   592.32
14.750    4.55    0.96      2.248  |    O  |       |       I       |   592.36
14.833    4.51    0.97      2.272  |    O  |       |       I       |   592.39
14.917    4.43    0.98      2.296  |    O  |       |      I|       |   592.43
15.000    4.40    0.98      2.320  |    O  |       |      I|       |   592.47
15.083    4.35    1.32      2.342  |      O|       |      I|       |   592.50
15.167    4.26    3.29      2.356  |       |       |O     I|       |   592.52
15.250    4.23    3.92      2.361  |       |       |    OI |       |   592.53
15.333    4.18    4.11      2.362  |       |       |     O |       |   592.53
15.417    4.09    4.13      2.362  |       |       |     O |       |   592.53
15.500    4.06    4.09      2.362  |       |       |    IO |       |   592.53
15.583    3.91    4.02      2.361  |       |       |    O  |       |   592.53
15.667    3.56    3.83      2.360  |       |       |  IO   |       |   592.53
15.750    3.44    3.61      2.358  |       |       | IO    |       |   592.53
15.833    3.39    3.48      2.357  |       |       | O     |       |   592.52
15.917    3.36    3.41      2.357  |       |       | O     |       |   592.52
16.000    3.34    3.37      2.357  |       |       | O     |       |   592.52
16.083    2.83    3.18      2.355  |       |      I|O      |       |   592.52
16.167    1.55    2.53      2.351  |       I    O  |       |       |   592.52
16.250    1.14    1.75      2.345  |     I |O      |       |       |   592.51
16.333    0.95    1.29      2.342  |    IO |       |       |       |   592.50
16.417    0.85    1.03      2.340  |   IO  |       |       |       |   592.50
16.500    0.78    0.99      2.339  |   IO  |       |       |       |   592.50
16.583    0.71    0.99      2.337  |  I O  |       |       |       |   592.50
16.667    0.59    0.99      2.335  |  I O  |       |       |       |   592.49
16.750    0.55    0.99      2.332  | I  O  |       |       |       |   592.49
16.833    0.54    0.99      2.329  | I  O  |       |       |       |   592.48
16.917    0.53    0.99      2.326  | I  O  |       |       |       |   592.48
17.000    0.53    0.98      2.323  | I  O  |       |       |       |   592.47
17.083    0.59    0.98      2.320  |  I O  |       |       |       |   592.47
17.167    0.76    0.98      2.318  |   IO  |       |       |       |   592.47
17.250    0.82    0.98      2.317  |   IO  |       |       |       |   592.46
17.333    0.84    0.98      2.315  |   IO  |       |       |       |   592.46
17.417    0.85    0.98      2.315  |   IO  |       |       |       |   592.46
17.500    0.86    0.98      2.314  |   IO  |       |       |       |   592.46
17.583    0.87    0.98      2.313  |   IO  |       |       |       |   592.46
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
17.667    0.87    0.98      2.312  |   IO  |       |       |       |   592.46
17.750    0.87    0.98      2.311  |   IO  |       |       |       |   592.46
17.833    0.84    0.98      2.311  |   IO  |       |       |       |   592.45
17.917    0.76    0.98      2.309  |   IO  |       |       |       |   592.45
18.000    0.73    0.98      2.308  |  I O  |       |       |       |   592.45
18.083    0.72    0.98      2.306  |  I O  |       |       |       |   592.45
18.167    0.71    0.98      2.304  |  I O  |       |       |       |   592.44
18.250    0.70    0.98      2.302  |  I O  |       |       |       |   592.44
18.333    0.70    0.98      2.300  |  I O  |       |       |       |   592.44
18.417    0.70    0.98      2.298  |  I O  |       |       |       |   592.43
18.500    0.70    0.98      2.296  |  I O  |       |       |       |   592.43
18.583    0.67    0.98      2.294  |  I O  |       |       |       |   592.43
18.667    0.58    0.97      2.292  |  I O  |       |       |       |   592.42
18.750    0.55    0.97      2.289  | I  O  |       |       |       |   592.42
18.833    0.51    0.97      2.286  | I  O  |       |       |       |   592.42
18.917    0.42    0.97      2.283  | I  O  |       |       |       |   592.41
19.000    0.38    0.97      2.279  | I  O  |       |       |       |   592.40
19.083    0.40    0.97      2.275  | I  O  |       |       |       |   592.40
19.167    0.48    0.97      2.271  | I  O  |       |       |       |   592.39
19.250    0.50    0.97      2.268  | I  O  |       |       |       |   592.39
19.333    0.54    0.97      2.265  | I  O  |       |       |       |   592.38
19.417    0.63    0.97      2.262  |  I O  |       |       |       |   592.38
19.500    0.66    0.96      2.260  |  I O  |       |       |       |   592.37
19.583    0.65    0.96      2.258  |  I O  |       |       |       |   592.37
19.667    0.57    0.96      2.255  |  I O  |       |       |       |   592.37
19.750    0.55    0.96      2.253  | I  O  |       |       |       |   592.36
19.833    0.51    0.96      2.250  | I  O  |       |       |       |   592.36
19.917    0.42    0.96      2.246  | I  O  |       |       |       |   592.35
20.000    0.38    0.96      2.242  | I  O  |       |       |       |   592.35
20.083    0.40    0.96      2.238  | I  O  |       |       |       |   592.34
20.167    0.48    0.96      2.235  | I  O  |       |       |       |   592.34
20.250    0.50    0.96      2.232  | I  O  |       |       |       |   592.33
20.333    0.51    0.96      2.229  | I  O  |       |       |       |   592.33
20.417    0.52    0.95      2.225  | I  O  |       |       |       |   592.32
20.500    0.52    0.95      2.222  | I  O  |       |       |       |   592.32
20.583    0.52    0.95      2.219  | I  O  |       |       |       |   592.31
20.667    0.52    0.95      2.217  | I  O  |       |       |       |   592.31
20.750    0.52    0.95      2.214  | I  O  |       |       |       |   592.30
20.833    0.49    0.95      2.211  | I  O  |       |       |       |   592.30
20.917    0.41    0.95      2.207  | I  O  |       |       |       |   592.29
21.000    0.38    0.95      2.203  | I  O  |       |       |       |   592.29
21.083    0.40    0.95      2.199  | I  O  |       |       |       |   592.28
21.167    0.48    0.94      2.196  | I  O  |       |       |       |   592.27
21.250    0.50    0.94      2.193  | I  O  |       |       |       |   592.27
21.333    0.48    0.94      2.190  | I  O  |       |       |       |   592.27
21.417    0.40    0.94      2.186  | I  O  |       |       |       |   592.26
21.500    0.37    0.94      2.182  | I  O  |       |       |       |   592.25
21.583    0.40    0.94      2.179  | I  O  |       |       |       |   592.25
21.667    0.48    0.94      2.175  | I  O  |       |       |       |   592.24
21.750    0.50    0.94      2.172  | I  O  |       |       |       |   592.24
21.833    0.48    0.94      2.169  | I  O  |       |       |       |   592.23
21.917    0.40    0.94      2.165  | I  O  |       |       |       |   592.23
22.000    0.37    0.93      2.162  | I  O  |       |       |       |   592.22
22.083    0.40    0.93      2.158  | I  O  |       |       |       |   592.22
22.167    0.48    0.93      2.154  | I  O  |       |       |       |   592.21
22.250    0.50    0.93      2.151  | I  O  |       |       |       |   592.21
22.333    0.48    0.93      2.148  | I  O  |       |       |       |   592.20
```

```
22.417    0.40    0.93      2.145  | I  O  |       |       |       |   592.20
22.500    0.37    0.93      2.141  | I  O  |       |       |       |   592.19
22.583    0.36    0.93      2.137  |I   O  |       |       |       |   592.18
22.667    0.36    0.93      2.134  |I   O  |       |       |       |   592.18
22.750    0.36    0.92      2.130  |I  O   |       |       |       |   592.17
22.833    0.35    0.92      2.126  |I  O   |       |       |       |   592.17
22.917    0.35    0.92      2.122  |I  O   |       |       |       |   592.16
23.000    0.35    0.92      2.118  |I  O   |       |       |       |   592.15
23.083    0.35    0.92      2.114  |I  O   |       |       |       |   592.15
23.167    0.35    0.92      2.110  |I  O   |       |       |       |   592.14
23.250    0.35    0.92      2.106  |I  O   |       |       |       |   592.13
23.333    0.35    0.92      2.102  |I  O   |       |       |       |   592.13
23.417    0.35    0.91      2.098  |I  O   |       |       |       |   592.12
23.500    0.35    0.91      2.094  |I  O   |       |       |       |   592.12
23.583    0.35    0.91      2.091  |I  O   |       |       |       |   592.11
23.667    0.35    0.91      2.087  |I  O   |       |       |       |   592.10
23.750    0.35    0.91      2.083  |I  O   |       |       |       |   592.10
23.833    0.35    0.91      2.079  |I  O   |       |       |       |   592.09
23.917    0.35    0.91      2.075  |I  O   |       |       |       |   592.09
24.000    0.35    0.91      2.071  |I  O   |       |       |       |   592.08
24.083    0.28    0.90      2.067  |I  O   |       |       |       |   592.07
24.167    0.11    0.90      2.062  I   O   |       |       |       |   592.07
24.250    0.06    0.90      2.057  I   O   |       |       |       |   592.06
24.333    0.03    0.90      2.051  I   O   |       |       |       |   592.05
24.417    0.02    0.90      2.045  I   O   |       |       |       |   592.04
24.500    0.01    0.90      2.039  I   O   |       |       |       |   592.03
24.583    0.01    0.89      2.033  I   O   |       |       |       |   592.02
24.667    0.00    0.89      2.027  I   O   |       |       |       |   592.01
24.750    0.00    0.89      2.020  I   O   |       |       |       |   592.00
24.833    0.00    0.89      2.014  I   O   |       |       |       |   591.99
24.917    0.00    0.89      2.008  I   O   |       |       |       |   591.98
25.000    0.00    0.88      2.002  I   O   |       |       |       |   591.97
25.083    0.00    0.88      1.996  I   O   |       |       |       |   591.96
25.167    0.00    0.88      1.990  I   O   |       |       |       |   591.95
25.250    0.00    0.88      1.984  I   O   |       |       |       |   591.94
25.333    0.00    0.88      1.978  I   O   |       |       |       |   591.93
25.417    0.00    0.87      1.972  I   O   |       |       |       |   591.92
25.500    0.00    0.87      1.966  I   O   |       |       |       |   591.92
25.583    0.00    0.87      1.960  I   O   |       |       |       |   591.91
25.667    0.00    0.87      1.954  I   O   |       |       |       |   591.90
25.750    0.00    0.87      1.948  I   O   |       |       |       |   591.89
25.833    0.00    0.87      1.942  I   O   |       |       |       |   591.88
25.917    0.00    0.86      1.936  I   O   |       |       |       |   591.87
26.000    0.00    0.86      1.930  I   O   |       |       |       |   591.86
26.083    0.00    0.86      1.924  I   O   |       |       |       |   591.85
26.167    0.00    0.86      1.918  I   O   |       |       |       |   591.84
26.250    0.00    0.86      1.912  I   O   |       |       |       |   591.83
26.333    0.00    0.85      1.906  I   O   |       |       |       |   591.82
26.417    0.00    0.85      1.900  I   O   |       |       |       |   591.81
26.500    0.00    0.85      1.895  I   O   |       |       |       |   591.80
26.583    0.00    0.85      1.889  I   O   |       |       |       |   591.79
26.667    0.00    0.85      1.883  I   O   |       |       |       |   591.79
26.750    0.00    0.85      1.877  I   O   |       |       |       |   591.78
26.833    0.00    0.84      1.871  I   O   |       |       |       |   591.77
26.917    0.00    0.84      1.865  I   O   |       |       |       |   591.76
27.000    0.00    0.84      1.860  I   O   |       |       |       |   591.75
27.083    0.00    0.84      1.854  I   O   |       |       |       |   591.74
```

```
 27.167     0.00     0.84       1.848  I    O   |        |        |        |    591.73
 27.250     0.00     0.83       1.842  I    O   |        |        |        |    591.72
 27.333     0.00     0.83       1.837  I    O   |        |        |        |    591.71
 27.417     0.00     0.83       1.831  I    O   |        |        |        |    591.70
 27.500     0.00     0.83       1.825  I    O   |        |        |        |    591.70
 27.583     0.00     0.83       1.819  I    O   |        |        |        |    591.69
 27.667     0.00     0.83       1.814  I    O   |        |        |        |    591.68
 27.750     0.00     0.82       1.808  I    O   |        |        |        |    591.67
 27.833     0.00     0.82       1.802  I    O   |        |        |        |    591.66
 27.917     0.00     0.82       1.797  I    O   |        |        |        |    591.65
 28.000     0.00     0.82       1.791  I    O   |        |        |        |    591.64
 28.083     0.00     0.82       1.785  I    O   |        |        |        |    591.63
 28.167     0.00     0.81       1.780  I    O   |        |        |        |    591.62
 28.250     0.00     0.81       1.774  I    O   |        |        |        |    591.62
 28.333     0.00     0.81       1.769  I    O   |        |        |        |    591.61
 28.417     0.00     0.81       1.763  I    O   |        |        |        |    591.60
 28.500     0.00     0.81       1.757  I    O   |        |        |        |    591.59
 28.583     0.00     0.81       1.752  I    O   |        |        |        |    591.58
 28.667     0.00     0.80       1.746  I    O   |        |        |        |    591.57
 28.750     0.00     0.80       1.741  I    O   |        |        |        |    591.56
 28.833     0.00     0.80       1.735  I    O   |        |        |        |    591.56
 28.917     0.00     0.80       1.730  I    O   |        |        |        |    591.55
 29.000     0.00     0.80       1.724  I    O   |        |        |        |    591.54
 29.083     0.00     0.80       1.719  I    O   |        |        |        |    591.53
 29.167     0.00     0.79       1.713  I    O   |        |        |        |    591.52
 29.250     0.00     0.79       1.708  I    O   |        |        |        |    591.51
 29.333     0.00     0.79       1.702  I    O   |        |        |        |    591.50
 29.417     0.00     0.79       1.697  I    O   |        |        |        |    591.49
 29.500     0.00     0.79       1.692  I    O   |        |        |        |    591.49
 29.583     0.00     0.79       1.686  I    O   |        |        |        |    591.48
 29.667     0.00     0.79       1.681  I    O   |        |        |        |    591.47
 29.750     0.00     0.79       1.675  I    O   |        |        |        |    591.46
 29.833     0.00     0.78       1.670  I    O   |        |        |        |    591.45
 29.917     0.00     0.78       1.664  I    O   |        |        |        |    591.44
 30.000     0.00     0.78       1.659  I    O   |        |        |        |    591.43
 30.083     0.00     0.78       1.654  I    O   |        |        |        |    591.42
 30.167     0.00     0.78       1.648  I    O   |        |        |        |    591.41
 30.250     0.00     0.78       1.643  I    O   |        |        |        |    591.40
 30.333     0.00     0.78       1.638  I    O   |        |        |        |    591.39
 30.417     0.00     0.78       1.632  I    O   |        |        |        |    591.38
 30.500     0.00     0.78       1.627  I    O   |        |        |        |    591.37
 30.583     0.00     0.78       1.622  I    O   |        |        |        |    591.36
 30.667     0.00     0.77       1.616  I    O   |        |        |        |    591.36
 30.750     0.00     0.77       1.611  I    O   |        |        |        |    591.35
 30.833     0.00     0.77       1.606  I    O   |        |        |        |    591.34
 30.917     0.00     0.77       1.600  I    O   |        |        |        |    591.33
 31.000     0.00     0.77       1.595  I    O   |        |        |        |    591.32
 31.083     0.00     0.77       1.590  I    O   |        |        |        |    591.31
 31.167     0.00     0.77       1.584  I    O   |        |        |        |    591.30
 31.250     0.00     0.77       1.579  I    O   |        |        |        |    591.29
 31.333     0.00     0.77       1.574  I    O   |        |        |        |    591.28
 31.417     0.00     0.77       1.569  I    O   |        |        |        |    591.27
 31.500     0.00     0.76       1.563  I    O   |        |        |        |    591.26
 31.583     0.00     0.76       1.558  I    O   |        |        |        |    591.26
 31.667     0.00     0.76       1.553  I    O   |        |        |        |    591.25
 31.750     0.00     0.76       1.547  I    O   |        |        |        |    591.24
 31.833     0.00     0.76       1.542  I    O   |        |        |        |    591.23
```

```
31.917    0.00    0.76      1.537  I   O   |       |       |       |   591.22
32.000    0.00    0.76      1.532  I   O   |       |       |       |   591.21
32.083    0.00    0.76      1.527  I   O   |       |       |       |   591.20
32.167    0.00    0.76      1.521  I   O   |       |       |       |   591.19
32.250    0.00    0.76      1.516  I   O   |       |       |       |   591.18
32.333    0.00    0.75      1.511  I   O   |       |       |       |   591.17
32.417    0.00    0.75      1.506  I   O   |       |       |       |   591.17
32.500    0.00    0.75      1.501  I   O   |       |       |       |   591.16
32.583    0.00    0.75      1.495  I   O   |       |       |       |   591.15
32.667    0.00    0.75      1.490  I   O   |       |       |       |   591.14
32.750    0.00    0.75      1.485  I   O   |       |       |       |   591.13
32.833    0.00    0.75      1.480  I   O   |       |       |       |   591.12
32.917    0.00    0.75      1.475  I   O   |       |       |       |   591.11
33.000    0.00    0.75      1.470  I   O   |       |       |       |   591.10
33.083    0.00    0.75      1.465  I   O   |       |       |       |   591.09
33.167    0.00    0.74      1.459  I   O   |       |       |       |   591.09
33.250    0.00    0.74      1.454  I   O   |       |       |       |   591.08
33.333    0.00    0.74      1.449  I   O   |       |       |       |   591.07
33.417    0.00    0.74      1.444  I   O   |       |       |       |   591.06
33.500    0.00    0.74      1.439  I   O   |       |       |       |   591.05
33.583    0.00    0.74      1.434  I   O   |       |       |       |   591.04
33.667    0.00    0.74      1.429  I  O    |       |       |       |   591.03
33.750    0.00    0.74      1.424  I  O    |       |       |       |   591.02
33.833    0.00    0.74      1.419  I  O    |       |       |       |   591.01
33.917    0.00    0.74      1.414  I  O    |       |       |       |   591.01
34.000    0.00    0.73      1.408  I  O    |       |       |       |   591.00
34.083    0.00    0.73      1.403  I  O    |       |       |       |   590.99
34.167    0.00    0.73      1.398  I  O    |       |       |       |   590.98
34.250    0.00    0.73      1.393  I  O    |       |       |       |   590.97
34.333    0.00    0.73      1.388  I  O    |       |       |       |   590.96
34.417    0.00    0.73      1.383  I  O    |       |       |       |   590.95
34.500    0.00    0.73      1.378  I  O    |       |       |       |   590.95
34.583    0.00    0.73      1.373  I  O    |       |       |       |   590.94
34.667    0.00    0.73      1.368  I  O    |       |       |       |   590.93
34.750    0.00    0.73      1.363  I  O    |       |       |       |   590.92
34.833    0.00    0.73      1.358  I  O    |       |       |       |   590.91
34.917    0.00    0.72      1.353  I  O    |       |       |       |   590.90
35.000    0.00    0.72      1.348  I  O    |       |       |       |   590.89
35.083    0.00    0.72      1.343  I  O    |       |       |       |   590.88
35.167    0.00    0.72      1.338  I  O    |       |       |       |   590.88
35.250    0.00    0.72      1.333  I  O    |       |       |       |   590.87
35.333    0.00    0.72      1.328  I  O    |       |       |       |   590.86
35.417    0.00    0.72      1.323  I  O    |       |       |       |   590.85
35.500    0.00    0.72      1.318  I  O    |       |       |       |   590.84
35.583    0.00    0.72      1.313  I  O    |       |       |       |   590.83
35.667    0.00    0.72      1.309  I  O    |       |       |       |   590.83
35.750    0.00    0.71      1.304  I  O    |       |       |       |   590.82
35.833    0.00    0.71      1.299  I  O    |       |       |       |   590.81
35.917    0.00    0.71      1.294  I  O    |       |       |       |   590.80
36.000    0.00    0.71      1.289  I  O    |       |       |       |   590.79
36.083    0.00    0.71      1.284  I  O    |       |       |       |   590.78
36.167    0.00    0.71      1.279  I  O    |       |       |       |   590.77
36.250    0.00    0.71      1.274  I  O    |       |       |       |   590.77
36.333    0.00    0.71      1.269  I  O    |       |       |       |   590.76
36.417    0.00    0.71      1.264  I  O    |       |       |       |   590.75
36.500    0.00    0.71      1.260  I  O    |       |       |       |   590.74
36.583    0.00    0.71      1.255  I  O    |       |       |       |   590.73
```

```
36.667    0.00    0.70     1.250  I   O    |       |       |       |    590.72
36.750    0.00    0.70     1.245  I   O    |       |       |       |    590.72
36.833    0.00    0.70     1.240  I   O    |       |       |       |    590.71
36.917    0.00    0.70     1.235  I   O    |       |       |       |    590.70
37.000    0.00    0.70     1.230  I   O    |       |       |       |    590.69
37.083    0.00    0.70     1.226  I   O    |       |       |       |    590.68
37.167    0.00    0.70     1.221  I   O    |       |       |       |    590.67
37.250    0.00    0.70     1.216  I   O    |       |       |       |    590.67
37.333    0.00    0.70     1.211  I   O    |       |       |       |    590.66
37.417    0.00    0.70     1.206  I   O    |       |       |       |    590.65
37.500    0.00    0.70     1.202  I   O    |       |       |       |    590.64
37.583    0.00    0.69     1.197  I   O    |       |       |       |    590.63
37.667    0.00    0.69     1.192  I   O    |       |       |       |    590.62
37.750    0.00    0.69     1.187  I   O    |       |       |       |    590.62
37.833    0.00    0.69     1.183  I   O    |       |       |       |    590.61
37.917    0.00    0.69     1.178  I   O    |       |       |       |    590.60
38.000    0.00    0.69     1.173  I   O    |       |       |       |    590.59
38.083    0.00    0.69     1.168  I   O    |       |       |       |    590.58
38.167    0.00    0.69     1.164  I   O    |       |       |       |    590.58
38.250    0.00    0.69     1.159  I   O    |       |       |       |    590.57
38.333    0.00    0.69     1.154  I   O    |       |       |       |    590.56
38.417    0.00    0.69     1.149  I   O    |       |       |       |    590.55
38.500    0.00    0.68     1.145  I   O    |       |       |       |    590.54
38.583    0.00    0.68     1.140  I   O    |       |       |       |    590.53
38.667    0.00    0.68     1.135  I   O    |       |       |       |    590.53
38.750    0.00    0.68     1.130  I   O    |       |       |       |    590.52
38.833    0.00    0.68     1.126  I   O    |       |       |       |    590.51
38.917    0.00    0.68     1.121  I   O    |       |       |       |    590.50
39.000    0.00    0.68     1.116  I   O    |       |       |       |    590.49
39.083    0.00    0.68     1.112  I   O    |       |       |       |    590.48
39.167    0.00    0.68     1.107  I   O    |       |       |       |    590.48
39.250    0.00    0.67     1.102  I   O    |       |       |       |    590.47
39.333    0.00    0.67     1.098  I   O    |       |       |       |    590.46
39.417    0.00    0.67     1.093  I   O    |       |       |       |    590.45
39.500    0.00    0.67     1.089  I   O    |       |       |       |    590.44
39.583    0.00    0.67     1.084  I   O    |       |       |       |    590.43
39.667    0.00    0.67     1.079  I   O    |       |       |       |    590.42
39.750    0.00    0.67     1.075  I   O    |       |       |       |    590.41
39.833    0.00    0.66     1.070  I   O    |       |       |       |    590.40
39.917    0.00    0.66     1.066  I   O    |       |       |       |    590.40
40.000    0.00    0.66     1.061  I   O    |       |       |       |    590.39
40.083    0.00    0.66     1.057  I   O    |       |       |       |    590.38
40.167    0.00    0.66     1.052  I   O    |       |       |       |    590.37
40.250    0.00    0.66     1.047  I   O    |       |       |       |    590.36
40.333    0.00    0.65     1.043  I   O    |       |       |       |    590.35
40.417    0.00    0.65     1.038  I   O    |       |       |       |    590.34
40.500    0.00    0.65     1.034  I   O    |       |       |       |    590.33
40.583    0.00    0.65     1.029  I   O    |       |       |       |    590.33
40.667    0.00    0.65     1.025  I   O    |       |       |       |    590.32
40.750    0.00    0.65     1.021  I   O    |       |       |       |    590.31
40.833    0.00    0.65     1.016  I   O    |       |       |       |    590.30
40.917    0.00    0.64     1.012  I   O    |       |       |       |    590.29
41.000    0.00    0.64     1.007  I   O    |       |       |       |    590.28
41.083    0.00    0.64     1.003  I   O    |       |       |       |    590.27
41.167    0.00    0.64     0.998  I   O    |       |       |       |    590.27
41.250    0.00    0.64     0.994  I   O    |       |       |       |    590.26
41.333    0.00    0.64     0.990  I   O    |       |       |       |    590.25
```

```
 41.417     0.00     0.64       0.985   I   O      |           |           |           |     590.24
 41.500     0.00     0.63       0.981   I   O      |           |           |           |     590.23
 41.583     0.00     0.63       0.976   I   O      |           |           |           |     590.22
 41.667     0.00     0.63       0.972   I   O      |           |           |           |     590.22
 41.750     0.00     0.63       0.968   I   O      |           |           |           |     590.21
 41.833     0.00     0.63       0.963   I   O      |           |           |           |     590.20
 41.917     0.00     0.63       0.959   I   O      |           |           |           |     590.19
 42.000     0.00     0.63       0.955   I   O      |           |           |           |     590.18
 42.083     0.00     0.62       0.950   I   O      |           |           |           |     590.17
 42.167     0.00     0.62       0.946   I   O      |           |           |           |     590.17
 42.250     0.00     0.62       0.942   I   O      |           |           |           |     590.16
 42.333     0.00     0.62       0.938   I   O      |           |           |           |     590.15
 42.417     0.00     0.62       0.933   I   O      |           |           |           |     590.14
 42.500     0.00     0.62       0.929   I   O      |           |           |           |     590.13
 42.583     0.00     0.62       0.925   I   O      |           |           |           |     590.12
 42.667     0.00     0.61       0.921   I   O      |           |           |           |     590.12
 42.750     0.00     0.61       0.916   I   O      |           |           |           |     590.11
 42.833     0.00     0.61       0.912   I   O      |           |           |           |     590.10
 42.917     0.00     0.61       0.908   I   O      |           |           |           |     590.09
 43.000     0.00     0.61       0.904   I   O      |           |           |           |     590.08
 43.083     0.00     0.61       0.900   I   O      |           |           |           |     590.08
 43.167     0.00     0.61       0.895   I   O      |           |           |           |     590.07
 43.250     0.00     0.61       0.891   I   O      |           |           |           |     590.06
 43.333     0.00     0.60       0.887   I   O      |           |           |           |     590.05
 43.417     0.00     0.60       0.883   I   O      |           |           |           |     590.04
 43.500     0.00     0.60       0.879   I   O      |           |           |           |     590.04
 43.583     0.00     0.60       0.875   I   O      |           |           |           |     590.03
 43.667     0.00     0.60       0.870   I   O      |           |           |           |     590.02
 43.750     0.00     0.60       0.866   I   O      |           |           |           |     590.01
 43.833     0.00     0.60       0.862   I   O      |           |           |           |     590.00
 43.917     0.00     0.59       0.858   I   O      |           |           |           |     590.00
 44.000     0.00     0.59       0.854   I   O      |           |           |           |     589.99
 44.083     0.00     0.59       0.850   I   O      |           |           |           |     589.98
 44.167     0.00     0.59       0.846   I   O      |           |           |           |     589.97
 44.250     0.00     0.59       0.842   I   O      |           |           |           |     589.97
 44.333     0.00     0.59       0.838   I   O      |           |           |           |     589.96
 44.417     0.00     0.59       0.834   I   O      |           |           |           |     589.95
 44.500     0.00     0.59       0.830   I   O      |           |           |           |     589.94
 44.583     0.00     0.58       0.826   I   O      |           |           |           |     589.93
 44.667     0.00     0.58       0.822   I   O      |           |           |           |     589.93
 44.750     0.00     0.58       0.818   I   O      |           |           |           |     589.92
 44.833     0.00     0.58       0.814   I   O      |           |           |           |     589.91
 44.917     0.00     0.58       0.810   I   O      |           |           |           |     589.90
 45.000     0.00     0.58       0.806   I   O      |           |           |           |     589.90
 45.083     0.00     0.58       0.802   I   O      |           |           |           |     589.89
 45.167     0.00     0.57       0.798   I   O      |           |           |           |     589.88
 45.250     0.00     0.57       0.794   I   O      |           |           |           |     589.87
 45.333     0.00     0.57       0.790   I   O      |           |           |           |     589.87
 45.417     0.00     0.57       0.786   I   O      |           |           |           |     589.86
 45.500     0.00     0.57       0.782   I   O      |           |           |           |     589.85
 45.583     0.00     0.57       0.778   I   O      |           |           |           |     589.84
 45.667     0.00     0.57       0.774   I   O      |           |           |           |     589.83
 45.750     0.00     0.57       0.770   I   O      |           |           |           |     589.83
 45.833     0.00     0.56       0.766   I   O      |           |           |           |     589.82
 45.917     0.00     0.56       0.762   I   O      |           |           |           |     589.81
 46.000     0.00     0.56       0.759   I   O      |           |           |           |     589.81
 46.083     0.00     0.56       0.755   I   O      |           |           |           |     589.80
```

```
46.167    0.00    0.56      0.751  I  O    |       |       |       |   589.79
46.250    0.00    0.56      0.747  I  O    |       |       |       |   589.78
46.333    0.00    0.56      0.743  I  O    |       |       |       |   589.78
46.417    0.00    0.56      0.739  I  O    |       |       |       |   589.77
46.500    0.00    0.55      0.736  I O     |       |       |       |   589.76
46.583    0.00    0.55      0.732  I O     |       |       |       |   589.75
46.667    0.00    0.55      0.728  I O     |       |       |       |   589.75
46.750    0.00    0.55      0.724  I O     |       |       |       |   589.74
46.833    0.00    0.55      0.720  I O     |       |       |       |   589.73
46.917    0.00    0.55      0.717  I O     |       |       |       |   589.72
47.000    0.00    0.55      0.713  I O     |       |       |       |   589.72
47.083    0.00    0.55      0.709  I O     |       |       |       |   589.71
47.167    0.00    0.54      0.705  I O     |       |       |       |   589.70
47.250    0.00    0.54      0.702  I O     |       |       |       |   589.70
47.333    0.00    0.54      0.698  I O     |       |       |       |   589.69
47.417    0.00    0.54      0.694  I O     |       |       |       |   589.68
47.500    0.00    0.54      0.690  I O     |       |       |       |   589.67
47.583    0.00    0.54      0.687  I O     |       |       |       |   589.67
47.667    0.00    0.54      0.683  I O     |       |       |       |   589.66
47.750    0.00    0.54      0.679  I O     |       |       |       |   589.65
47.833    0.00    0.53      0.676  I O     |       |       |       |   589.65
47.917    0.00    0.53      0.672  I O     |       |       |       |   589.64
48.000    0.00    0.53      0.668  I O     |       |       |       |   589.63
48.083    0.00    0.53      0.665  I O     |       |       |       |   589.62
48.167    0.00    0.53      0.661  I O     |       |       |       |   589.62
48.250    0.00    0.53      0.657  I O     |       |       |       |   589.61
48.333    0.00    0.53      0.654  I O     |       |       |       |   589.60
48.417    0.00    0.53      0.650  I O     |       |       |       |   589.60
48.500    0.00    0.53      0.646  I O     |       |       |       |   589.59
48.583    0.00    0.52      0.643  I O     |       |       |       |   589.58
48.667    0.00    0.52      0.639  I O     |       |       |       |   589.58
48.750    0.00    0.52      0.636  I O     |       |       |       |   589.57
48.833    0.00    0.52      0.632  I O     |       |       |       |   589.56
48.917    0.00    0.52      0.628  I O     |       |       |       |   589.55
49.000    0.00    0.52      0.625  I O     |       |       |       |   589.55
49.083    0.00    0.52      0.621  I O     |       |       |       |   589.54
49.167    0.00    0.52      0.618  I O     |       |       |       |   589.53
49.250    0.00    0.51      0.614  I O     |       |       |       |   589.53
49.333    0.00    0.51      0.611  I O     |       |       |       |   589.52
49.417    0.00    0.51      0.607  I O     |       |       |       |   589.51
49.500    0.00    0.51      0.604  I O     |       |       |       |   589.51
49.583    0.00    0.51      0.600  I O     |       |       |       |   589.50
49.667    0.00    0.51      0.597  I O     |       |       |       |   589.48
49.750    0.00    0.51      0.593  I O     |       |       |       |   589.45
49.833    0.00    0.51      0.590  I O     |       |       |       |   589.43
49.917    0.00    0.50      0.586  I O     |       |       |       |   589.41
50.000    0.00    0.50      0.583  I O     |       |       |       |   589.38
50.083    0.00    0.50      0.579  I O     |       |       |       |   589.36
50.167    0.00    0.50      0.576  I O     |       |       |       |   589.34
50.250    0.00    0.50      0.572  I O     |       |       |       |   589.32
50.333    0.00    0.50      0.569  I O     |       |       |       |   589.29
50.417    0.00    0.49      0.565  I O     |       |       |       |   589.27
50.500    0.00    0.49      0.562  I O     |       |       |       |   589.25
50.583    0.00    0.49      0.559  I O     |       |       |       |   589.22
50.667    0.00    0.49      0.555  I O     |       |       |       |   589.20
50.750    0.00    0.49      0.552  I O     |       |       |       |   589.18
50.833    0.00    0.49      0.549  I O     |       |       |       |   589.16
```

```
 50.917    0.00    0.48     0.545  I O     |       |       |       |    589.14
 51.000    0.00    0.48     0.542  I O     |       |       |       |    589.11
 51.083    0.00    0.48     0.539  I O     |       |       |       |    589.09
 51.167    0.00    0.48     0.535  I O     |       |       |       |    589.07
 51.250    0.00    0.48     0.532  I O     |       |       |       |    589.05
 51.333    0.00    0.48     0.529  I O     |       |       |       |    589.02
 51.417    0.00    0.48     0.525  I O     |       |       |       |    589.00
 51.500    0.00    0.47     0.522  I O     |       |       |       |    588.98
 51.583    0.00    0.47     0.519  I O     |       |       |       |    588.96
 51.667    0.00    0.47     0.516  I O     |       |       |       |    588.94
 51.750    0.00    0.47     0.512  I O     |       |       |       |    588.92
 51.833    0.00    0.47     0.509  I O     |       |       |       |    588.89
 51.917    0.00    0.47     0.506  I O     |       |       |       |    588.87
 52.000    0.00    0.46     0.503  I O     |       |       |       |    588.85
 52.083    0.00    0.46     0.500  I O     |       |       |       |    588.83
 52.167    0.00    0.46     0.496  I O     |       |       |       |    588.81
 52.250    0.00    0.46     0.493  I O     |       |       |       |    588.79
 52.333    0.00    0.46     0.490  I O     |       |       |       |    588.77
 52.417    0.00    0.46     0.487  I O     |       |       |       |    588.75
 52.500    0.00    0.46     0.484  I O     |       |       |       |    588.73
 52.583    0.00    0.45     0.481  I O     |       |       |       |    588.70
 52.667    0.00    0.45     0.478  I O     |       |       |       |    588.68
 52.750    0.00    0.45     0.474  I O     |       |       |       |    588.66
 52.833    0.00    0.45     0.471  I O     |       |       |       |    588.64
 52.917    0.00    0.45     0.468  I O     |       |       |       |    588.62
 53.000    0.00    0.45     0.465  I O     |       |       |       |    588.60
 53.083    0.00    0.45     0.462  I O     |       |       |       |    588.58
 53.167    0.00    0.44     0.459  I O     |       |       |       |    588.56
 53.250    0.00    0.44     0.456  I O     |       |       |       |    588.54
 53.333    0.00    0.44     0.453  I O     |       |       |       |    588.52
 53.417    0.00    0.44     0.450  I O     |       |       |       |    588.50
 53.500    0.00    0.44     0.447  I O     |       |       |       |    588.48
 53.583    0.00    0.44     0.444  I O     |       |       |       |    588.46
 53.667    0.00    0.44     0.441  I O     |       |       |       |    588.44
 53.750    0.00    0.43     0.438  I O     |       |       |       |    588.42
 53.833    0.00    0.43     0.435  I O     |       |       |       |    588.40
 53.917    0.00    0.43     0.432  I O     |       |       |       |    588.38
 54.000    0.00    0.43     0.429  I O     |       |       |       |    588.36
 54.083    0.00    0.43     0.426  I O     |       |       |       |    588.34
 54.167    0.00    0.43     0.423  I O     |       |       |       |    588.32
 54.250    0.00    0.42     0.420  I O     |       |       |       |    588.30
 54.333    0.00    0.42     0.417  I O     |       |       |       |    588.28
 54.417    0.00    0.42     0.414  I O     |       |       |       |    588.26
 54.500    0.00    0.42     0.411  I O     |       |       |       |    588.24
 54.583    0.00    0.42     0.408  I O     |       |       |       |    588.22
 54.667    0.00    0.42     0.406  I O     |       |       |       |    588.20
 54.750    0.00    0.41     0.403  I O     |       |       |       |    588.19
 54.833    0.00    0.41     0.400  I O     |       |       |       |    588.17
 54.917    0.00    0.41     0.397  I O     |       |       |       |    588.15
 55.000    0.00    0.41     0.394  I O     |       |       |       |    588.13
 55.083    0.00    0.41     0.391  I O     |       |       |       |    588.11
 55.167    0.00    0.41     0.389  I O     |       |       |       |    588.09
 55.250    0.00    0.41     0.386  I O     |       |       |       |    588.07
 55.333    0.00    0.40     0.383  I O     |       |       |       |    588.05
 55.417    0.00    0.40     0.380  I O     |       |       |       |    588.03
 55.500    0.00    0.40     0.377  I O     |       |       |       |    588.02
 55.583    0.00    0.40     0.375  I O     |       |       |       |    588.00
```

```
55.667    0.00    0.40      0.372  I O     |       |       |       |   587.98
55.750    0.00    0.40      0.369  I O     |       |       |       |   587.96
55.833    0.00    0.40      0.366  I O     |       |       |       |   587.94
55.917    0.00    0.39      0.364  I O     |       |       |       |   587.93
56.000    0.00    0.39      0.361  I O     |       |       |       |   587.91
56.083    0.00    0.39      0.358  I O     |       |       |       |   587.89
56.167    0.00    0.39      0.356  I O     |       |       |       |   587.87
56.250    0.00    0.39      0.353  I O     |       |       |       |   587.85
56.333    0.00    0.39      0.350  I O     |       |       |       |   587.84
56.417    0.00    0.39      0.348  I O     |       |       |       |   587.82
56.500    0.00    0.38      0.345  I O     |       |       |       |   587.80
56.583    0.00    0.38      0.342  I O     |       |       |       |   587.78
56.667    0.00    0.38      0.340  I O     |       |       |       |   587.77
56.750    0.00    0.38      0.337  I O     |       |       |       |   587.75
56.833    0.00    0.38      0.335  I O     |       |       |       |   587.73
56.917    0.00    0.38      0.332  I O     |       |       |       |   587.71
57.000    0.00    0.38      0.329  I O     |       |       |       |   587.70
57.083    0.00    0.37      0.327  I O     |       |       |       |   587.68
57.167    0.00    0.37      0.324  I O     |       |       |       |   587.66
57.250    0.00    0.37      0.322  I O     |       |       |       |   587.64
57.333    0.00    0.37      0.319  I O     |       |       |       |   587.63
57.417    0.00    0.37      0.317  IO      |       |       |       |   587.61
57.500    0.00    0.37      0.314  IO      |       |       |       |   587.59
57.583    0.00    0.37      0.311  IO      |       |       |       |   587.58
57.667    0.00    0.36      0.309  IO      |       |       |       |   587.56
57.750    0.00    0.36      0.306  IO      |       |       |       |   587.54
57.833    0.00    0.36      0.304  IO      |       |       |       |   587.53
57.917    0.00    0.36      0.301  IO      |       |       |       |   587.51
58.000    0.00    0.36      0.299  IO      |       |       |       |   587.49
58.083    0.00    0.36      0.296  IO      |       |       |       |   587.48
58.167    0.00    0.36      0.294  IO      |       |       |       |   587.46
58.250    0.00    0.35      0.292  IO      |       |       |       |   587.44
58.333    0.00    0.35      0.289  IO      |       |       |       |   587.43
58.417    0.00    0.35      0.287  IO      |       |       |       |   587.41
58.500    0.00    0.35      0.284  IO      |       |       |       |   587.40
58.583    0.00    0.35      0.282  IO      |       |       |       |   587.38
58.667    0.00    0.34      0.280  IO      |       |       |       |   587.36
58.750    0.00    0.34      0.277  IO      |       |       |       |   587.35
58.833    0.00    0.34      0.275  IO      |       |       |       |   587.33
58.917    0.00    0.34      0.273  IO      |       |       |       |   587.32
59.000    0.00    0.34      0.270  IO      |       |       |       |   587.30
59.083    0.00    0.33      0.268  IO      |       |       |       |   587.29
59.167    0.00    0.33      0.266  IO      |       |       |       |   587.27
59.250    0.00    0.33      0.263  IO      |       |       |       |   587.26
59.333    0.00    0.33      0.261  IO      |       |       |       |   587.24
59.417    0.00    0.33      0.259  IO      |       |       |       |   587.23
59.500    0.00    0.33      0.257  IO      |       |       |       |   587.21
59.583    0.00    0.32      0.254  IO      |       |       |       |   587.20
59.667    0.00    0.32      0.252  IO      |       |       |       |   587.18
59.750    0.00    0.32      0.250  IO      |       |       |       |   587.17
59.833    0.00    0.32      0.248  IO      |       |       |       |   587.15
59.917    0.00    0.32      0.246  IO      |       |       |       |   587.14
60.000    0.00    0.31      0.243  IO      |       |       |       |   587.12
60.083    0.00    0.31      0.241  IO      |       |       |       |   587.11
60.167    0.00    0.31      0.239  IO      |       |       |       |   587.09
60.250    0.00    0.31      0.237  IO      |       |       |       |   587.08
60.333    0.00    0.31      0.235  IO      |       |       |       |   587.07
```

```
60.417    0.00    0.31      0.233  IO       |       |       |       |   587.05
60.500    0.00    0.30      0.231  IO       |       |       |       |   587.04
60.583    0.00    0.30      0.228  IO       |       |       |       |   587.02
60.667    0.00    0.30      0.226  IO       |       |       |       |   587.01
60.750    0.00    0.30      0.224  IO       |       |       |       |   587.00
60.833    0.00    0.30      0.222  IO       |       |       |       |   586.98
60.917    0.00    0.30      0.220  IO       |       |       |       |   586.97
61.000    0.00    0.29      0.218  IO       |       |       |       |   586.95
61.083    0.00    0.29      0.216  IO       |       |       |       |   586.94
61.167    0.00    0.29      0.214  IO       |       |       |       |   586.93
61.250    0.00    0.29      0.212  IO       |       |       |       |   586.91
61.333    0.00    0.29      0.210  IO       |       |       |       |   586.90
61.417    0.00    0.29      0.208  IO       |       |       |       |   586.89
61.500    0.00    0.28      0.206  IO       |       |       |       |   586.87
61.583    0.00    0.28      0.204  IO       |       |       |       |   586.86
61.667    0.00    0.28      0.202  IO       |       |       |       |   586.85
61.750    0.00    0.28      0.200  IO       |       |       |       |   586.84
61.833    0.00    0.28      0.198  IO       |       |       |       |   586.82
61.917    0.00    0.28      0.197  IO       |       |       |       |   586.81
62.000    0.00    0.28      0.195  IO       |       |       |       |   586.80
62.083    0.00    0.27      0.193  IO       |       |       |       |   586.78
62.167    0.00    0.27      0.191  IO       |       |       |       |   586.77
62.250    0.00    0.27      0.189  IO       |       |       |       |   586.76
62.333    0.00    0.27      0.187  IO       |       |       |       |   586.75
62.417    0.00    0.27      0.185  IO       |       |       |       |   586.74
62.500    0.00    0.27      0.183  IO       |       |       |       |   586.72
62.583    0.00    0.27      0.182  IO       |       |       |       |   586.71
62.667    0.00    0.26      0.180  IO       |       |       |       |   586.70
62.750    0.00    0.26      0.178  IO       |       |       |       |   586.69
62.833    0.00    0.26      0.176  IO       |       |       |       |   586.67
62.917    0.00    0.26      0.174  IO       |       |       |       |   586.66
63.000    0.00    0.26      0.173  IO       |       |       |       |   586.65
63.083    0.00    0.26      0.171  IO       |       |       |       |   586.64
63.167    0.00    0.26      0.169  IO       |       |       |       |   586.63
63.250    0.00    0.25      0.167  IO       |       |       |       |   586.62
63.333    0.00    0.25      0.166  IO       |       |       |       |   586.60
63.417    0.00    0.25      0.164  IO       |       |       |       |   586.59
63.500    0.00    0.25      0.162  IO       |       |       |       |   586.58
63.583    0.00    0.25      0.160  IO       |       |       |       |   586.57
63.667    0.00    0.25      0.159  IO       |       |       |       |   586.56
63.750    0.00    0.25      0.157  IO       |       |       |       |   586.55
63.833    0.00    0.24      0.155  IO       |       |       |       |   586.54
63.917    0.00    0.24      0.154  IO       |       |       |       |   586.52
64.000    0.00    0.24      0.152  IO       |       |       |       |   586.51
64.083    0.00    0.24      0.150  IO       |       |       |       |   586.50
64.167    0.00    0.24      0.149  IO       |       |       |       |   586.49
64.250    0.00    0.24      0.147  IO       |       |       |       |   586.48
64.333    0.00    0.23      0.145  IO       |       |       |       |   586.47
64.417    0.00    0.23      0.144  IO       |       |       |       |   586.46
64.500    0.00    0.23      0.142  IO       |       |       |       |   586.45
64.583    0.00    0.23      0.141  IO       |       |       |       |   586.44
64.667    0.00    0.22      0.139  IO       |       |       |       |   586.43
64.750    0.00    0.22      0.138  IO       |       |       |       |   586.42
64.833    0.00    0.22      0.136  IO       |       |       |       |   586.41
64.917    0.00    0.22      0.135  IO       |       |       |       |   586.40
65.000    0.00    0.21      0.133  IO       |       |       |       |   586.39
65.083    0.00    0.21      0.132  IO       |       |       |       |   586.38
```

```
65.167     0.00     0.21      0.130  IO        |        |        |        |     586.37
65.250     0.00     0.21      0.129  IO        |        |        |        |     586.36
65.333     0.00     0.20      0.127  IO        |        |        |        |     586.35
65.417     0.00     0.20      0.126  IO        |        |        |        |     586.34
65.500     0.00     0.20      0.125  IO        |        |        |        |     586.33
65.583     0.00     0.20      0.123  IO        |        |        |        |     586.32
65.667     0.00     0.19      0.122  IO        |        |        |        |     586.31
65.750     0.00     0.19      0.121  IO        |        |        |        |     586.30
65.833     0.00     0.19      0.119  IO        |        |        |        |     586.29
65.917     0.00     0.19      0.118  IO        |        |        |        |     586.28
66.000     0.00     0.19      0.117  IO        |        |        |        |     586.28
66.083     0.00     0.18      0.115  O         |        |        |        |     586.27
66.167     0.00     0.18      0.114  O         |        |        |        |     586.26
66.250     0.00     0.18      0.113  O         |        |        |        |     586.25
66.333     0.00     0.18      0.112  O         |        |        |        |     586.24
66.417     0.00     0.18      0.110  O         |        |        |        |     586.23
66.500     0.00     0.17      0.109  O         |        |        |        |     586.23
66.583     0.00     0.17      0.108  O         |        |        |        |     586.22
66.667     0.00     0.17      0.107  O         |        |        |        |     586.21
66.750     0.00     0.17      0.106  O         |        |        |        |     586.20
66.833     0.00     0.17      0.104  O         |        |        |        |     586.19
66.917     0.00     0.17      0.103  O         |        |        |        |     586.19
67.000     0.00     0.16      0.102  O         |        |        |        |     586.18
67.083     0.00     0.16      0.101  O         |        |        |        |     586.17
67.167     0.00     0.16      0.100  O         |        |        |        |     586.16
67.250     0.00     0.16      0.099  O         |        |        |        |     586.16
67.333     0.00     0.16      0.098  O         |        |        |        |     586.15
67.417     0.00     0.15      0.097  O         |        |        |        |     586.14
67.500     0.00     0.15      0.096  O         |        |        |        |     586.14
67.583     0.00     0.15      0.095  O         |        |        |        |     586.13
67.667     0.00     0.15      0.094  O         |        |        |        |     586.12
67.750     0.00     0.15      0.093  O         |        |        |        |     586.11
67.833     0.00     0.15      0.092  O         |        |        |        |     586.11
67.917     0.00     0.14      0.091  O         |        |        |        |     586.10
68.000     0.00     0.14      0.090  O         |        |        |        |     586.09
68.083     0.00     0.14      0.089  O         |        |        |        |     586.09
68.167     0.00     0.14      0.088  O         |        |        |        |     586.08
68.250     0.00     0.14      0.087  O         |        |        |        |     586.07
68.333     0.00     0.14      0.086  O         |        |        |        |     586.07
68.417     0.00     0.14      0.085  O         |        |        |        |     586.06
68.500     0.00     0.13      0.084  O         |        |        |        |     586.06
68.583     0.00     0.13      0.083  O         |        |        |        |     586.05
68.667     0.00     0.13      0.082  O         |        |        |        |     586.04
68.750     0.00     0.13      0.081  O         |        |        |        |     586.04
68.833     0.00     0.13      0.080  O         |        |        |        |     586.03
68.917     0.00     0.13      0.079  O         |        |        |        |     586.03
69.000     0.00     0.13      0.078  O         |        |        |        |     586.02
69.083     0.00     0.12      0.078  O         |        |        |        |     586.01
69.167     0.00     0.12      0.077  O         |        |        |        |     586.01
69.250     0.00     0.12      0.076  O         |        |        |        |     586.00
69.333     0.00     0.12      0.075  O         |        |        |        |     586.00
69.417     0.00     0.12      0.074  O         |        |        |        |     585.99
69.500     0.00     0.12      0.073  O         |        |        |        |     585.99
69.583     0.00     0.12      0.073  O         |        |        |        |     585.98
69.667     0.00     0.11      0.072  O         |        |        |        |     585.98
69.750     0.00     0.11      0.071  O         |        |        |        |     585.97
69.833     0.00     0.11      0.070  O         |        |        |        |     585.97
```

```
 69.917     0.00     0.11       0.070  O        |        |        |        |    585.96
 70.000     0.00     0.11       0.069  O        |        |        |        |    585.96
 70.083     0.00     0.11       0.068  O        |        |        |        |    585.95
 70.167     0.00     0.11       0.067  O        |        |        |        |    585.94
 70.250     0.00     0.11       0.067  O        |        |        |        |    585.94
 70.333     0.00     0.11       0.066  O        |        |        |        |    585.94
 70.417     0.00     0.10       0.065  O        |        |        |        |    585.93
 70.500     0.00     0.10       0.064  O        |        |        |        |    585.93
 70.583     0.00     0.10       0.064  O        |        |        |        |    585.92
 70.667     0.00     0.10       0.063  O        |        |        |        |    585.92
 70.750     0.00     0.10       0.062  O        |        |        |        |    585.91
 70.833     0.00     0.10       0.062  O        |        |        |        |    585.91
 70.917     0.00     0.10       0.061  O        |        |        |        |    585.90
 71.000     0.00     0.10       0.060  O        |        |        |        |    585.90
 71.083     0.00     0.10       0.060  O        |        |        |        |    585.89
 71.167     0.00     0.09       0.059  O        |        |        |        |    585.89
 71.250     0.00     0.09       0.058  O        |        |        |        |    585.88
 71.333     0.00     0.09       0.058  O        |        |        |        |    585.88
 71.417     0.00     0.09       0.057  O        |        |        |        |    585.88
 71.500     0.00     0.09       0.056  O        |        |        |        |    585.87
 71.583     0.00     0.09       0.056  O        |        |        |        |    585.87
 71.667     0.00     0.09       0.055  O        |        |        |        |    585.86
 71.750     0.00     0.09       0.055  O        |        |        |        |    585.86
 71.833     0.00     0.09       0.054  O        |        |        |        |    585.86
 71.917     0.00     0.09       0.053  O        |        |        |        |    585.85
 72.000     0.00     0.08       0.053  O        |        |        |        |    585.85
 72.083     0.00     0.08       0.052  O        |        |        |        |    585.84
 72.167     0.00     0.08       0.052  O        |        |        |        |    585.84
 72.250     0.00     0.08       0.051  O        |        |        |        |    585.84
 72.333     0.00     0.08       0.051  O        |        |        |        |    585.83
 72.417     0.00     0.08       0.050  O        |        |        |        |    585.83
 72.500     0.00     0.08       0.049  O        |        |        |        |    585.83
 72.583     0.00     0.08       0.049  O        |        |        |        |    585.82
 72.667     0.00     0.08       0.048  O        |        |        |        |    585.82
 72.750     0.00     0.08       0.048  O        |        |        |        |    585.81
 72.833     0.00     0.08       0.047  O        |        |        |        |    585.81
 72.917     0.00     0.07       0.047  O        |        |        |        |    585.81
 73.000     0.00     0.07       0.046  O        |        |        |        |    585.80
 73.083     0.00     0.07       0.046  O        |        |        |        |    585.80
 73.167     0.00     0.07       0.045  O        |        |        |        |    585.80
 73.250     0.00     0.07       0.045  O        |        |        |        |    585.79
 73.333     0.00     0.07       0.044  O        |        |        |        |    585.79
 73.417     0.00     0.07       0.044  O        |        |        |        |    585.79
 73.500     0.00     0.07       0.043  O        |        |        |        |    585.78
 73.583     0.00     0.07       0.043  O        |        |        |        |    585.78
 73.667     0.00     0.07       0.042  O        |        |        |        |    585.78
 73.750     0.00     0.07       0.042  O        |        |        |        |    585.78
 73.833     0.00     0.07       0.042  O        |        |        |        |    585.77
 73.917     0.00     0.07       0.041  O        |        |        |        |    585.77
 74.000     0.00     0.06       0.041  O        |        |        |        |    585.77
 74.083     0.00     0.06       0.040  O        |        |        |        |    585.76
 74.167     0.00     0.06       0.040  O        |        |        |        |    585.76
 74.250     0.00     0.06       0.039  O        |        |        |        |    585.76
 74.333     0.00     0.06       0.039  O        |        |        |        |    585.75
 74.417     0.00     0.06       0.038  O        |        |        |        |    585.75
 74.500     0.00     0.06       0.038  O        |        |        |        |    585.75
 74.583     0.00     0.06       0.038  O        |        |        |        |    585.75
```

```
74.667    0.00    0.06      0.037  O       |       |       |       |   585.74
74.750    0.00    0.06      0.037  O       |       |       |       |   585.74
74.833    0.00    0.06      0.036  O       |       |       |       |   585.74
74.917    0.00    0.06      0.036  O       |       |       |       |   585.74
75.000    0.00    0.06      0.036  O       |       |       |       |   585.73
75.083    0.00    0.06      0.035  O       |       |       |       |   585.73
75.167    0.00    0.06      0.035  O       |       |       |       |   585.73
75.250    0.00    0.05      0.034  O       |       |       |       |   585.72
75.333    0.00    0.05      0.034  O       |       |       |       |   585.72
75.417    0.00    0.05      0.034  O       |       |       |       |   585.72
75.500    0.00    0.05      0.033  O       |       |       |       |   585.72
75.583    0.00    0.05      0.033  O       |       |       |       |   585.71
75.667    0.00    0.05      0.033  O       |       |       |       |   585.71
75.750    0.00    0.05      0.032  O       |       |       |       |   585.71
75.833    0.00    0.05      0.032  O       |       |       |       |   585.71
75.917    0.00    0.05      0.032  O       |       |       |       |   585.71
76.000    0.00    0.05      0.031  O       |       |       |       |   585.70
76.083    0.00    0.05      0.031  O       |       |       |       |   585.70
76.167    0.00    0.05      0.031  O       |       |       |       |   585.70
76.250    0.00    0.05      0.030  O       |       |       |       |   585.70
76.333    0.00    0.05      0.030  O       |       |       |       |   585.69
76.417    0.00    0.05      0.030  O       |       |       |       |   585.69
76.500    0.00    0.05      0.029  O       |       |       |       |   585.69
76.583    0.00    0.05      0.029  O       |       |       |       |   585.69
76.667    0.00    0.05      0.029  O       |       |       |       |   585.69
76.750    0.00    0.04      0.028  O       |       |       |       |   585.68
76.833    0.00    0.04      0.028  O       |       |       |       |   585.68
76.917    0.00    0.04      0.028  O       |       |       |       |   585.68
77.000    0.00    0.04      0.027  O       |       |       |       |   585.68
77.083    0.00    0.04      0.027  O       |       |       |       |   585.68
77.167    0.00    0.04      0.027  O       |       |       |       |   585.67
77.250    0.00    0.04      0.027  O       |       |       |       |   585.67
77.333    0.00    0.04      0.026  O       |       |       |       |   585.67
77.417    0.00    0.04      0.026  O       |       |       |       |   585.67
77.500    0.00    0.04      0.026  O       |       |       |       |   585.67
77.583    0.00    0.04      0.025  O       |       |       |       |   585.66
77.667    0.00    0.04      0.025  O       |       |       |       |   585.66
77.750    0.00    0.04      0.025  O       |       |       |       |   585.66
77.833    0.00    0.04      0.025  O       |       |       |       |   585.66
77.917    0.00    0.04      0.024  O       |       |       |       |   585.66
78.000    0.00    0.04      0.024  O       |       |       |       |   585.65
78.083    0.00    0.04      0.024  O       |       |       |       |   585.65
78.167    0.00    0.04      0.024  O       |       |       |       |   585.65
78.250    0.00    0.04      0.023  O       |       |       |       |   585.65
78.333    0.00    0.04      0.023  O       |       |       |       |   585.65
78.417    0.00    0.04      0.023  O       |       |       |       |   585.65
78.500    0.00    0.04      0.023  O       |       |       |       |   585.64
78.583    0.00    0.04      0.022  O       |       |       |       |   585.64
78.667    0.00    0.03      0.022  O       |       |       |       |   585.64
78.750    0.00    0.03      0.022  O       |       |       |       |   585.64
78.833    0.00    0.03      0.022  O       |       |       |       |   585.64
78.917    0.00    0.03      0.021  O       |       |       |       |   585.64
79.000    0.00    0.03      0.021  O       |       |       |       |   585.64
79.083    0.00    0.03      0.021  O       |       |       |       |   585.63
79.167    0.00    0.03      0.021  O       |       |       |       |   585.63
79.250    0.00    0.03      0.020  O       |       |       |       |   585.63
79.333    0.00    0.03      0.020  O       |       |       |       |   585.63
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
79.417    0.00    0.03     0.020  O       |       |       |       |    585.63
79.500    0.00    0.03     0.020  O       |       |       |       |    585.63
79.583    0.00    0.03     0.020  O       |       |       |       |    585.62
79.667    0.00    0.03     0.019  O       |       |       |       |    585.62
79.750    0.00    0.03     0.019  O       |       |       |       |    585.62
79.833    0.00    0.03     0.019  O       |       |       |       |    585.62
79.917    0.00    0.03     0.019  O       |       |       |       |    585.62
80.000    0.00    0.03     0.019  O       |       |       |       |    585.62
80.083    0.00    0.03     0.018  O       |       |       |       |    585.62
80.167    0.00    0.03     0.018  O       |       |       |       |    585.62
80.250    0.00    0.03     0.018  O       |       |       |       |    585.61
80.333    0.00    0.03     0.018  O       |       |       |       |    585.61
80.417    0.00    0.03     0.018  O       |       |       |       |    585.61
80.500    0.00    0.03     0.017  O       |       |       |       |    585.61
80.583    0.00    0.03     0.017  O       |       |       |       |    585.61
80.667    0.00    0.03     0.017  O       |       |       |       |    585.61
80.750    0.00    0.03     0.017  O       |       |       |       |    585.61
80.833    0.00    0.03     0.017  O       |       |       |       |    585.61
80.917    0.00    0.03     0.016  O       |       |       |       |    585.60
81.000    0.00    0.03     0.016  O       |       |       |       |    585.60
81.083    0.00    0.03     0.016  O       |       |       |       |    585.60
81.167    0.00    0.02     0.016  O       |       |       |       |    585.60
81.250    0.00    0.02     0.016  O       |       |       |       |    585.60
81.333    0.00    0.02     0.016  O       |       |       |       |    585.60
81.417    0.00    0.02     0.015  O       |       |       |       |    585.60
81.500    0.00    0.02     0.015  O       |       |       |       |    585.60
81.583    0.00    0.02     0.015  O       |       |       |       |    585.59
81.667    0.00    0.02     0.015  O       |       |       |       |    585.59
81.750    0.00    0.02     0.015  O       |       |       |       |    585.59
81.833    0.00    0.02     0.015  O       |       |       |       |    585.59
81.917    0.00    0.02     0.014  O       |       |       |       |    585.59
82.000    0.00    0.02     0.014  O       |       |       |       |    585.59
82.083    0.00    0.02     0.014  O       |       |       |       |    585.59
82.167    0.00    0.02     0.014  O       |       |       |       |    585.59
82.250    0.00    0.02     0.014  O       |       |       |       |    585.59
82.333    0.00    0.02     0.014  O       |       |       |       |    585.59
82.417    0.00    0.02     0.014  O       |       |       |       |    585.58
82.500    0.00    0.02     0.013  O       |       |       |       |    585.58
82.583    0.00    0.02     0.013  O       |       |       |       |    585.58
82.667    0.00    0.02     0.013  O       |       |       |       |    585.58
82.750    0.00    0.02     0.013  O       |       |       |       |    585.58
82.833    0.00    0.02     0.013  O       |       |       |       |    585.58
82.917    0.00    0.02     0.013  O       |       |       |       |    585.58
83.000    0.00    0.02     0.013  O       |       |       |       |    585.58
83.083    0.00    0.02     0.012  O       |       |       |       |    585.58
83.167    0.00    0.02     0.012  O       |       |       |       |    585.58
83.250    0.00    0.02     0.012  O       |       |       |       |    585.58
83.333    0.00    0.02     0.012  O       |       |       |       |    585.57
83.417    0.00    0.02     0.012  O       |       |       |       |    585.57
83.500    0.00    0.02     0.012  O       |       |       |       |    585.57
83.583    0.00    0.02     0.012  O       |       |       |       |    585.57
83.667    0.00    0.02     0.012  O       |       |       |       |    585.57
83.750    0.00    0.02     0.011  O       |       |       |       |    585.57
83.833    0.00    0.02     0.011  O       |       |       |       |    585.57
83.917    0.00    0.02     0.011  O       |       |       |       |    585.57
84.000    0.00    0.02     0.011  O       |       |       |       |    585.57
84.083    0.00    0.02     0.011  O       |       |       |       |    585.57
```

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

```
84.167    0.00    0.02      0.011  O       |       |       |       |   585.57
84.250    0.00    0.02      0.011  O       |       |       |       |   585.57
84.333    0.00    0.02      0.011  O       |       |       |       |   585.56
84.417    0.00    0.02      0.010  O       |       |       |       |   585.56
84.500    0.00    0.02      0.010  O       |       |       |       |   585.56
84.583    0.00    0.02      0.010  O       |       |       |       |   585.56
84.667    0.00    0.02      0.010  O       |       |       |       |   585.56
84.750    0.00    0.02      0.010  O       |       |       |       |   585.56
84.833    0.00    0.02      0.010  O       |       |       |       |   585.56
84.917    0.00    0.02      0.010  O       |       |       |       |   585.56
85.000    0.00    0.02      0.010  O       |       |       |       |   585.56
85.083    0.00    0.01      0.010  O       |       |       |       |   585.56
85.167    0.00    0.01      0.010  O       |       |       |       |   585.56
85.250    0.00    0.01      0.009  O       |       |       |       |   585.56
85.333    0.00    0.01      0.009  O       |       |       |       |   585.56
85.417    0.00    0.01      0.009  O       |       |       |       |   585.56
85.500    0.00    0.01      0.009  O       |       |       |       |   585.55
85.583    0.00    0.01      0.009  O       |       |       |       |   585.55
85.667    0.00    0.01      0.009  O       |       |       |       |   585.55
85.750    0.00    0.01      0.009  O       |       |       |       |   585.55
85.833    0.00    0.01      0.009  O       |       |       |       |   585.55
85.917    0.00    0.01      0.009  O       |       |       |       |   585.55
86.000    0.00    0.01      0.009  O       |       |       |       |   585.55
86.083    0.00    0.01      0.008  O       |       |       |       |   585.55
86.167    0.00    0.01      0.008  O       |       |       |       |   585.55
86.250    0.00    0.01      0.008  O       |       |       |       |   585.55
86.333    0.00    0.01      0.008  O       |       |       |       |   585.55
86.417    0.00    0.01      0.008  O       |       |       |       |   585.55
86.500    0.00    0.01      0.008  O       |       |       |       |   585.55
86.583    0.00    0.01      0.008  O       |       |       |       |   585.55
86.667    0.00    0.01      0.008  O       |       |       |       |   585.55
86.750    0.00    0.01      0.008  O       |       |       |       |   585.55
86.833    0.00    0.01      0.008  O       |       |       |       |   585.55
86.917    0.00    0.01      0.008  O       |       |       |       |   585.54
87.000    0.00    0.01      0.008  O       |       |       |       |   585.54
87.083    0.00    0.01      0.007  O       |       |       |       |   585.54
87.167    0.00    0.01      0.007  O       |       |       |       |   585.54
87.250    0.00    0.01      0.007  O       |       |       |       |   585.54
87.333    0.00    0.01      0.007  O       |       |       |       |   585.54
87.417    0.00    0.01      0.007  O       |       |       |       |   585.54
87.500    0.00    0.01      0.007  O       |       |       |       |   585.54
87.583    0.00    0.01      0.007  O       |       |       |       |   585.54
87.667    0.00    0.01      0.007  O       |       |       |       |   585.54
87.750    0.00    0.01      0.007  O       |       |       |       |   585.54
87.833    0.00    0.01      0.007  O       |       |       |       |   585.54
87.917    0.00    0.01      0.007  O       |       |       |       |   585.54
88.000    0.00    0.01      0.007  O       |       |       |       |   585.54
88.083    0.00    0.01      0.007  O       |       |       |       |   585.54
88.167    0.00    0.01      0.007  O       |       |       |       |   585.54
88.250    0.00    0.01      0.006  O       |       |       |       |   585.54
88.333    0.00    0.01      0.006  O       |       |       |       |   585.54
88.417    0.00    0.01      0.006  O       |       |       |       |   585.54
88.500    0.00    0.01      0.006  O       |       |       |       |   585.54
88.583    0.00    0.01      0.006  O       |       |       |       |   585.53
88.667    0.00    0.01      0.006  O       |       |       |       |   585.53
88.750    0.00    0.01      0.006  O       |       |       |       |   585.53
88.833    0.00    0.01      0.006  O       |       |       |       |   585.53
```

```
88.917    0.00    0.01      0.006  O        |       |       |       |   585.53
89.000    0.00    0.01      0.006  O        |       |       |       |   585.53
89.083    0.00    0.01      0.006  O        |       |       |       |   585.53
89.167    0.00    0.01      0.006  O        |       |       |       |   585.53
89.250    0.00    0.01      0.006  O        |       |       |       |   585.53
89.333    0.00    0.01      0.006  O        |       |       |       |   585.53
89.417    0.00    0.01      0.006  O        |       |       |       |   585.53
89.500    0.00    0.01      0.006  O        |       |       |       |   585.53
89.583    0.00    0.01      0.005  O        |       |       |       |   585.53
89.667    0.00    0.01      0.005  O        |       |       |       |   585.53
89.750    0.00    0.01      0.005  O        |       |       |       |   585.53
89.833    0.00    0.01      0.005  O        |       |       |       |   585.53
89.917    0.00    0.01      0.005  O        |       |       |       |   585.53
90.000    0.00    0.01      0.005  O        |       |       |       |   585.53
90.083    0.00    0.01      0.005  O        |       |       |       |   585.53
90.167    0.00    0.01      0.005  O        |       |       |       |   585.53
90.250    0.00    0.01      0.005  O        |       |       |       |   585.53
90.333    0.00    0.01      0.005  O        |       |       |       |   585.53
90.417    0.00    0.01      0.005  O        |       |       |       |   585.53
90.500    0.00    0.01      0.005  O        |       |       |       |   585.53
90.583    0.00    0.01      0.005  O        |       |       |       |   585.53
90.667    0.00    0.01      0.005  O        |       |       |       |   585.53
90.750    0.00    0.01      0.005  O        |       |       |       |   585.53
90.833    0.00    0.01      0.005  O        |       |       |       |   585.52
90.917    0.00    0.01      0.005  O        |       |       |       |   585.52
91.000    0.00    0.01      0.005  O        |       |       |       |   585.52
91.083    0.00    0.01      0.005  O        |       |       |       |   585.52
91.167    0.00    0.01      0.005  O        |       |       |       |   585.52
91.250    0.00    0.01      0.004  O        |       |       |       |   585.52
91.333    0.00    0.01      0.004  O        |       |       |       |   585.52
91.417    0.00    0.01      0.004  O        |       |       |       |   585.52
91.500    0.00    0.01      0.004  O        |       |       |       |   585.52
91.583    0.00    0.01      0.004  O        |       |       |       |   585.52
91.667    0.00    0.01      0.004  O        |       |       |       |   585.52
91.750    0.00    0.01      0.004  O        |       |       |       |   585.52
91.833    0.00    0.01      0.004  O        |       |       |       |   585.52
91.917    0.00    0.01      0.004  O        |       |       |       |   585.52
92.000    0.00    0.01      0.004  O        |       |       |       |   585.52
92.083    0.00    0.01      0.004  O        |       |       |       |   585.52
92.167    0.00    0.01      0.004  O        |       |       |       |   585.52
92.250    0.00    0.01      0.004  O        |       |       |       |   585.52
92.333    0.00    0.01      0.004  O        |       |       |       |   585.52
92.417    0.00    0.01      0.004  O        |       |       |       |   585.52
92.500    0.00    0.01      0.004  O        |       |       |       |   585.52
92.583    0.00    0.01      0.004  O        |       |       |       |   585.52
92.667    0.00    0.01      0.004  O        |       |       |       |   585.52
92.750    0.00    0.01      0.004  O        |       |       |       |   585.52
92.833    0.00    0.01      0.004  O        |       |       |       |   585.52
92.917    0.00    0.01      0.004  O        |       |       |       |   585.52
93.000    0.00    0.01      0.004  O        |       |       |       |   585.52
93.083    0.00    0.01      0.004  O        |       |       |       |   585.52
93.167    0.00    0.01      0.004  O        |       |       |       |   585.52
93.250    0.00    0.01      0.004  O        |       |       |       |   585.52
93.333    0.00    0.00      0.003  O        |       |       |       |   585.52
93.417    0.00    0.00      0.003  O        |       |       |       |   585.52
93.500    0.00    0.00      0.003  O        |       |       |       |   585.52
93.583    0.00    0.00      0.003  O        |       |       |       |   585.52
```

```
 93.667    0.00    0.00      0.003  O         |         |         |         |    585.52
 93.750    0.00    0.00      0.003  O         |         |         |         |    585.52
 93.833    0.00    0.00      0.003  O         |         |         |         |    585.52
 93.917    0.00    0.00      0.003  O         |         |         |         |    585.52
 94.000    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.083    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.250    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.333    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.417    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.500    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.583    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.667    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.750    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.833    0.00    0.00      0.003  O         |         |         |         |    585.51
 94.917    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.000    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.083    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.250    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.333    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.417    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.500    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.583    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.667    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.750    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.833    0.00    0.00      0.003  O         |         |         |         |    585.51
 95.917    0.00    0.00      0.003  O         |         |         |         |    585.51
 96.000    0.00    0.00      0.003  O         |         |         |         |    585.51
 96.083    0.00    0.00      0.003  O         |         |         |         |    585.51
 96.167    0.00    0.00      0.003  O         |         |         |         |    585.51
 96.250    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.333    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.417    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.500    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.583    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.667    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.750    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.833    0.00    0.00      0.002  O         |         |         |         |    585.51
 96.917    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.000    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.083    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.167    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.250    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.333    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.417    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.500    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.583    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.667    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.750    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.833    0.00    0.00      0.002  O         |         |         |         |    585.51
 97.917    0.00    0.00      0.002  O         |         |         |         |    585.51
 98.000    0.00    0.00      0.002  O         |         |         |         |    585.51
 98.083    0.00    0.00      0.002  O         |         |         |         |    585.51
 98.167    0.00    0.00      0.002  O         |         |         |         |    585.51
 98.250    0.00    0.00      0.002  O         |         |         |         |    585.51
 98.333    0.00    0.00      0.002  O         |         |         |         |    585.51
```

```
 98.417    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.500    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.583    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.667    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.750    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.833    0.00    0.00      0.002  O       |       |       |       |   585.51
 98.917    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.000    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.083    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.167    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.250    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.333    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.417    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.500    0.00    0.00      0.002  O       |       |       |       |   585.51
 99.583    0.00    0.00      0.002  O       |       |       |       |   585.50
 99.667    0.00    0.00      0.002  O       |       |       |       |   585.50
 99.750    0.00    0.00      0.002  O       |       |       |       |   585.50
 99.833    0.00    0.00      0.002  O       |       |       |       |   585.50
 99.917    0.00    0.00      0.002  O       |       |       |       |   585.50
100.000    0.00    0.00      0.002  O       |       |       |       |   585.50
100.083    0.00    0.00      0.002  O       |       |       |       |   585.50
100.167    0.00    0.00      0.002  O       |       |       |       |   585.50
100.250    0.00    0.00      0.002  O       |       |       |       |   585.50
100.333    0.00    0.00      0.002  O       |       |       |       |   585.50
100.417    0.00    0.00      0.002  O       |       |       |       |   585.50
100.500    0.00    0.00      0.002  O       |       |       |       |   585.50
100.583    0.00    0.00      0.002  O       |       |       |       |   585.50
100.667    0.00    0.00      0.002  O       |       |       |       |   585.50
100.750    0.00    0.00      0.002  O       |       |       |       |   585.50
100.833    0.00    0.00      0.002  O       |       |       |       |   585.50
100.917    0.00    0.00      0.002  O       |       |       |       |   585.50
101.000    0.00    0.00      0.001  O       |       |       |       |   585.50
101.083    0.00    0.00      0.001  O       |       |       |       |   585.50
101.167    0.00    0.00      0.001  O       |       |       |       |   585.50
101.250    0.00    0.00      0.001  O       |       |       |       |   585.50
101.333    0.00    0.00      0.001  O       |       |       |       |   585.50
101.417    0.00    0.00      0.001  O       |       |       |       |   585.50
101.500    0.00    0.00      0.001  O       |       |       |       |   585.50
101.583    0.00    0.00      0.001  O       |       |       |       |   585.50
101.667    0.00    0.00      0.001  O       |       |       |       |   585.50
101.750    0.00    0.00      0.001  O       |       |       |       |   585.50
101.833    0.00    0.00      0.001  O       |       |       |       |   585.50
101.917    0.00    0.00      0.001  O       |       |       |       |   585.50
102.000    0.00    0.00      0.001  O       |       |       |       |   585.50
102.083    0.00    0.00      0.001  O       |       |       |       |   585.50
102.167    0.00    0.00      0.001  O       |       |       |       |   585.50
102.250    0.00    0.00      0.001  O       |       |       |       |   585.50
102.333    0.00    0.00      0.001  O       |       |       |       |   585.50
102.417    0.00    0.00      0.001  O       |       |       |       |   585.50
102.500    0.00    0.00      0.001  O       |       |       |       |   585.50
102.583    0.00    0.00      0.001  O       |       |       |       |   585.50
102.667    0.00    0.00      0.001  O       |       |       |       |   585.50
102.750    0.00    0.00      0.001  O       |       |       |       |   585.50
102.833    0.00    0.00      0.001  O       |       |       |       |   585.50
102.917    0.00    0.00      0.001  O       |       |       |       |   585.50
103.000    0.00    0.00      0.001  O       |       |       |       |   585.50
103.083    0.00    0.00      0.001  O       |       |       |       |   585.50
```

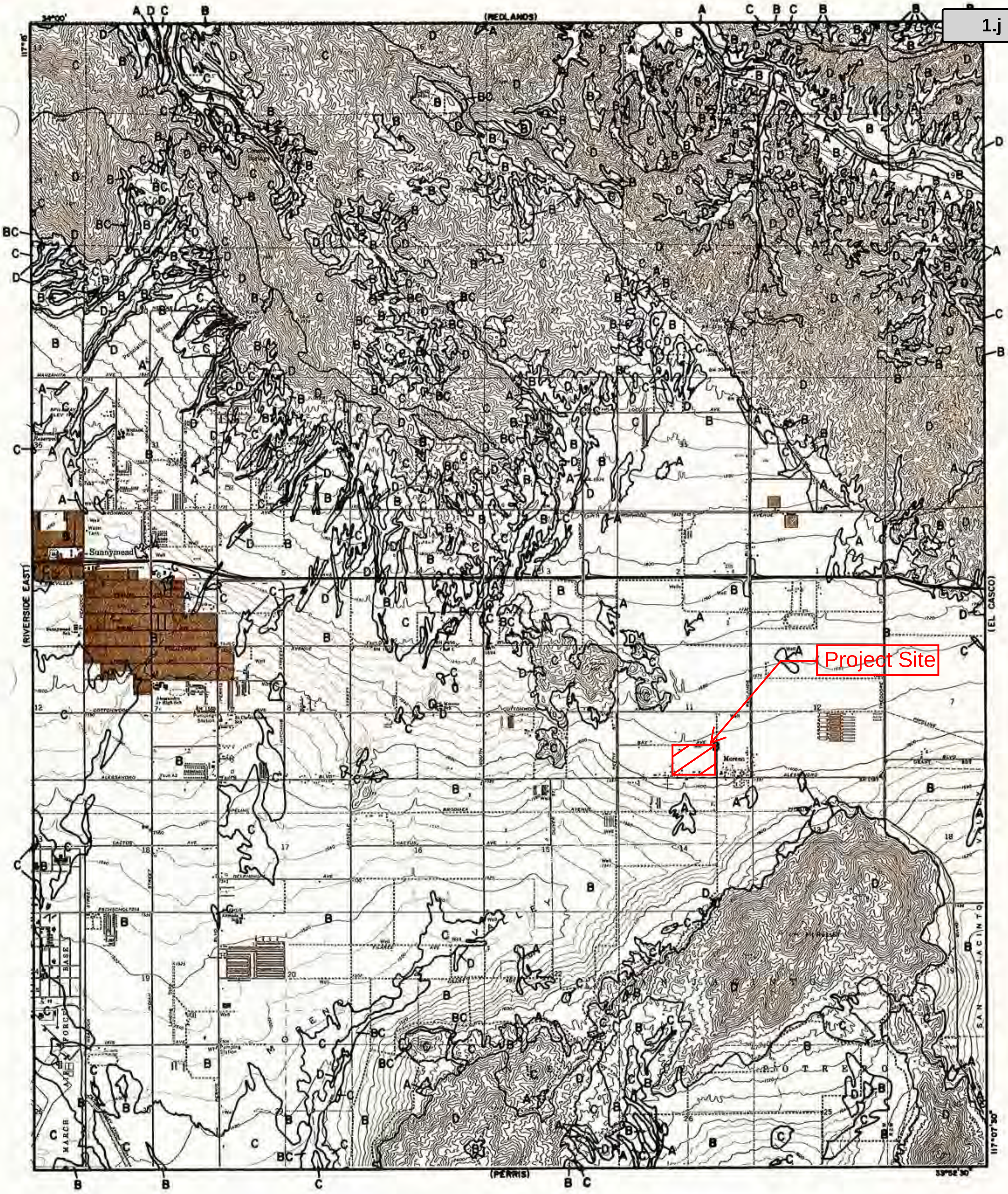
```
103.167    0.00    0.00      0.001  O       |       |       |       |   585.50
103.250    0.00    0.00      0.001  O       |       |       |       |   585.50
103.333    0.00    0.00      0.001  O       |       |       |       |   585.50
103.417    0.00    0.00      0.001  O       |       |       |       |   585.50
103.500    0.00    0.00      0.001  O       |       |       |       |   585.50
103.583    0.00    0.00      0.001  O       |       |       |       |   585.50
103.667    0.00    0.00      0.001  O       |       |       |       |   585.50
103.750    0.00    0.00      0.001  O       |       |       |       |   585.50
103.833    0.00    0.00      0.001  O       |       |       |       |   585.50
103.917    0.00    0.00      0.001  O       |       |       |       |   585.50
104.000    0.00    0.00      0.001  O       |       |       |       |   585.50
104.083    0.00    0.00      0.001  O       |       |       |       |   585.50
104.167    0.00    0.00      0.001  O       |       |       |       |   585.50
104.250    0.00    0.00      0.001  O       |       |       |       |   585.50
104.333    0.00    0.00      0.001  O       |       |       |       |   585.50
104.417    0.00    0.00      0.001  O       |       |       |       |   585.50
104.500    0.00    0.00      0.001  O       |       |       |       |   585.50
104.583    0.00    0.00      0.001  O       |       |       |       |   585.50
104.667    0.00    0.00      0.001  O       |       |       |       |   585.50
104.750    0.00    0.00      0.001  O       |       |       |       |   585.50
104.833    0.00    0.00      0.001  O       |       |       |       |   585.50
104.917    0.00    0.00      0.001  O       |       |       |       |   585.50
105.000    0.00    0.00      0.001  O       |       |       |       |   585.50
105.083    0.00    0.00      0.001  O       |       |       |       |   585.50
105.167    0.00    0.00      0.001  O       |       |       |       |   585.50
105.250    0.00    0.00      0.001  O       |       |       |       |   585.50
105.333    0.00    0.00      0.001  O       |       |       |       |   585.50
105.417    0.00    0.00      0.001  O       |       |       |       |   585.50
105.500    0.00    0.00      0.001  O       |       |       |       |   582.62

      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =  1266
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =        4.126 (CFS)
                  Total volume =       3.611 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
      ***********************************************************************

      --------------------------------------------------------------------
```

IV. EXHIBITS

EXHIBIT A	HYDROLOGIC SOILS MAP
EXHIBIT B	PRECIPITATION MAPS
EXHIBIT C	RATIONAL HYDROLOGY MAP
EXHIBIT D	UNIT HYDROGRAPH MAP

EXHIBIT A

HYDROLOGIC SOILS MAP



LEGEND

SOILS GROUP BOUNDARY
A SOILS GROUP DESIGNATION

RCFC & WCD
HYDROLOGY MANUAL

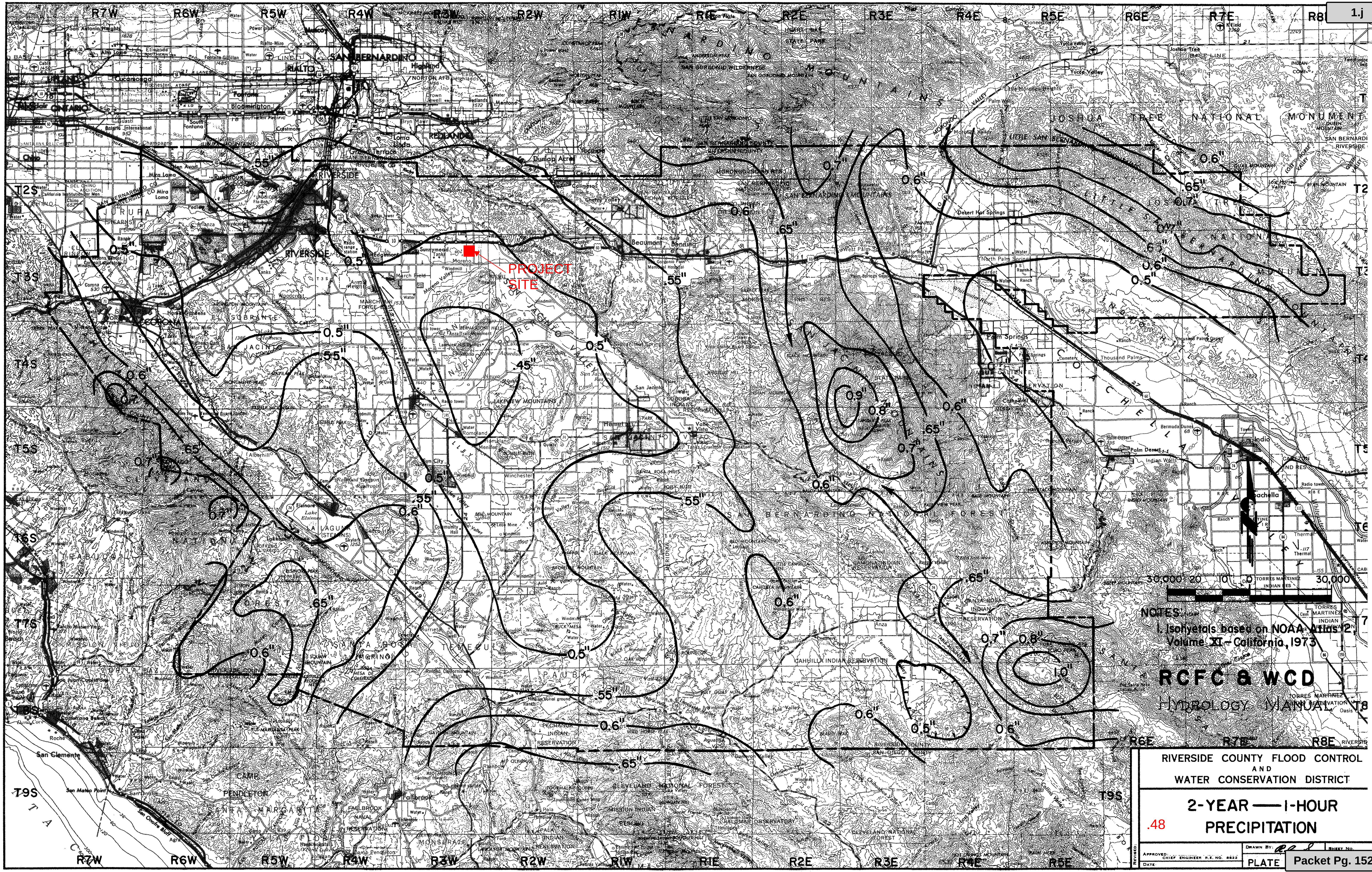
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SUNNYMEAD

PLATE C

EXHIBIT B

PRECIPITATION MAPS



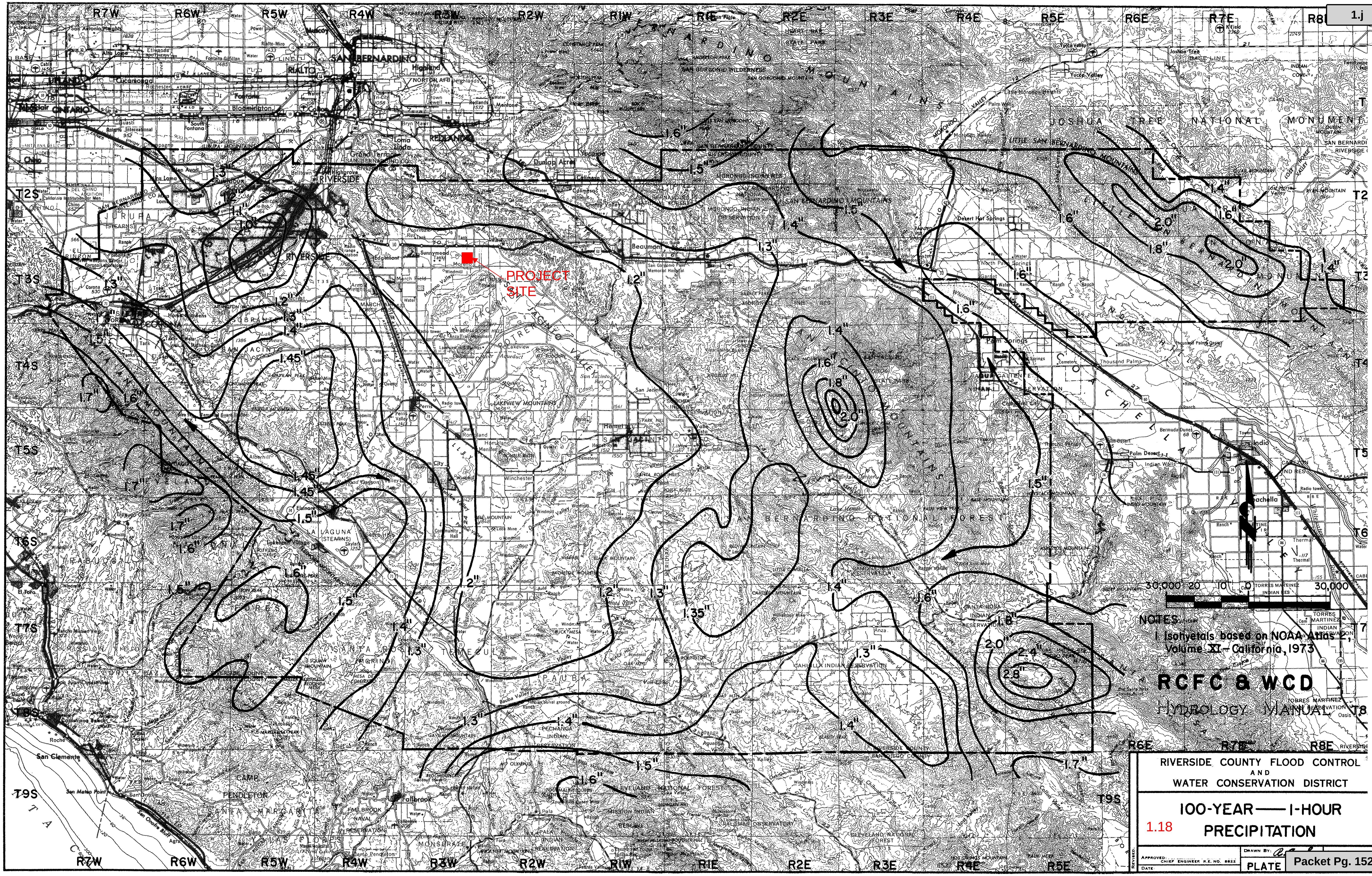
NOTES
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR PRECIPITATION

DRAWN BY:
APPROVED: CHIEF ENGINEER R.E. NO. 8622
DATE
REVISED
PLATE
SHEET NO.



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

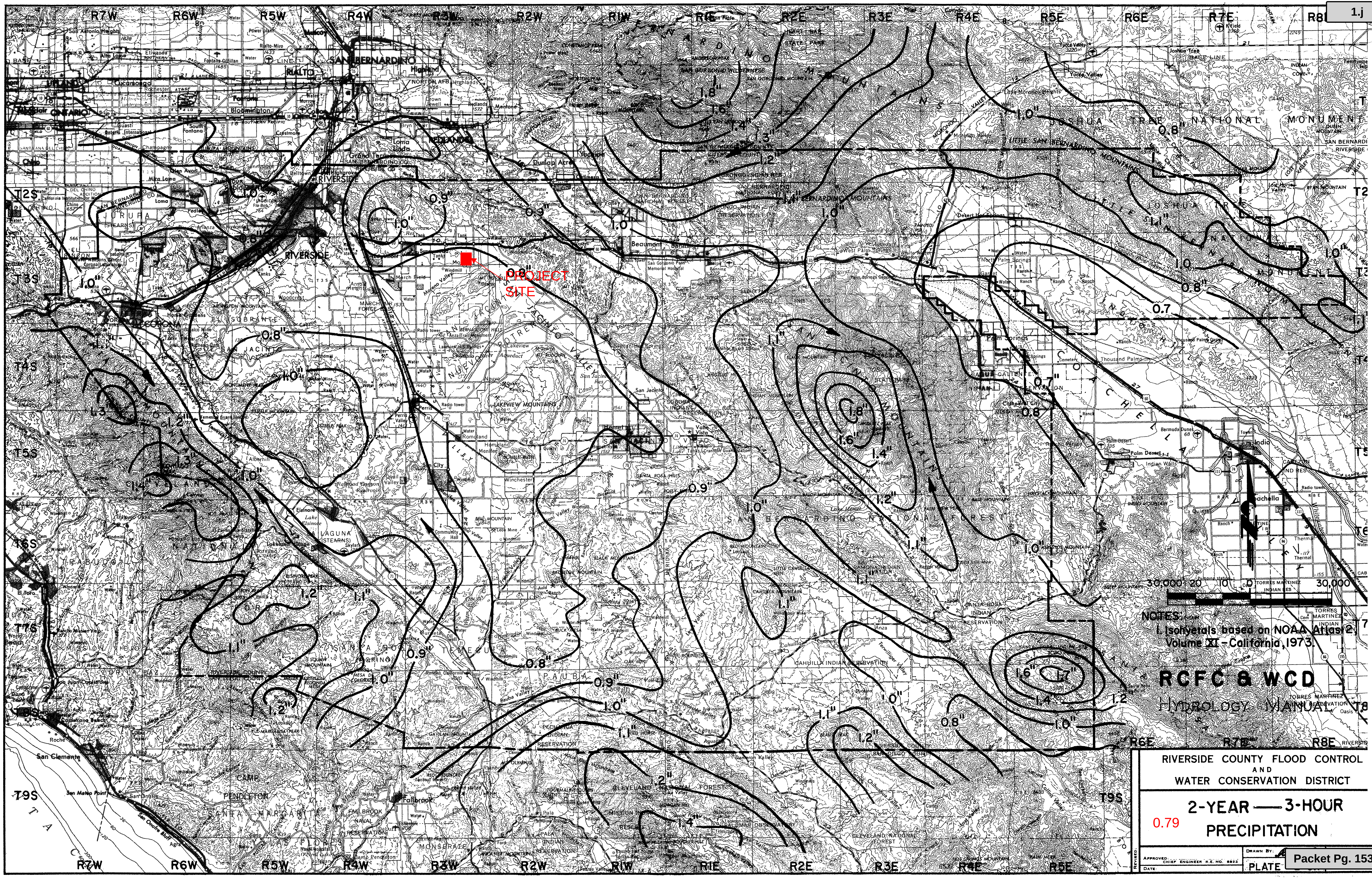
RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 1-HOUR
PRECIPITATION

1.18

APPROVED: CHIEF ENGINEER R.E. NO. 8822
DATE
DRAWN BY:
PLATE
REVISED



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI – California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

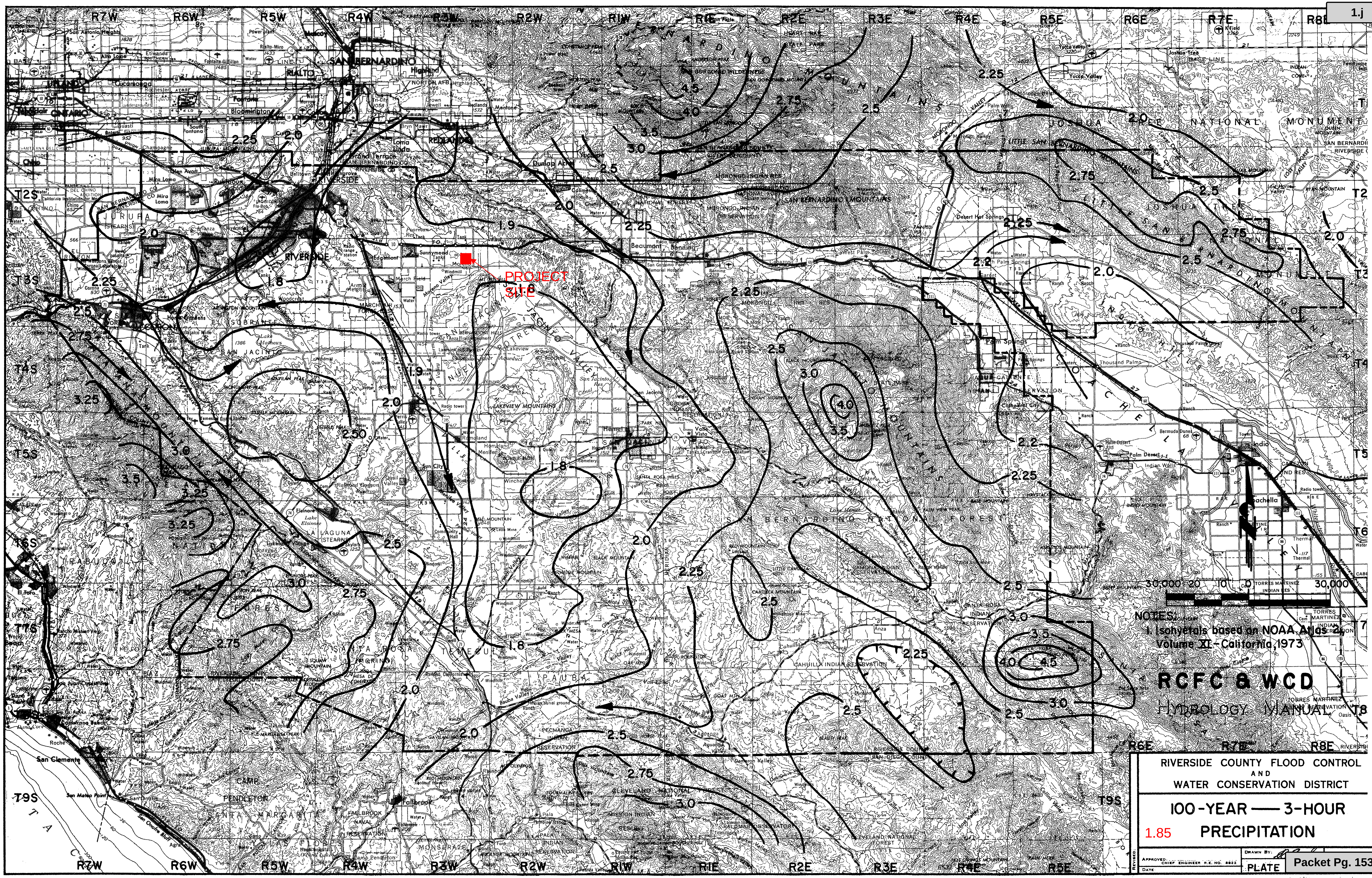
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 3-HOUR
PRECIPITATION

0.79

APPROVED
CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY
PLATE

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973

RCFC & WCD
HYDROLOGY MANUAL

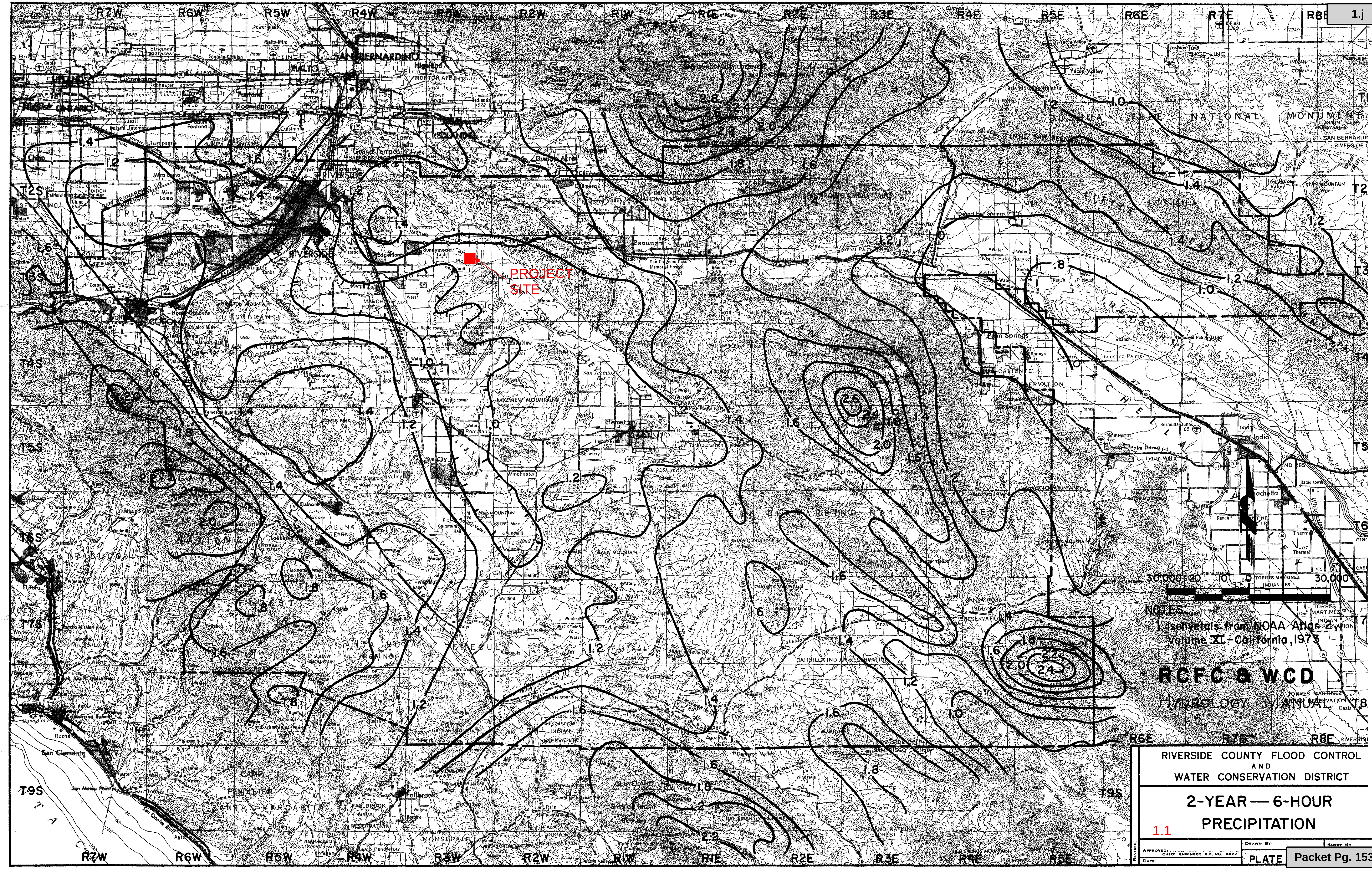
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR —— 3-HOUR
PRECIPITATION

1.85

APPROVED .... CHIEF ENGINEER R.E. NO. 8822
DATE
REVISED:
DRAWN BY:
PLATE

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



NOTES:
1. Isohyetals from NOAA Atlas 2 Volume XI - California, 1973

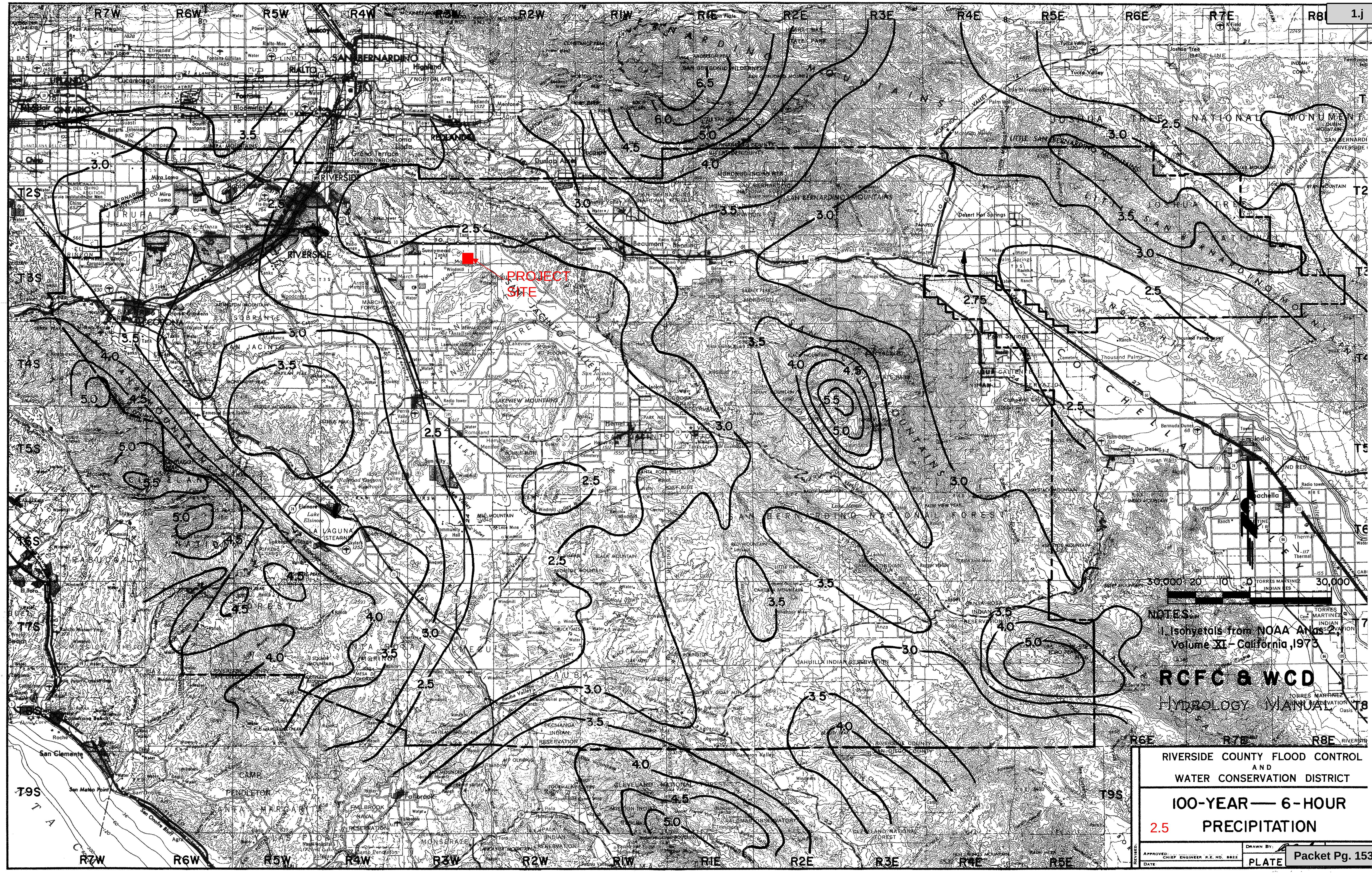
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 6-HOUR PRECIPITATION

1.1

REVISED:
APPROVED: CHIEF ENGINEER R.E. NO. 8822
DATE:
DRAWN BY:
SHEET NO.
PLATE

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

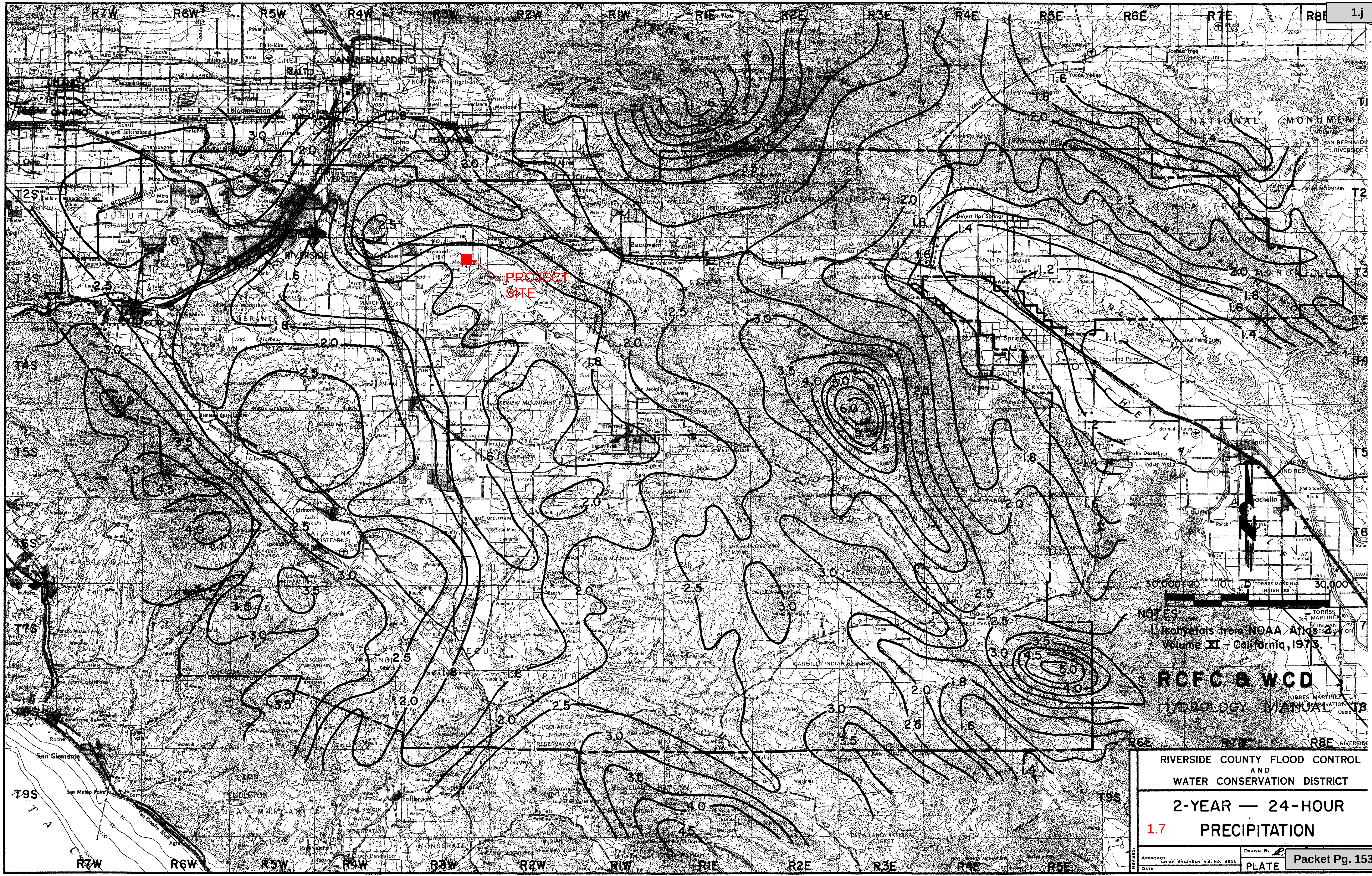


RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR — 6-HOUR PRECIPITATION

2.5

APPROVED: CHIEF ENGINEER R.E. NO.
DATE
REVISED
DRAWN BY:
PLATE



NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD

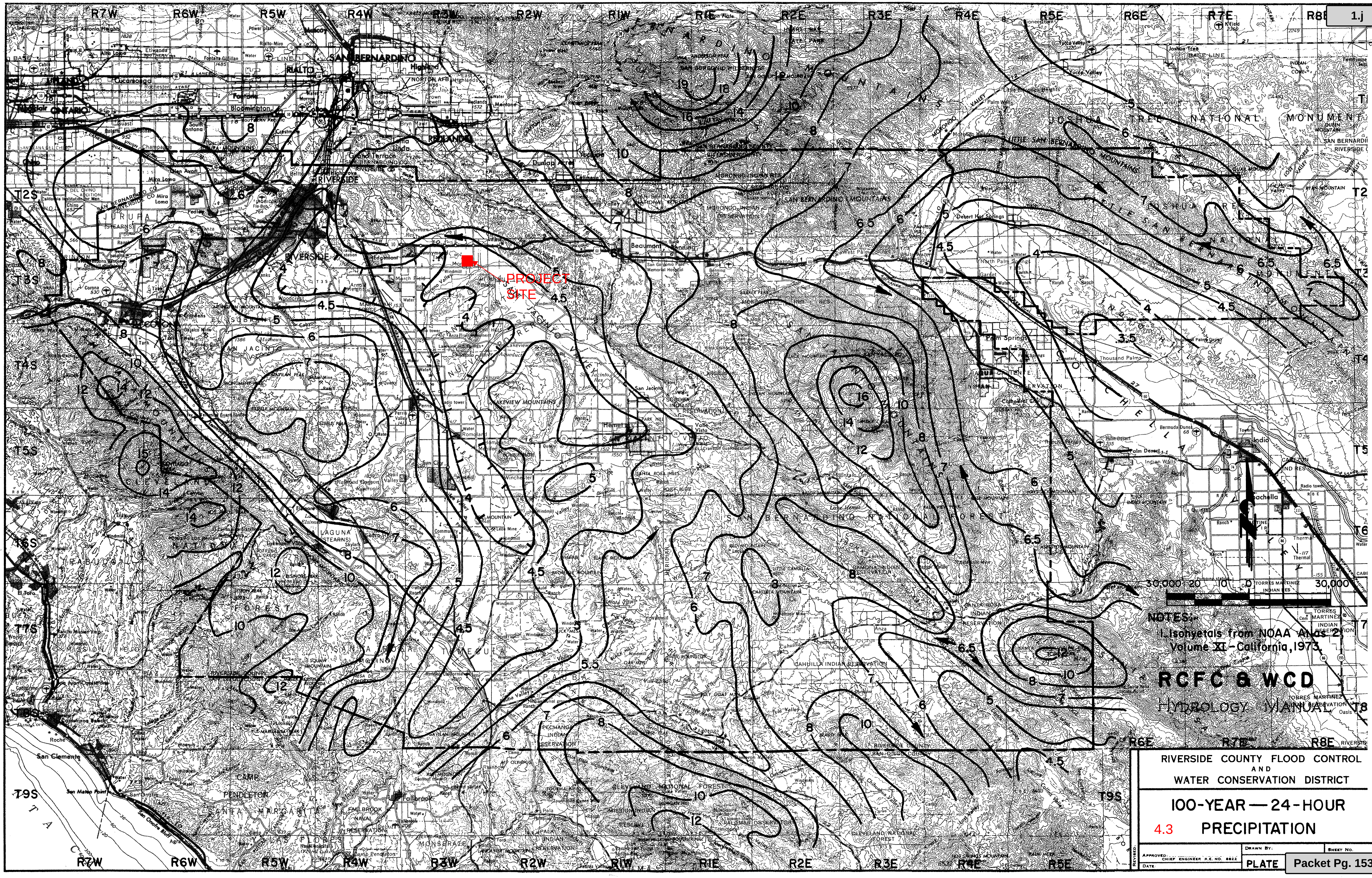
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

2-YEAR — 24-HOUR PRECIPITATION

1.7

APPROVED: CHIEF ENGINEER R.E. NO.
DATE
DRAWN BY:
PLATE
REVISED:



NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD
HYDROLOGY MANUAL

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

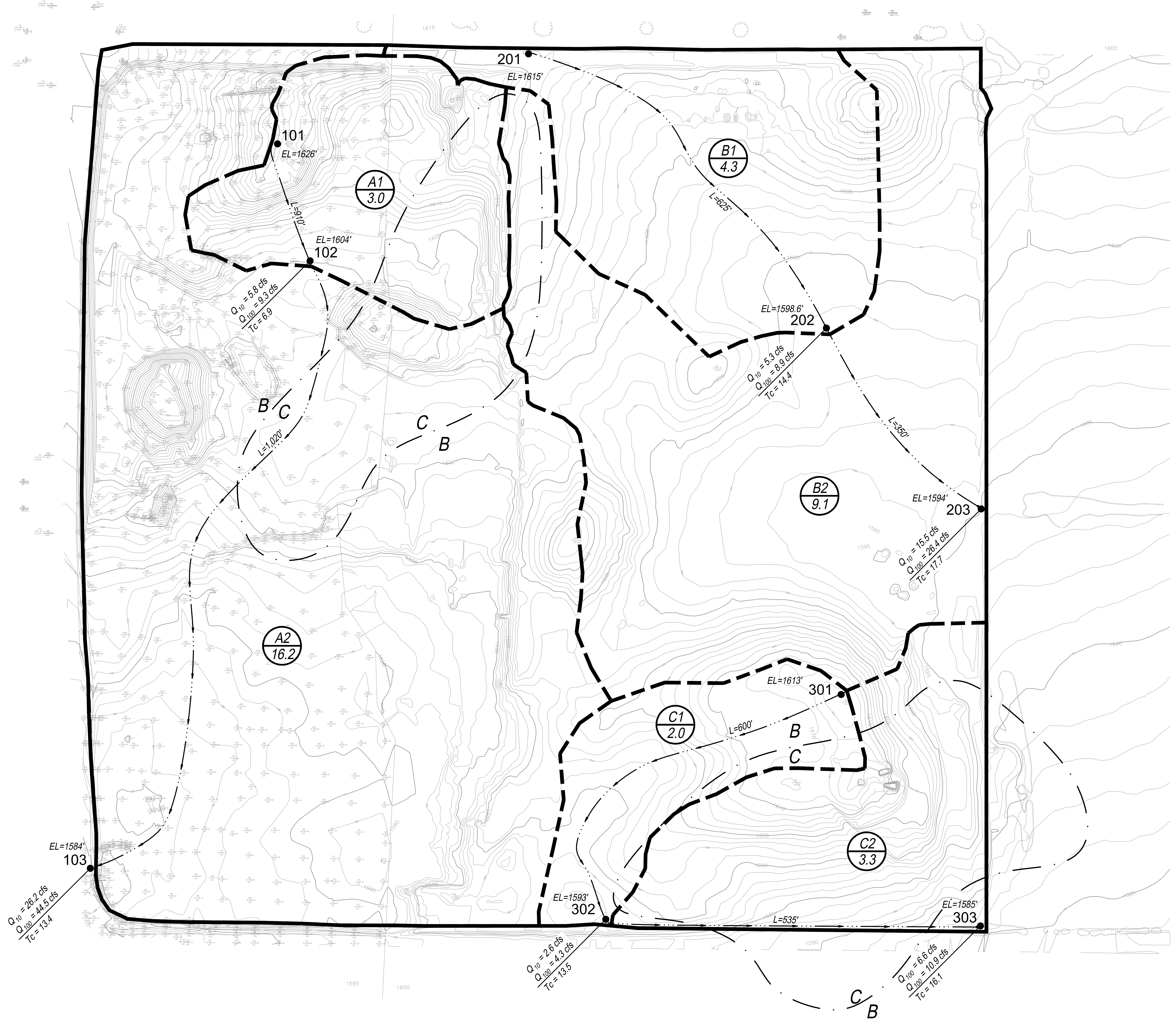
100-YEAR — 24-HOUR
4.3 PRECIPITATION

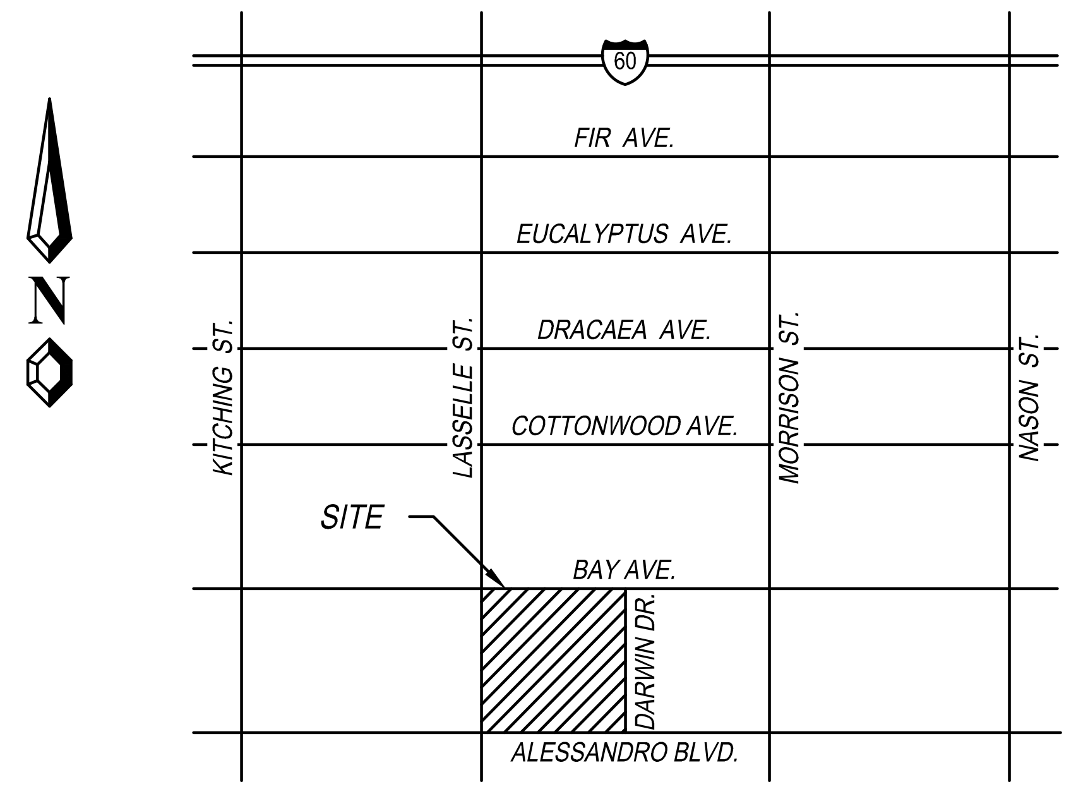
REVISED
APPROVED: CHIEF ENGINEER R.E. NO. 8822
DATE
DRAWN BY:
SHEET NO.
PLATE

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

EXHIBIT C

RATIONAL HYDROLOGY



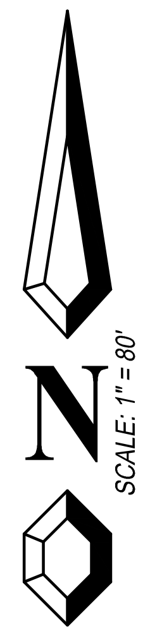


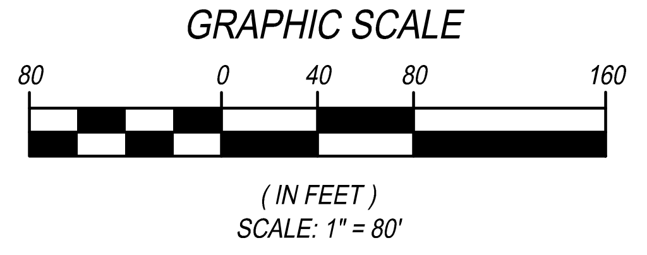
VICINITY MAP

NOT TO SCALE

LEGEND

▬▬▬	MAJOR DRAINAGE BOUNDARY
▬ ▬ ▬	MINOR DRAINAGE BOUNDARY
Q_{10} = 8.0cfs Q_{100} = 10.0cfs Tc= C.B. #	PEAK FLOW RATE TIME OF CONCENTRATION
ΣQ_{10} = 8.0cfs ΣQ_{100} = 10.0cfs Tc=	PEAK CONFLUENCE FLOW RATE TIME OF CONCENTRATION
— · · · —	PROPOSED STORM DRAIN
— C · B —	SOIL GROUP BOUNDARY





EXISTING
HYDROLOGY
TENT. TRACT MAP 38123

PREPARED BY:

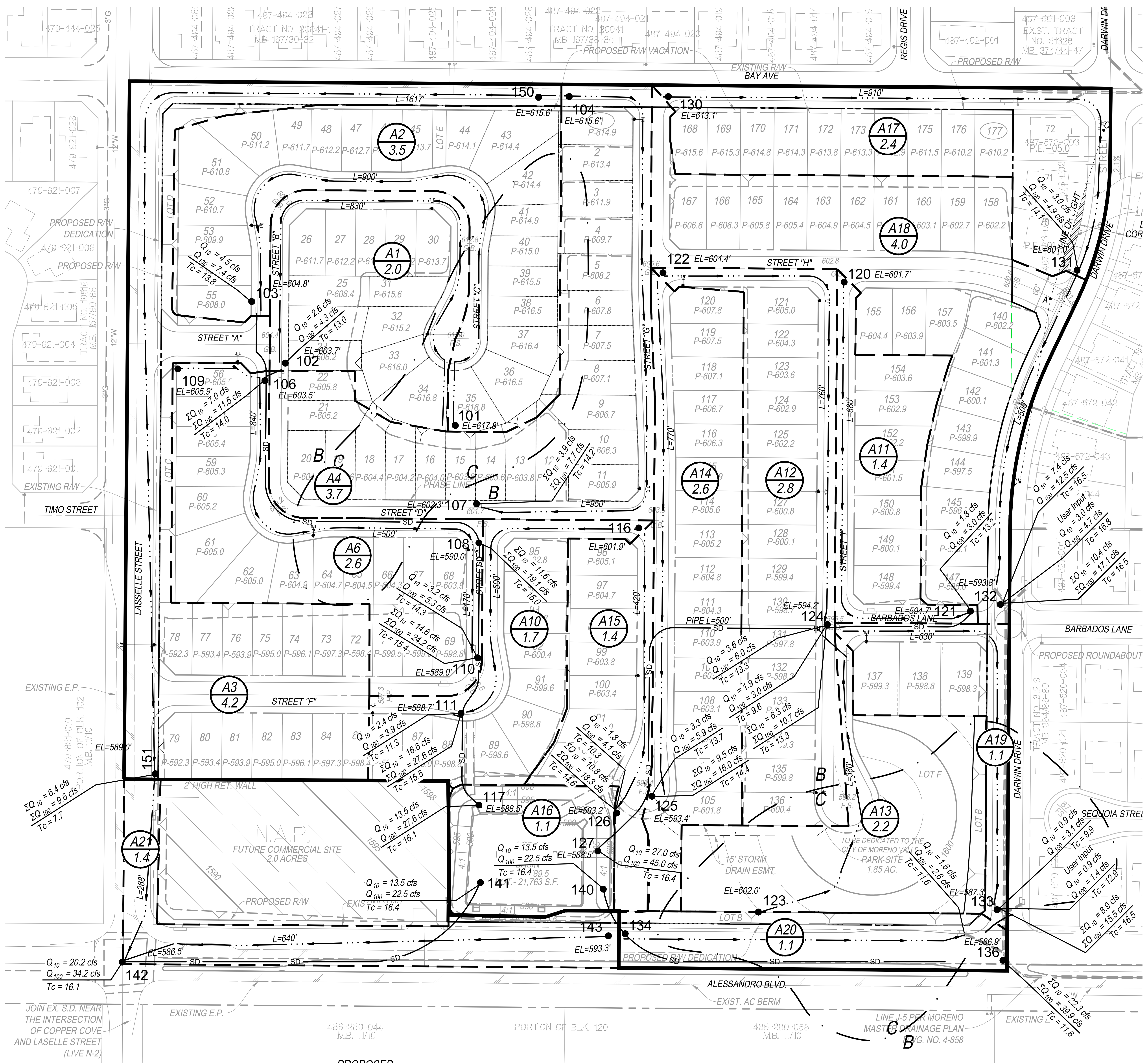
MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

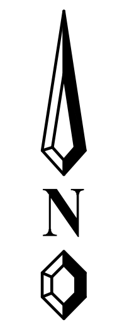
Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

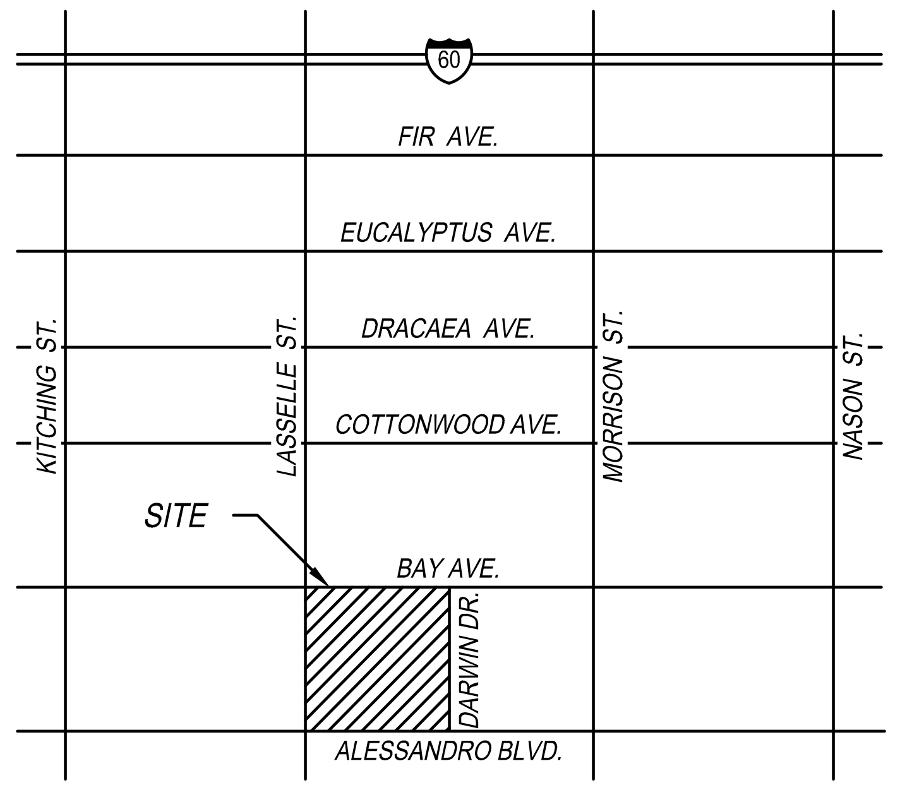
Job No.

Dwg. Revision Date: 06/11/2021 BY: M.M. PLOT DATE: 06/10/2021

P:\20-0300-06 Moreno Valley Tentative Tract Map\Improvements\Storm Drain\Hydrology\Rational\Existing Hydrology.dwg





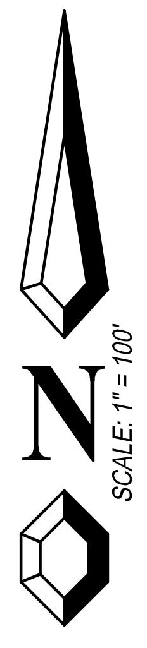


VICINITY MAP

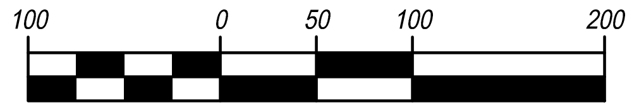
NOT TO SCALE

LEGEND

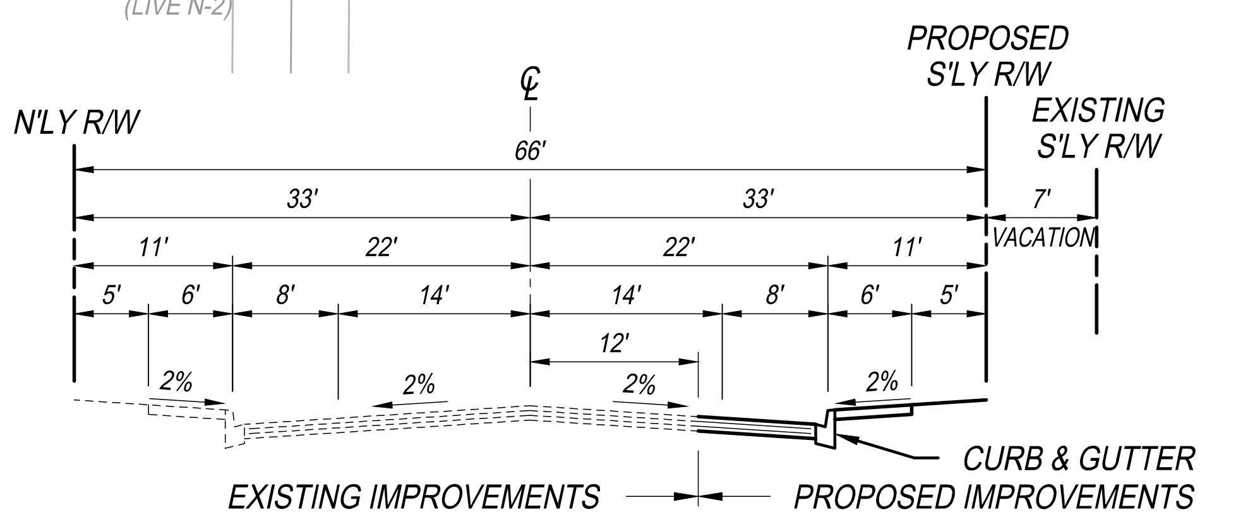
▬	MAJOR DRAINAGE BOUNDARY
‒ ‒	MINOR DRAINAGE BOUNDARY
Q_{10}= 8.0cfs Q_{100}= 10.0cfs Tc= C.B. #	PEAK FLOW RATE TIME OF CONCENTRATION
ΣQ_{10}= 8.0cfs ΣQ_{100}= 10.0cfs Tc=	PEAK CONFLUENCE FLOW RATE TIME OF CONCENTRATION
SD	PROPOSED STORM DRAIN
C B	SOIL GROUP BOUNDARY



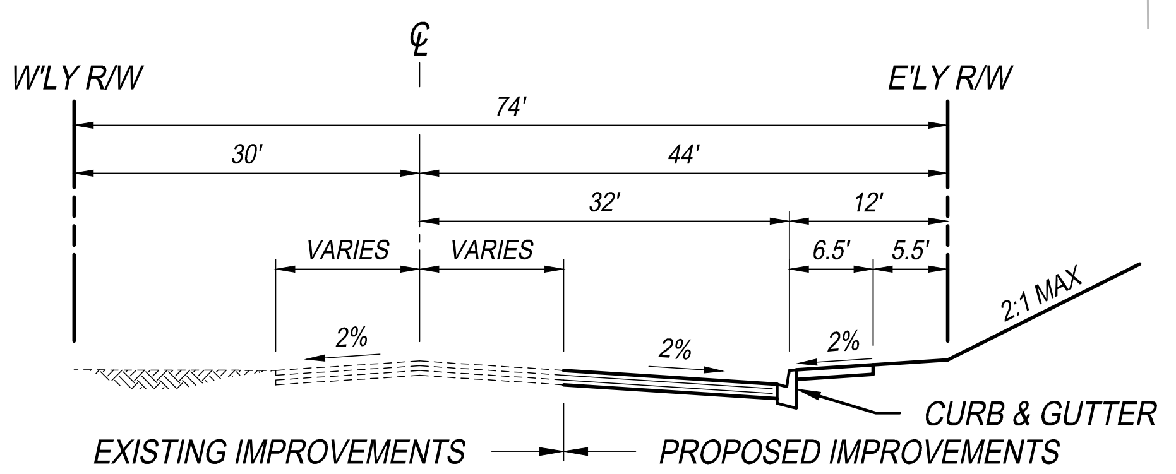
GRAPHIC SCALE



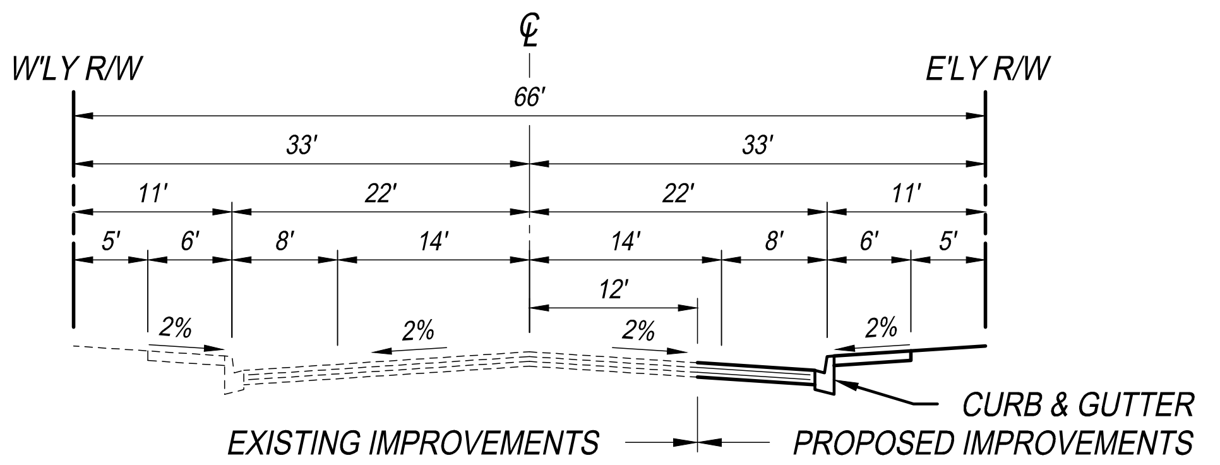
(IN FEET)
SCALE: 1" = 100'



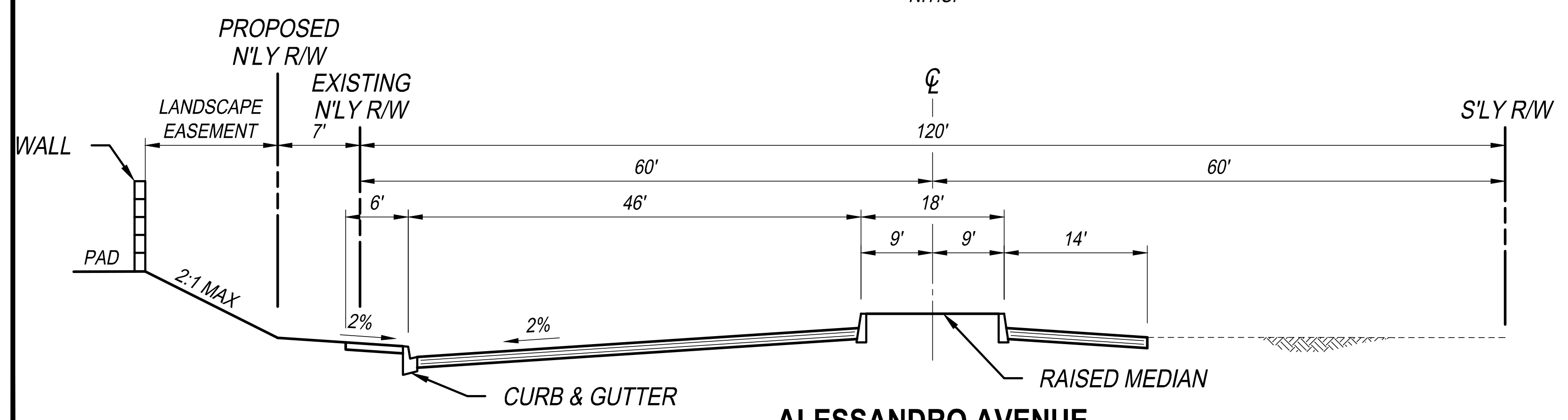
BAY AVENUE
COLLECTOR STD. NO. MVSI-106B
TYPICAL SECTION
N.T.S.



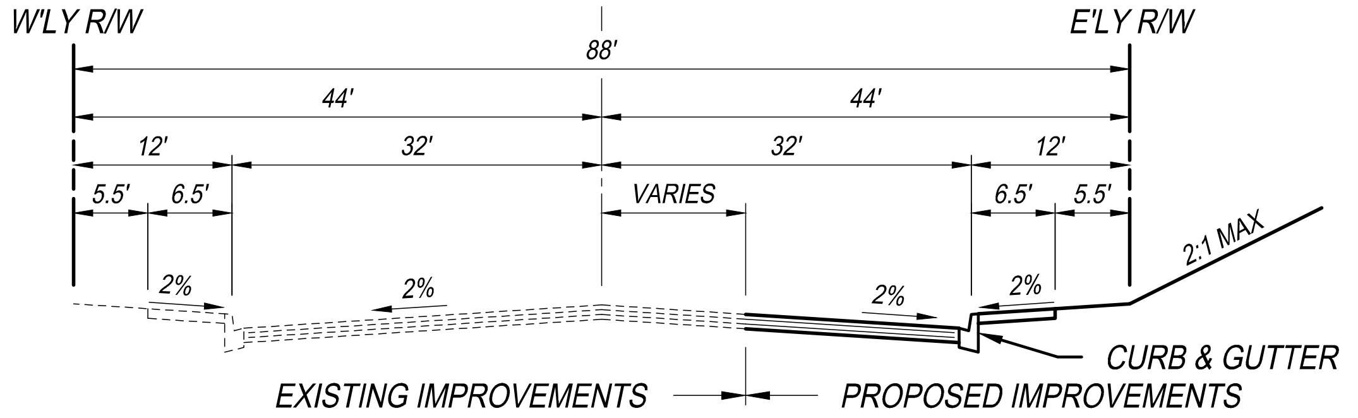
LASSELLE STREET
MINOR ARTERIAL STD. NO. MVSI-105A
TYPICAL SECTION
N.T.S.



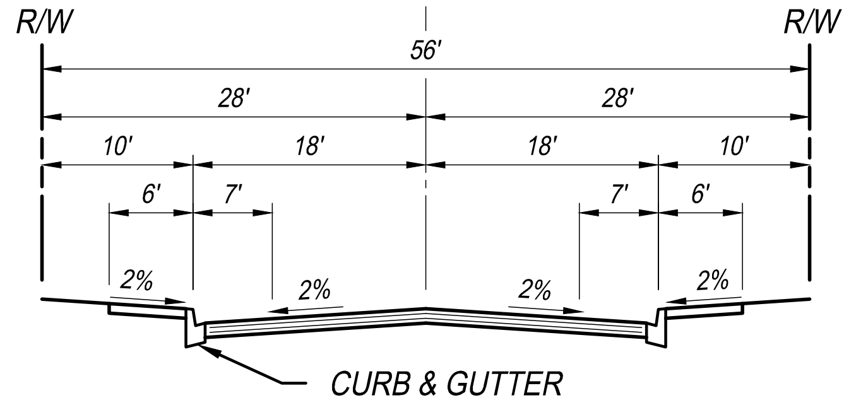
DARWIN DRIVE
COLLECTOR STD. NO. MVSI-106B
TYPICAL SECTION
N.T.S.



ALESSANDRO AVENUE
DIVIDED MAJOR ARTERIAL STD. NO. MVSI-101A
TYPICAL SECTION
N.T.S.



LASSELLE STREET
MINOR ARTERIAL STD. NO. MVSI-105A
TYPICAL SECTION
N.T.S.



STREET "A" THRU "I" & BARBADOS LANE
SHORT LOCAL STREET STD. NO. MVSI-108B
TYPICAL SECTION
N.T.S.

PROPOSED HYDROLOGY TRACT NO. 38123

PREPARED BY:

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Dwg. Revision Date: 11/05/2021 BY: M.M. PLOT DATE: 11/03/2021

P:\20-0300-06 Moreno Valley Tentative Tract Map\Improvements\Storm Drain\Hydrology\Rational\09-02-21 Proposed Hydrology.dwg

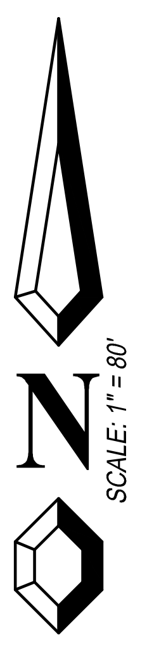
EXHIBIT D

UNIT HYDROGRAPH MAPS

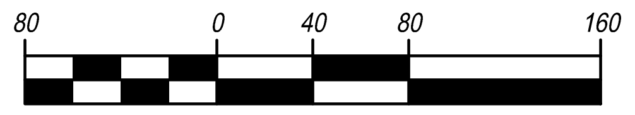
VICINITY MAP

LEGEND

▬▬▬	MAJOR DRAINAGE BOUNDARY
▬ ▬ ▬	MINOR DRAINAGE BOUNDARY
Q_{10} = 8.0cfs Q_{100}= 10.0cfs Tc= C.B. #	PEAK FLOW RATE TIME OF CONCENTRATION
ΣQ_{10}= 8.0cfs ΣQ_{100}= 10.0cfs Tc=	PEAK CONFLUENCE FLOW RATE TIME OF CONCENTRATION
— · · · —	PROPOSED STORM DRAIN
— C/B —	SOIL GROUP BOUNDARY



GRAPHIC SCALE



(IN FEET)
SCALE: 1" = 80'

EXISTING
HYDROLOGY
TENT. TRACT MAP 38123

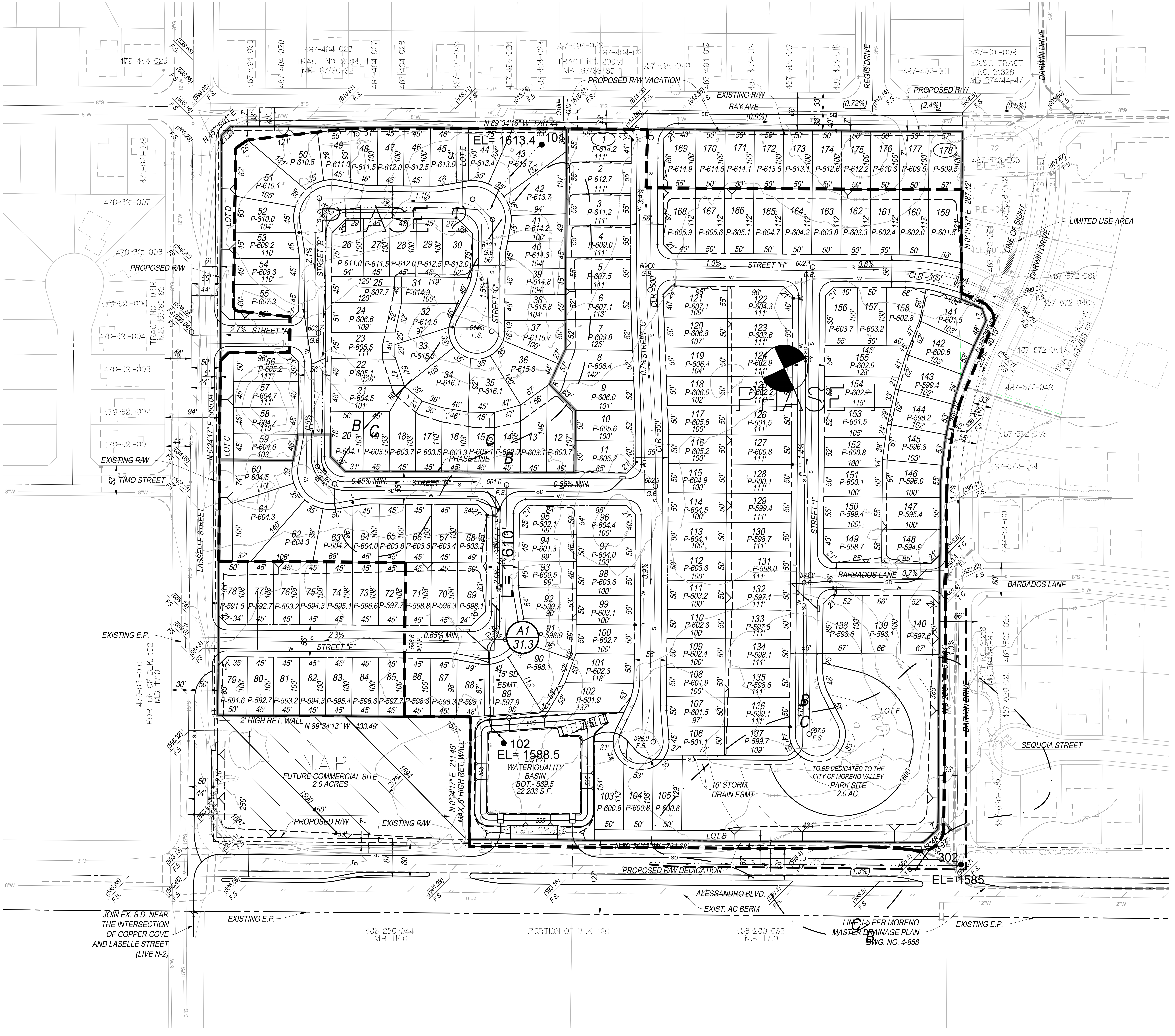
PREPARED BY:

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

Attachment: Appendix G - Hydrology Report [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Dwg. Revision Date: 03/04/2021 BY: M.M. PLOT DATE: 06/14/2021

P:\20-0300-06 Moreno Valley Tentative Tract Map\Improvements\Storm Drain\Hydrology\Unit Hydopgraph\Existing Unit Hydrograph.dwg



VICINITY MAP

LEGEND

▬▬▬	MAJOR DRAINAGE BOUNDARY
▬ ▬ ▬	MINOR DRAINAGE BOUNDARY
Q_{10} = 8.0cfs Q_{100} = 10.0cfs Tc= C.B. #	PEAK FLOW RATE TIME OF CONCENTRATION
ΣQ_{10} = 8.0cfs ΣQ_{100} = 10.0cfs Tc=	PEAK CONFLUENCE FLOW RATE TIME OF CONCENTRATION
—— · · · ——	PROPOSED STORM DRAIN
—— C · B ——	SOIL GROUP BOUNDARY

N

SCALE: 1" = 80'

GRAPHIC SCALE

80 0 40 80 160

(IN FEET)
SCALE: 1" = 80'

PROPOSED HYDROLOGY TENT. TRACT MAP 38123

PREPARED BY:

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

Jot

Dwg. Revision Date: 09/07/2021 BY: M.M. PLOT DATE: 09/09/2021

P:\20-0300-06 Moreno Valley Tentative Tract Map\Improvements\Storm Drain\Hydrology\Unit Hydopgraph\Proposed Uni

Tentative Tract Map 38123 Residential Project

Noise Assessment Study

October 2021 | 00239.00028.001

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

This page intentionally left blank

Tentative Tract Map 38123 Residential Project

Noise Assessment Study

Prepared for:

The City of Moreno Valley
Planning Division
14177 Frederick Street
P.O. Box 88005
Moreno Valley, CA 92552

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

October 2021 | 00239.00028.001

This page intentionally left blank

TABLE OF CONTENTS

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
ANFO	ammonium nitrate/fuel oil
ANSI	American National Standards Institute
APN	Assessor’s Parcel Number
CAD	Computer Aided Design
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Moreno Valley
CNEL	Community Noise Equivalent Level
CY	cubic yard
dB	decibel
dBA	A-weighted decibels
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
kHz	kilohertz
L_{DN}	Day-Night level
L_{EQ}	equivalent sound level
L_{MAX}	maximum noise level
mPa	micro-Pascals
mph	miles per hour
NSLU	noise-sensitive land use
OSM	Office of Surface Mining Reclamation and Enforcement
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
SPL	sound pressure level
STC	Sound Transmission Class
S_{WL}	sound power level

ACRONYMS AND ABBREVIATIONS (cont.)

TFIC	Transportation Forecast Information Center
TNM	Traffic Noise Model
USDOT	U.S. Department of Transportation

EXECUTIVE SUMMARY

This report presents an assessment of potential noise impacts associated with the proposed Tentative Tract Map 38123 Residential Project (project) in the City of Moreno Valley (City). The project area totals 33.6 acres and is located on two adjacent parcels. The Project includes construction of 177 single-family residential lots, a water quality basin, a 2.1-acre park, underground utilities, street improvements, and off-site sewer improvements. The vacant lot in the southwest corner of the western parcel is not part of the project.

Anticipated construction activities would generate temporary elevated noise levels for nearby residences to the west, north, and east. Noise levels from construction equipment, as well as potential blasting, may exceed the noise limits set by the City. Mitigation measures NOI-1 and NOI-2 would reduce noise impacts to less than significant levels. Construction would not generate substantial vibration.

Future residential units and exterior use areas would be exposed to noise from vehicular traffic along Alessandro Boulevard, Bay Avenue, and Lassalle Street. Noise levels at exterior use areas would not exceed the 65 CNEL exterior limit set forth in the City's General Plan Noise Element. The incorporation of mitigation measure NOI-3 requires the incorporation of noise-reducing building materials and an analysis to confirm results to ensure that interior noise levels do not exceed the applicable 45 CNEL interior limits for residential uses.

The project's heating, ventilation, and air conditioning (HVAC) systems would not exceed allowable City limits within the noise ordinance at the nearest property lines.

The addition of project-generated traffic to nearby roadways, would not result in a significant increase in ambient noise levels along affected roadways.

This page intentionally left blank

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report analyzes potential noise and vibration impacts associated with the proposed Darco Residential Project (project). The analysis includes a description of existing conditions in the project vicinity and an assessment of potential impacts associated with project implementation. Analysis within this report addresses the relevant issues listed in Appendix G of the California Environmental Quality Act (CEQA) Guidelines.

1.2 PROJECT LOCATION

The project is located within the City of Moreno Valley (City), in western Riverside County (Figure 1, *Regional Location*. The site is bordered by Bay Avenue along the north, Darwin Drive along the east, Alessandro Boulevard on the south, and Laselle Street on the west. The project site consists of two adjacent properties: the approximately 15.6-acre “Skylar Place” property (Assessor’s Parcel Number [APN] 487-470-025) on the west and the approximately 17.9-acre “Windsong” property (APN 487-470-028) on the east. See Figure 1, *Regional Location*, and Figure 2, *Aerial Photograph*.

1.3 PROJECT DESCRIPTION

The proposed project intends to develop a residential tract within the two adjacent parcels, totaling 33.6 acres of development (see Figure 3, *Site Plan*). The project would construction of 177 single-family homes with residential home sizes ranging from 1,378 square feet (SF) to 2,435 SF. Site development would include the grading and construction of single-family residential lots, a water quality basin, an approximately two-acre park, underground utilities, street improvements, and off-site sewer improvements. The vacant lot in the southwest corner of the western parcel is not part of the project. Vehicular access to the project site would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. A series of internal drives would provide access throughout the two properties and to the residences.

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center. This designation allows for residential uses, including single-family homes. Topographically, site elevations range from approximately 1,626 feet above mean sea level (amsl) located in the north-northeast edge of the site and lowest ground elevation of 1,585 feet amsl towards the southwestern corner. Surface drainage is to the south-southwest. Both parcels are currently vacant but have been graded and/or previously disturbed by past activities and are currently regularly disked and/or mowed for fire prevention.

1.4 NOISE AND SOUND LEVEL DESCRIPTORS AND TERMINOLOGY

1.4.1 Descriptors

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dBA weighting, and noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting. This is similar to the Day Night sound level (L_{DN}), which is a 24-hour average with an added 10 dBA weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on dBA. These metrics are used to express noise levels for both measurement and municipal regulations, as well as for land use guidelines and enforcement of noise ordinances.

1.4.2 Terminology

1.4.2.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

1.4.2.2 Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

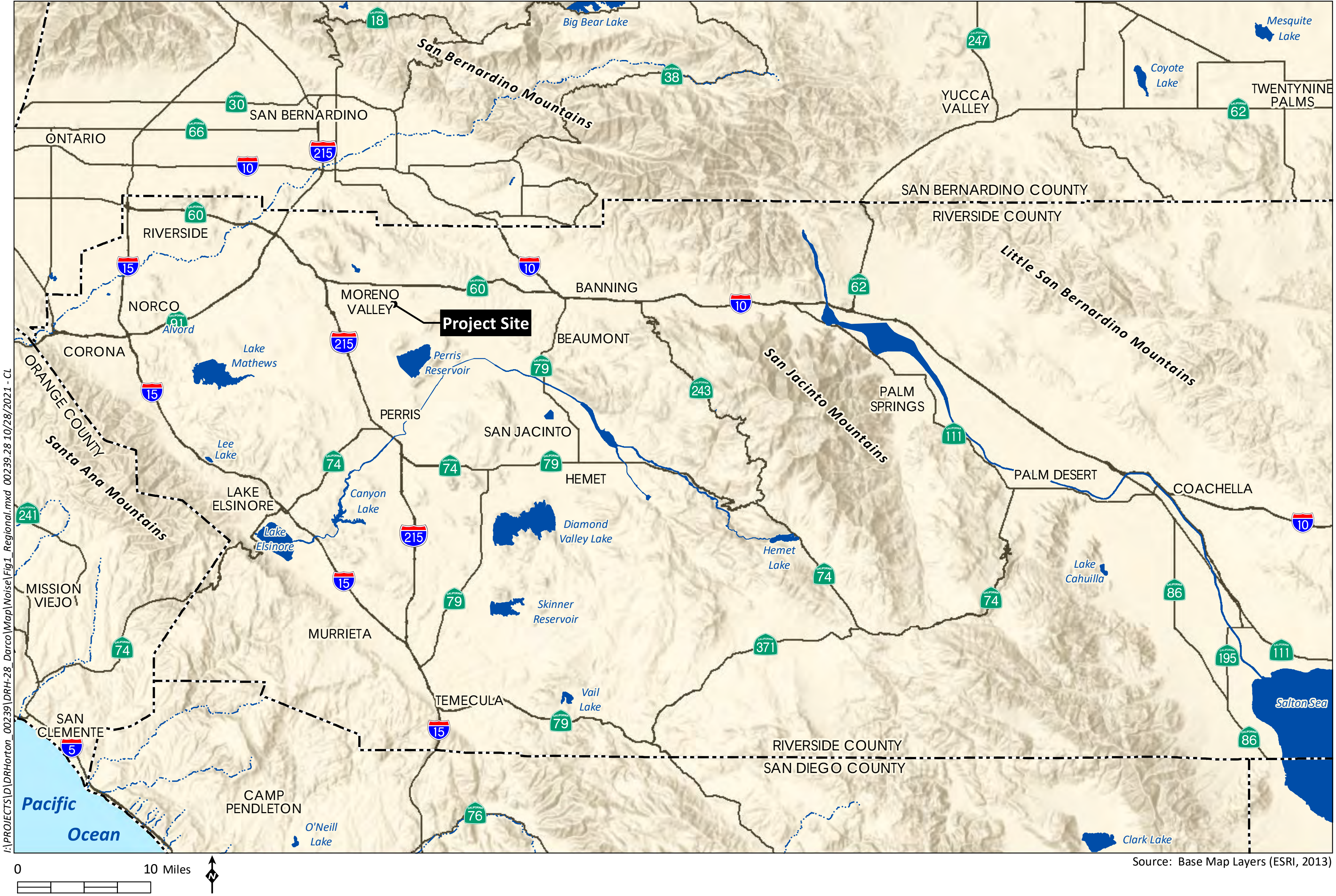
Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this wide range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA. The threshold of hearing for the human ear is about 0 dBA, which corresponds to 20 mPa.

1.4.2.3 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through standard arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than from one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously

Tentative Tract Map 38123 Residential Project



Source: Base Map Layers (ESRI, 2013)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\Noise\Fig1_Regional.mxd 00239.28 10/28/2021 - CL

HELIX
Environmental Planning

Regional Location

Figure 1

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family

Tentative Tract Map 38123 Residential Project

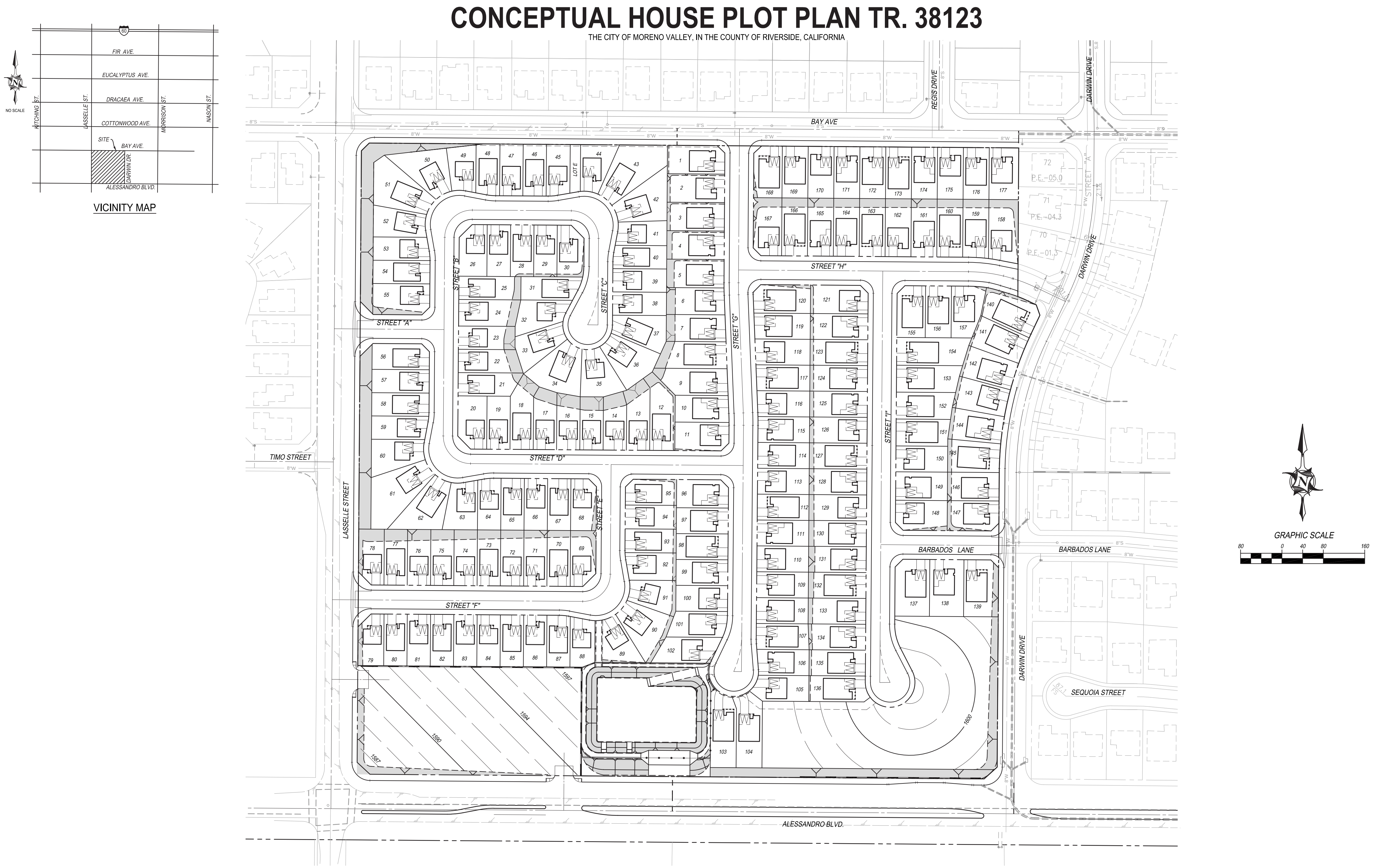
Source: Aerial (Maxar, 2019)

I:\PROJECTS\D\DRHorton_00239\DRH-28_Darco\Map\Noise\Fig2_Aerial.mxd 00239.28 10/28/2021 - SAB

HELIX
Environmental Planning

Aerial Photograph

Figure 2



Source: Mayers & Associates Civil Engineering, 2021

HELIX
Environmental Planning

Site Plan

Figure 3

This page intentionally left blank

would not produce 140 dBA—rather, they would combine to produce 73 dBA. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dBA louder than one source.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1 dBA changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dBA are generally not perceptible. It is widely accepted, however, that people begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dBA increase is generally perceived as a distinctly noticeable increase, and a 10 dBA increase is generally perceived as a doubling of loudness.

No known studies have directly correlated the ability of a healthy human ear to discern specific levels of change in traffic noise over a 24-hour period. Many ordinances, however, specify a change of 3 CNEL as the significant impact threshold. This is based on the concept of a doubling in noise energy resulting in a 3 dBA change in noise, which is the amount of change in noise necessary for the increase to be perceptible to the average healthy human ear.

1.5 NOISE-SENSITIVE LAND USES

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, including residences, hospitals, schools, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. Noise receptors are individual locations that may be affected by noise. NSLUs in the project vicinity include single-family residences surrounding the project site on the north, west, and east.

1.6 REGULATORY FRAMEWORK

1.6.1 California Noise Control Act

The California Noise Control Act is a section within the California Health and Safety Code that describes excessive noise as a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

1.6.2 City of Moreno Valley General Plan, Noise Element

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. The City’s 2040 General Plan Noise Element establishes noise compatibility guidelines for uses affected by noise, as shown in Table 1, *City of Moreno Valley Land Use Noise Compatibility Guidelines*. The acceptable noise levels for project land uses are 65 CNEL for single-family residential and 70 CNEL for parks and recreation (playgrounds and neighborhood parks; City 2021a).

For outdoor uses at a normally acceptable land use, feasible noise mitigation techniques should be analyzed and incorporated to reduce noise levels to make the outdoor activities acceptable. For indoor uses at a normally acceptable land use, exterior noise must be attenuated to 45 CNEL for single-family residential to be considered an acceptable land use. The City limits interior noise levels to 45 CNEL for single-family residential development. In addition, the City requires compliance with the Title 24 Noise Insulation Standards and the use of noise attenuation where necessary to achieve acceptable interior noise levels. The acceptable interior noise is 45 CNEL for residences and schools and 50 CNEL for libraries, hospitals, places of worship and office uses. The General Plan also discourages new residential development where noise due to aircraft overflights exceeds 65 CNEL.

Table 1
CITY OF MORENO VALLEY LAND USE NOISE COMPATIBILITY GUIDELINES

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	<60	60-65	65-70	70-75	75+
Residential					
Single-family, Duplex, and Mobile Homes	□	□	▒	■	■
Multiple Family	□	□	▒	■	■
Transient Lodging					
Hotels and Motels	□	□	▒	■	■
Institutional					
Schools, Libraries, Churches, Hospitals, and Nursing Homes	□	□	□	■	■
Gathering Spaces					
Auditoriums, Concert Halls, Amphitheaters	▒	▒	▒	■	■
Sports Arena, Outdoor Spectator Sports	▒	▒	▒	▒	■
Parks and Recreation					
Playgrounds and Neighborhood Parks	□	□	□	■	■
Golf Courses, Riding Stables, Water Recreation, and Cemeteries	□	□	□	□	■
Commercial and Office Uses					
Office Buildings, Businesses, Commercial and Professional Uses	□	□	□	■	■
Industrial					
Industrial, Manufacturing, and Utilities	□	□	□	□	■
Agricultural					
Agricultural and Nurseries	□	□	□	□	■

□	Acceptable	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level.
		Outdoor Uses	Activities associated with the land use may be carried out.
▒	Normally Acceptable	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level for occupied areas.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable.
■	Unacceptable	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

Source: City 2021a; CNEL=Community Noise Equivalent Level; dBA=A-weighted decibel

1.6.3 City of Moreno Valley Noise Ordinance (Municipal Code, Title 11, Chapter 11.80, Noise Regulation)

The City's municipal code establishes City noise requirements and enforcement of violations. For the purpose of controlling excessive noise levels, including noise from construction activities, the City has established sound level limits based on land use. Per the City's Ordinance, noise levels are to be measured at the residential property lines and adjacent receptors using the noise criteria cited in Table 11.80.030-2 of the Ordinance, as shown below in Table 2, *Applicable Exterior Property Line Noise Limits*, which lists the applicable exterior property line noise limits. It is unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level at any point on or beyond the boundaries of the property exceeds these limits (City 2021b).

Table 2
APPLICABLE EXTERIOR PROPERTY LINE NOISE LIMITS

Land Use	Time	Applicable Limit One-hour Average Sound Level (dBA)
Residential	8:00 a.m. – 10:00 p. m.	60
	10:00 p.m. – 8:00 a. m.	55

Source: City 2021b

Additionally, the Noise Ordinance states that, except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment between 8:00 p.m. and 7:00 a.m.

2.0 ENVIRONMENTAL SETTING

2.1 SURROUNDING LAND USES

Adjacent lands surrounding the project site include single-family residential neighborhoods to the north, undeveloped open space to the south and a combination of undeveloped land and single-family residences to the east and west. The project site and adjacent land are within the City limits. See Figure 2 for nearby land uses.

2.2 EXISTING NOISE ENVIRONMENT

The existing noise environment is dominated by traffic noise from Alessandro Boulevard to the south, Lasselle Street to the west, and Bay Avenue to the north. The project is subject to some distant aircraft noise and is located approximately 3 miles northeast of March Air Reserve Base. Nearly the entire City is located within the boundaries of the March Air Reserve Base's Airport Land Use Compatibility Plan (ALUCP). However, according to the March Air Reserve Base Compatibility Map, the project site is not located within a noise impact or overflight zone (Riverside County Airport Land Use Commission 2014).

2.2.1 Ambient Noise Survey

An ambient noise measurement was taken at the project site in June 2021. The measurement was recorded at the northwest corner of the project site approximately 50 feet south of Lassalle Street and 450 feet east of Alessandro Boulevard. A traffic count was conducted at this location to estimate the breakdown of heavy trucks (three or more axles), medium trucks (double tires/two axles), and automobiles along Lassalle Street. The measured noise level is shown in Table 3, *Noise Measurement Results.* Traffic counts for the timed measurement and the one-hour equivalent volume are shown in Table 4, *Recorded Traffic Volume and Vehicle Mix.* The site visit sheet is included as Appendix A, *Site Survey Measurement Sheets.*

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Table 3
NOISE MEASUREMENT RESULTS

Ambient Measurement	
Date:	June 3, 2021
Conditions:	Temperature: 91°F. Wind Speed: 6-8 mph. Low humidity. Sunny.
Time:	2:14 p.m. – 2:29 p.m.
Location:	Along the northern boundary of the project site
Measured Noise Level:	63.7 dBA L_{EQ}
Notes:	Ambient nature sounds. Noise primarily from traffic on Lassalle Street facing project site.

Table 4
RECORDED TRAFFIC VOLUME AND VEHICLE MIX

Measurement	Roadway	Traffic	Autos	MT[1]	HT[2]
1	Lassalle Street	15-minute count	245	8	3
		One-hour equivalent	980	24	12
		Percent	96.7%	0.9%	2.3%

[1] Medium Trucks (double tires/two axles)
[2] Heavy Trucks (three or more axles)

3.0 ANALYSIS, METHODOLOGY, AND ASSUMPTIONS

3.1 METHODOLOGY

3.1.1 Ambient Noise Survey

The following equipment was used to measure existing noise levels at the project site:

- Larson Davis 831 Noise Meter
- Larson Davis Model CA250 Calibrator
- Windscreen and tripod for the sound level meter

The sound level meter was field-calibrated immediately prior to the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2006). All instruments were maintained with National Institute of Standards and Technology traceable calibration per the manufacturers' standards.

3.1.2 Noise Modeling Software

Modeling of the exterior noise environment for this report was accomplished using two computer noise models: Computer Aided Noise Abatement (CadnaA) version 2019 and Traffic Noise Model (TNM) version 2.5. CadnaA is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CadnaA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project related information, such as noise source data, barriers, structures, and topography to create a detailed CadnaA model, and uses the most up-to-

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

date calculation standards to predict outdoor noise impacts. CadnaA traffic noise prediction is based on the data and methodology used in the TNM.

TNM was released in February 2004 by the U.S. Department of Transportation (USDOT) and calculates the daytime average hourly L_{EQ} from three dimensional model inputs and traffic data (California Department of Transportation [Caltrans] 2004). TNM was developed from Computer Aided Design (CAD) plans provided by the project applicant. Input variables included road alignment, elevation, lane configuration, area topography, existing and planned noise control features, projected traffic volumes, estimated truck composition percentages, and vehicle speeds.

Peak-hour traffic volumes are estimated based on the assumption that approximately 10 percent of the average daily traffic would occur during a peak hour. The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic. Peak hour L_{EQ} can be converted to CNEL using the following equation, where $L_{EQ}(h)pk$ is the peak hour L_{EQ}, P is the peak hour volume percentage of the average daily trips (ADT), d and e are divisions of the daytime fraction of ADT to account for daytime and evening hours, and N is the nighttime fraction of ADT:

$$\text{CNEL} = L_{EQ}(h)pk + 10\log10\ 4.17/P + 10\log10(d + 4.77e + 10N)$$

The model-calculated one-hour L_{EQ} noise output is therefore approximately equal to the CNEL (Caltrans 2013).

Project construction noise was analyzed using the Roadway Construction Noise Model (RCNM; USDOT 2008), which utilizes estimates of sound levels from standard construction equipment.

3.2 ASSUMPTIONS

3.2.1 Construction

Project construction is assumed to occur over approximately three years and two months starting in May 2022. Construction activities include grading (possibly with blasting), installation of underground utilities and infrastructure, paving, construction of residences, and architectural coating (e.g., painting). The project would not require demolition, as the site is currently vacant and undeveloped. Construction would require the use of equipment throughout the site for the full term of construction. The most prominent noise-generating standard construction equipment anticipated to be used on the site includes excavators, front-end loaders, backhoes, scrapers, dozers, rollers, pavers, and backhoe or excavator mounted impact hammers. Construction activities would include the transport of soil. Based on project-specific information provided by Mesa General Engineering, approximately 180 truckloads per day of material would be exported over 15 days during grading, generating approximately 5,400 one-way truck trips.

Small areas of rock may require blasting during grading. Blasting is assumed to occur up to one day per week during grading, for a total of up to 8 days. All other construction activities on the project site would be halted while explosives are prepared and detonated. As of this analysis, the area and depth of potential blasting has not been determined. However, the northeast portion of the project site, near the closest sensitive receptors, does not contain rock formations that may require blasting.

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Blasting operations would be conducted through the use of drilling and blasting to fracture rocks. Blasting operations would be conducted by a licensed blasting contractor, in strict compliance with pertinent federal, state, and County of Riverside requirements. All blasting materials would be transported to the site for each blasting sequence and no explosives would be stored at the site. Drill rigs would be used to drill a pattern of boreholes each with a 3- to 6-inch diameter. A contractor then loads the holes with carefully metered explosives. The "shot" is timed to detonate each of the holes in sequence. This minimizes the ground vibration and noise of the blast, while maximizing fracture of the rock. Some dust is created as a result of the blast. However, the dust would be fully dissipated within 30 to 60 seconds following the shot. The rock would be broken up to sizes less than 18 inches in diameter.

Following blasting, the rock resource would be fractured into gravel using a crusher and can be moved with conventional earthmoving equipment. A front-end loader would be used to spread the gravel around the site and used as fill material.

Blasting typically includes three components that can result in impacts: flyrock, vibration, and airblast, as described below.

Flyrock: Flyrock is debris (smaller and potentially larger chunks of rock) ejected from the blast. Outside the immediate area of the blast itself, flyrock is potentially the most dangerous portion of blasting; it has the ability to damage structures and maim or kill humans or other animals at great distances from the blast.

Vibration: Both air and ground vibrations create waves that disturb the material in which they travel. When these waves encounter a structure, they cause it to shake and may cause structural damage. Ground vibrations enter the house through the foundation.

Airblast: Airblast is a pressure wave that creates a push (positive pressure) and pull (negative pressure) effect; it may be audible (noise) or inaudible (concussion). A blast occurring outside of a residence may be heard inside because of the audible noise; however, noise has little impact on the structure. The concussion wave causes the structure to shake and rattle and can break windows at higher pressure levels.

3.2.2 Operations

The proposed project's operational noise sources are anticipated to include heating, ventilation, and air conditioning (HVAC) systems and vehicular traffic. During operations the project would also be exposed to vehicular traffic noise from surrounding roadways, including Alessandro Boulevard, Darwin Drive, Bay Avenue, and Lasselle Street.

3.2.2.1 Heating, Ventilation, and Air Conditioning Units

The analysis assumes that the buildings would use a typical to larger-sized residential condenser mounted on ground level pads. The unit used in this analysis is a Carrier 38HDR060 split system condenser. The manufacturer's noise data is provided below in Table 5, *Carrier HDR060 Condenser Noise*.

Table 5
CARRIER HDR060 CONDENSER NOISE

Noise Levels in Decibels[1] (dB) Measured at Octave Frequencies							Overall Noise Level in A-weighted Scale (dBA)[1]
125 Hz	250 Hz	500 Hz	1 KHz	2 KHz	4 KHz	8 KHz	
63.0	61.5	64.0	66.5	66.0	64.5	55.5	72.0

[1] Sound Power Level (S_{WL})
KHz = kilohertz

3.2.2.2 Vehicular Traffic

Traffic volume data along nearby streets and the project's trip generation was based on information from the project's Traffic Impact Analysis (TIA; TJW Engineering 2021) and the City's street segment traffic counts (City of Moreno Valley 2021). Existing traffic and project-generated traffic is assumed to be generated primarily by automobiles, based on the existing development and project's proposed residential development served by existing streets. A typical traffic distribution of 96 percent automobiles, 3 percent medium trucks, and 1 percent heavy trucks was used in this analysis for non-project traffic along Alessandro Boulevard, Lasselle Street, and Bay Avenue. Vehicular access to the project site would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. According to the TIA, the project would conservatively generate 1,841 new trips per day. Because the TIA did not calculate project trip distribution for road segments adjacent to the project site, all project trips were conservatively assumed to occur on all road segments. The City assumes an annual growth rate of 2 percent to account for cumulative traffic growth and this is accounted for in the long-term scenario. Table 6, *Existing Plus Project Traffic Volumes*, summarizes the ADT data for the roadway segments surrounding the project site, conservatively assuming all project trips would occur on all road segments. Traffic noise modeling assumes 10 percent of ADT would occur during the peak hour.

Table 6
EXISTING PLUS PROJECT TRAFFIC VOLUMES

Roadway Segment	ADT Existing	ADT Existing + Project	ADT Long-term	ADT Long-term + Project
Lassalle Street (Between Alessandro Boulevard and Bay Avenue)	13,900	15,741	18,070	19,911
Alessandro Boulevard (Between Lassalle Street and Darwin Drive)	10,000	11,841	13,000	14,841
Bay Avenue (Between Lassalle Street and Darwin Drive)	7,100	8,941	9,230	11,071
Darwin Drive (Between Alessandro Boulevard and Bay Avenue)	3,000	4,841	3,900	5,741

Source: City of Moreno Valley 2021; TJW 2021

3.3 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

A potentially significant noise impact would occur if the project would:

1. Result in temporary construction noise that exceeds the existing ambient noise levels at nearby noise-sensitive receptors. For the purposes of this analysis, construction noise would be considered significant if it exceeds 60 dBA L_{EQ} at the property line of a residentially zoned property during daytime hours per the City's Municipal Code Section 11.80.030.

2. Subject vibration-sensitive land uses to construction-related ground-borne vibration that exceeds the "strongly perceptible" vibration annoyance potential criteria for human receptors, as specified by Caltrans (Caltrans 2020), of 0.1 inches per second peak particle velocity (PPV), and 0.3 inches per second PPV for damage to older residential structures for continuous/frequent intermittent construction sources (such as impact pile drivers, vibratory pile drivers, and vibratory compaction equipment).

3. Result in a substantial permanent increase in existing ambient noise levels that:

    a. Exceeds the exterior noise limits specified by the Noise Ordinance as shown in Table 2; or

    b. Results in transportation-related noise levels that exceed the Acceptable limits specified by the Noise Element as shown in Table 1, or if the project would generate a perceptible change in transportation-related noise level (3 CNEL) over existing conditions.

The following condition of approval would be required for all proposed new uses:

4. Projects shall not expose new development to noise levels at exterior use areas or interior areas in excess of the noise compatibility guidelines established in the City General Plan Noise Element. The conditionally compatible noise levels for project land uses are 65 CNEL for single-family residential and 70 CNEL for community parks. For outdoor uses at a normally acceptable land use, feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable. For indoor uses at a normally acceptable land use, exterior noise must be attenuated to 45 CNEL within residences to be considered a compatible land use.

4.0 IMPACTS

4.1 ISSUE 1: TEMPORARY INCREASE IN AMBIENT NOISE LEVELS

4.1.1 Construction Noise Generation

4.1.1.1 Construction Equipment

Construction of the project would require site clearing, grading, installation of underground utilities/infrastructure, construction of new buildings, paving, architectural coating, and potentially blasting. The magnitude of the noise impact would depend on the type of construction activity, equipment, duration of each construction phase, distance between the noise source and receiver, and any intervening structures. Construction would generate elevated noise levels for nearby residences to

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

the west, north, and east of the project site. All construction equipment would not be expected to be operating at the same time and would be located throughout the project site and would therefore not remain at one distance to nearby residences during the 8-hour operating day. As a conservative analysis, it was assumed that the equipment would be in operation simultaneously and at an average distance of 100 feet. Table 7, *Construction Equipment Noise Levels*, provides the 100-foot distance noise levels for equipment anticipated to be used for general construction activities.

Table 7
CONSTRUCTION EQUIPMENT NOISE LEVELS

Unit	Percent Operating Time	dBA L_{EQ} at 100 feet
Backhoe	40	67.6
Compactor	20	70.2
Compressor	40	67.7
Concrete Mixer Truck	40	68.8
Concrete Pump Truck	20	68.4
Dozer	40	71.7
Dump Truck	50	66.5
Drum Mixer	40	71.0
Excavator	40	70.7
Front End Loader	40	69.1
Generator	50	71.6
Paver	50	68.2
Roller	20	67.0
Scraper	40	73.6

Source: RCNM
L_{MAX} = maximum noise level; dBA = A-weighted decibel; L_{EQ} = equivalent sound level

Further, not all the pieces of equipment included in Table 7 would be used within 100 feet of off-site residences. The project's most prominent noise-generating construction activities are anticipated to include grading and blasting. These activities are further analyzed below. Grading would occur across the project site and is anticipated to involve the simultaneous use of a scraper and dozer. At a distance of 100 feet, a scraper and dozer would together generate a noise level of 75.7 dBA L_{EQ}. This would exceed the 60 dBA L_{EQ} noise level limit and impacts would be potentially significant. The City noise ordinance does not allow the operation of construction equipment between 8:00 p.m. and 7:00 a.m. Mitigation measure NOI-1 would require a construction noise management plan with measures to ensure construction equipment noise during the hours from 7:00 a.m. to 8:00 p.m. would not exceed the 60 dBA L_{EQ} noise level limit. With implementation of mitigation measure NOI-1, the potential impact from construction equipment noise would be reduced to a less than significant level.

NOI-1 **Construction Noise Management Plan.** Noise levels from project-related construction activities shall not exceed the 60 dBA noise limit specified in the Noise Ordinance, when measured at the boundary line of the property where the noise is located or any occupied property where noise is being received. A Construction Management Plan that describes the measures included on the construction plans to ensure compliance with the noise limit shall be prepared by the project

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

applicant and submitted to the City for approval prior to issuance of the grading permit. The following measures may be included to reduce construction noise:

- Construction equipment to be properly outfitted and maintained with manufacturer-recommended noise-reduction devices.
- Diesel equipment to be operated with closed engine doors and equipped with factory-recommended mufflers.
- Mobile or fixed “package” equipment (e.g., arc-welders and air compressors) to be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Electrically powered equipment to be used instead of pneumatic or internal-combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) to be prohibited.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas to be located as far as practicable from noise sensitive receptors.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
- Temporary sound barriers or sound blankets may be installed between construction operations and adjacent noise-sensitive receptors. Due to equipment exhaust pipes being approximately 7 to 8 feet above ground, a sound wall at least 10 feet in height above grade, located along the eastern property line between the project and neighboring three residences would mitigate noise levels to within acceptable levels. To effectively reduce noise levels, the sound barrier should be constructed of a material with a minimum weight of two pounds per square foot with no gaps or perforations and remain in place until the conclusion of demolition, grading, and construction activities.
- The project applicant shall notify residences within 100 feet of the project’s property line in writing within one week of any construction activity such as blasting or heavy grading operations. The notification shall describe the activities anticipated, provide dates and hours, and provide contact information with a description of a complaint and response procedure.
- The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process for the affected resident shall be established prior to construction commencement to allow for resolution of noise problems that cannot be immediately solved by the site supervisor.

4.1.1.2 Blasting

If blasting is required, a full blasting analysis cannot be done until after the site is cleared of all surface material (including any rippable material) to expose the specific type of material to be blasted, and until the extent of the area of blasting and the required blasting charge type are known. Single-family residences are located on adjacent lots; however, the precise location of blasting cannot be known at this time. For this analysis, it is conservatively assumed blasting could occur as close as 100 feet from off-site residences. The northeast portion of the project site, near the closest sensitive receptors, does not contain rock formations that would require blasting. Most of the site where blasting may occur is located at distances much greater than 100 feet from off-site residences.

In accordance with the Code of Federal Regulations Section 816.67(b), flyrock is not allowed at this site beyond the direct area of the blast, under any circumstances. This analysis assumes that proper blast planning would be used, that all flyrock would be controlled with blast mats or other flyrock control techniques, and proper stemming materials for the charge hole would be utilized.

As with flyrock, control of airblast is dependent on the skill of the Blasting Supervisor, along with many factors including but not limited to: the depth of the charge, the type of rock, the amount of fractures in the rock, and the length of correct stemming materials. Airblast is regulated by the limits from 30 CFR 816.61-68, which are provided below in Table 8, *Maximum Allowable Airblast Limit*s.

Table 8
MAXIMUM ALLOWABLE AIRBLAST LIMITS

Lower Frequency Limit of Measuring System (Hz)	Maximum Level (±3 dB)
0.1 Hz or lower	134 peak
2 Hz or lower	133 peak
6 Hz or lower	128 peak
C-weighted noise level (dBC)	105 dBC

Hz = Hertz, dB = decibel

The following analysis is based on a general description of potential impacts that would result from blasting activities. The information is based on guidance for calculating the scaled distance in blasting provided by the Office of Surface Mining Reclamation and Enforcement (OSM 2009).

Blasting operations would be conducted through the use of drilling and blasting to fracture rocks. Blasting operations would be conducted by a licensed blasting contractor, in strict compliance with pertinent federal, state, and County of Riverside requirements. All blasting materials would be transported to the site for each blasting sequence and no explosives would be stored at the site.

Drill rigs would be used to drill a pattern of boreholes each with a 3- to 6-inch diameter. Typical borehole patterns would be a 10-by-10-foot to 20-by-20-foot grid spacing between the holes depending on shot requirements, with up to approximately 25-foot-deep holes. The blasting contractor would load the holes with carefully metered explosives. Each shot hole would be completely stemmed using fine gravel or dry sand. The shot is timed to detonate each hole(s) in sequence. This minimizes the ground vibration and noise of the blast, while maximizing fracture and controlling shot placement of the rock. The rock would be broken up to boulders less than 18 inches in diameter.

Based on an assumption of 0.5 pounds of explosive material required per ton of material removed and a typical granite weight of 166.5 pounds per cubic foot, or 2.25 tons per cubic yard (CY), a typical shot designed to break up 10 CY of material (typical truckload) would require about 11.25 pounds of explosive charge. The charge would typically consist of a 0.5-pound or less of detonation charge per hole, and the remainder of the charge would be provided by TOVEX (or other similar water gel explosive slurry) or ammonium nitrate/fuel oil (ANFO).

The following scaled distance factors in Table 9, *Scaled Distance Factors*, are based on the relationship between peak particle velocity and frequency. Analysis of scaled distance for the charge weight is based on the following:

Table 9
SCALED DISTANCE FACTORS

Distance from the Blasting Site (feet)	Scaled Distance Factor
0 to 300	50
300 to 5,000	55
5,001 and beyond	65

The allowable charge weight is calculated by: $W = (D/D_S)^2$

W = Allowable charge weight in pounds
D = Distance to the nearest structure in feet
D_S = Value from table based on D

A distance (D) of 100 feet was used in the calculation. At a distance of 100 feet, the scaled distance factor (D_s) would be 50. Therefore, for the control of ground-borne vibration impacts to the closest off-site residence, the maximum charge weight would be 4 pounds at a minimum distance of 100 feet.[1]

Because project-specific details regarding blasting operations are not available at this time, impacts to off-site residences are conservatively assessed as potentially significant. The basic planning for blasting discussed in this report provides an estimate of distances and does not constitute a final project-specific analysis. The blasting contractor would be required to determine the allowable distances and charge weights. This analysis is general in nature and does not substitute for proper planning of any blasting and/or responsibility for any potential damages caused by the blaster. Mitigation measure NOI-2 would require a Blasting Management Plan to be submitted and approved by the City. With implementation of measure NOI-2 potential impacts from blasting during project construction would be reduced to a less than significant level.

NOI-2 **Blasting Management Plan**. Should blasting be required on the project site, the project applicant shall prepare a Blasting Management Plan that minimizes potential blasting effects, including from noise, vibration, airblast and flyrock, to adjacent residences within 100 feet. All blast planning must be done by a City of Moreno Valley-approved blasting contractor and submitted to the City with the appropriate blasting permits, and all other applicable local, state, and federal permits, licenses, and bonding. The blasting contractor or owner must conduct all

---

[1] This analysis is based on basic planning assumptions and does not provide final project-specific analysis for allowable blasting charges, nor is it intended to limit the blasting company to the minimum distance or maximum charge weight listed. This analysis is provided as general guidance and is not intended to provide final blasting planning for any specific blast nor does it imply acceptance of any liability for the proper or improper planning of any blasting and/or responsibility for any damages caused by the blaster. All blasting planning and impacts and/or damages that may occur are the sole responsibility of the owner and blasting planning company. The project applicant may also choose alternative options to blasting, such as the use of non-explosive chemical fracturing techniques.

notifications, inspections, monitoring, and major or minor blasting requirements planning with seismograph reports, as necessary.

4.1.2 Construction Traffic Noise

As discussed in Section 3.2.1, it is anticipated that approximately 5,400 one-way truck trips, or approximately 180 truckloads per day of material would be exported over 15 days during grading, which would be required for construction over the course of 15 days during construction. Over the course of an eight-hour construction day, it is assumed 22 trips would occur per hour. This daily traffic level is anticipated to be the highest daily traffic level associated with project construction. The existing traffic volume and the increased traffic volume from construction were input into TNM and modeled from the roadway centerline (the approximate distance to the nearest single family residential NSLUs), and construction haul trips were modeled as heavy trucks. As presented in Table 10, *Off-site Truck Trip Noise Levels*, the addition of the project's haul truck trips during construction would result in noise levels exceeding 65 CNEL within 8 feet of the roadway centerline. However, the nearest residential properties are more than 50 feet from the roadway centerline. Therefore, noise levels would remain below the 65 CNEL maximum exterior noise limit guideline for residential uses. Further, this increase in noise from haul trucks would be temporary (estimated at 15 days) and would cease upon the completion of construction. Therefore, impacts from construction traffic noise would be less than significant.

Table 10
OFF-SITE TRUCK TRIP NOISE LEVELS

Distance from Edge of Property Line to Noise Level (feet)	CNEL at Each Distance
8	65
53	60
174	55

Source: TNM

4.2 ISSUE 2: EXCESSIVE GROUND-BORNE VIBRATION

4.2.1 Construction Vibration

Blasting, analyzed in Section 4.1.1.2, above, would be a potentially significant source of vibration during project construction. Implementation of mitigation measure NOI-2 requiring a blasting plan would reduce vibration impacts from blasting to less than significant.

Another potential source of vibration during project construction activities would be a vibratory roller, which may be used for compaction of soil beneath building foundations and could be used within 50 feet of off-site residences. Vibratory rollers, however, are anticipated to be used at distances greater than 50 feet from any single residence. A vibratory roller would create approximately 0.210 inch per second PPV at a distance of 25 feet (Caltrans 2020). A 0.210 inch per second PPV vibration level would equal 0.098 inch per second PPV at a distance of 50 feet.[2] This would be lower than the structural damage impact to older structures of 0.3 inch per second PPV and the "strongly perceptible" impact for

---

[2] Equipment PPV = Reference PPV * $(25/D)^n$ (inches per second), where Reference PPV is PPV at 25 feet, D is distance from equipment to the receiver in feet, and n = 1.1 (the value related to the attenuation rate through the ground); formula from Caltrans 2020.

humans of 0.1 inch per second PPV. Additionally, off-site exposure to such ground-borne vibration would be temporary as it would be limited to the short-term construction period. Therefore, although vibration may be perceptible at nearby residences, temporary impacts associated with the roller (and other potential construction equipment) would be less than significant.

4.2.2 Operational Vibration

Land uses that may generate substantial operational vibration include heavy industrial or mining operations that would require the use of vibratory equipment. The proposed residential and recreational land uses do not include equipment that would generate substantial vibration. Therefore, operational vibration impacts would be less than significant.

4.3 ISSUE 3: PERMANENT INCREASE IN AMBIENT NOISE LEVELS

4.3.1 Operational On-site Noise Generation

The project would include HVAC units at ground-level locations adjacent to each proposed residence. Specific locations and planning data for the future HVAC units is not available at this stage of project design; however, HVAC units are assumed to be located on the sides of the proposed residences. Further, as mentioned above, modeling assumed that the HVAC unit would be a Carrier 38HDR060 split system condenser. A single unit typically generates a noise level of 56 dBA at a distance of 7 feet. At this distance, off-site single-family residences would not be exposed to excess noise from the project's HVAC units. Property line noise levels would not be in excess of the 55 dBA nighttime limit at the property line for off-site single-family residential uses. As such, impacts would be less than significant.

4.3.2 Operational Off-site Transportation Noise Generation

The project would generate vehicular traffic that would utilize surrounding streets and have the potential to result in increased noise levels at existing single-family residences. In general, a doubling of ADT would cause a doubling in noise (a 3 dBA increase), the level at which a change in noise is perceptible in a typical outdoor environment, and which would be considered a potentially significant increase. The conservative addition of the entirety of the project's 1,841 new trips any of these existing roadways would not double ADT, as shown above in Table 6. Therefore, impacts from project-generated traffic would be less than significant.

4.4 ISSUE 4: NOISE LEVEL STANDARD COMPLIANCE FOR NEW USES

4.4.1 Transportation Noise

4.4.1.1 Exterior Noise Levels

The project would conflict with the City General Plan Noise Element if the proposed single-family residences are exposed to exterior noise levels in excess 65 CNEL. Traffic from adjacent roadways would be the largest contributor of noise at the project site. Traffic noise levels for exterior use areas were modeled in CadnaA. Receivers were placed at a height of 5 feet above ground level in the project's residential lot lines closest to the external streets. The resulting highest noise level for lots along each street is shown in Table 11, *Traffic Noise Levels*. The noise modeling output tables are included as Appendix B to this report.

Table 11
TRAFFIC NOISE LEVELS

Roadway Segment	Existing + Project Traffic Noise Levels (CNEL)
Darwin Drive	59.4
Alessandro Boulevard	55.4
Lassalle Street	63.0
Bay Avenue	62.6

As shown in Table 11, under future traffic conditions, accounting for topography but not existing or future structures, exterior noise levels would be below 65 CNEL. The highest calculated traffic noise levels at the perimeter of the proposed park area in the southeast corner of the project site would be 58.4 CNEL, below the 70 CNEL limit for recreational uses as defined in the City's Noise Element.

4.4.1.2 Interior Noise Levels

Traditional architectural materials typically attenuate noise levels by 15 CNEL. Therefore, at locations where noise levels at residence's façades would exceed 60 CNEL, interior noise levels of proposed residential units may exceed the City Noise Element's interior noise standard of 45 CNEL. Noise levels at the project site were modeled in CadnaA using a height of approximately 5 feet above ground level. The residences proposed in the western and northern portions of the project site near Lassalle Street and Bay Avenue would be exposed to exterior noise levels in excess of 60 CNEL. At these residences, interior noise levels would exceed City Noise Element interior noise standards unless the buildings were set back from the road or additional architectural attenuation is incorporated. Measure NOI-3 would ensure the reduction of noise levels at interior habitable spaces would not exceed 45 CNEL.

NOI-3 **Compliance with Interior Noise Standards.** The project shall incorporate building materials that reduce interior noise levels to 45 CNEL. Standard measures such as glazing with appropriate Sound Transmission Class (STC) ratings, as well as walls with appropriate STC ratings, should be considered. Once specific building plan information is available, an exterior-to-interior analysis shall be performed for residences in locations exceeding 60 CNEL to demonstrate compliance. The information in the analysis shall include wall heights and lengths, room volumes, window and door tables typical for a building plan, as well as information on any other openings in the building shell. With this specific building plan information, the analysis shall determine the predicted interior noise levels for the planned residential spaces. If predicted noise levels are found to exceed 45 CNEL, the analysis shall identify architectural materials or techniques that could be included to reduce noise levels to 45 CNEL. Final plans shall demonstrate that interior noise levels do not exceed 45 CNEL for proposed habitable areas.

5.0 LIST OF PREPARERS

Brendan Sullivan	Noise Analyst
Jason Runyan	Noise Analyst
Martin Rolph	Noise Analyst
Charles Terry	Principal Acoustician
Joanne Dramko, AICP	Principal Noise Specialist, QAQC
Dave Crook, AICP	Project Manager

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

6.0 REFERENCES

California Department of Transportation (Caltrans). 2020. Transportation and Construction Vibration Guidance Manual. April.

2013. Technical Noise Supplement to the Traffic Noise Protocol. September.

2004. California Department of Transportation, Traffic Noise Model (TNM).

Moreno Valley, City of (City). 2021a General Plan Update. Available at: http://www.moval.org/cdd/documents/general-plan-public-hearings.html.

2021b. City of Moreno Valley Municipal Code, Noise Control. Available at: http://qcode.us/codes/morenovalley/?view=desktop&topic=11-11_80-11_80_030.

2020. Roadway Segment Traffic Counts. Available at: http://www.moval.org/city_hall/departments/pub-works/transportation/pdfs/traffic-counts.pdf.

Office of Surface Mining Reclamation and Enforcement (OSM). 2009. Controlling the Adverse Effects of Blasting (Presentation).

Riverside County Airport Land Use Commission. 2014. March Air Reserve Base Compatibility Map. Available at: http://www.rcaluc.org/Portals/13/PDFGeneral/plan/2014/17%20-%20Vol.%201%20March%20Air%20Reserve%20Base%20Final.pdf.

TJW Engineering, Inc. 2021. Darco Tract 38123 Traffic impact Analysis. March 26.

U.S. Department of Transportation (USDOT). 2008. Roadway Construction Noise Model.

This page intentionally left blank

Appendix A

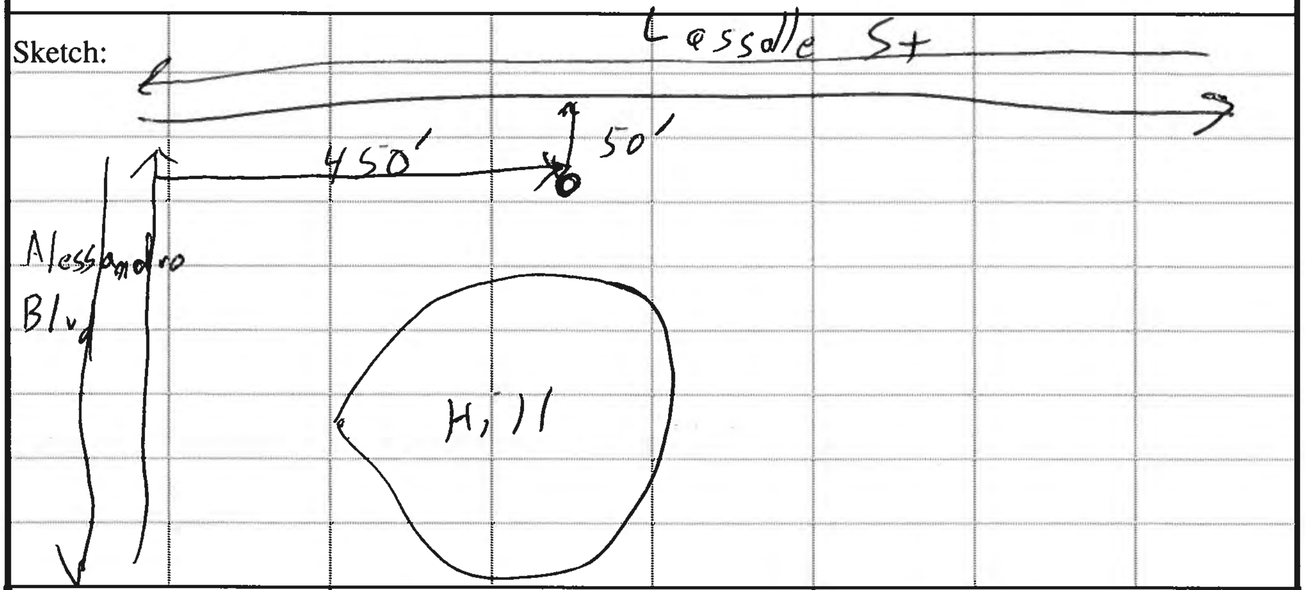
Site Survey Measurement Sheets

This page intentionally left blank

Site Survey

Project #: DRH-28
Project Name: Darco
Date: 6/3/21
Site #:
Engineer: Charles Terry
Address:
Meter: LD 831
Serial #: 1741
Calibrator: CA250
Serial #: 2621
Notes:

Sketch:



Temp: 91°
Wind Spd: 6-8 mph
Humidity: low %
Start of Measurement: 2:14
End of Measurement: 2:29
63.7 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 IIII = 49x5 = 245	IIIIIIII 8	III 3

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Attachment: Appendix H - Noise Study [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

This page intentionally left blank

Appendix B

Noise Modeling Output

This page intentionally left blank

CadnaA Vesrion 2021 MR 1 (32 Bit) (build: 183.5110)
Source Table: Road

Name	M.	ID	Lme	exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
			Day	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
			(dBA)	Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%)	(dB)	(m)	(m)
Lassalle Street North	+	1	63.1	996	0	0	4	0	0	65		0	0	1	0	0		
Lassalle Street South	+	2	63.1	996	0	0	4	0	0	65		0	0	1	0	0		
Bay Avenue West	+	3	57.3	743	0	0	4	0	0	41		0	0	1	0	0		
Bay Avenue East	+	4	57.3	743	0	0	4	0	0	41		0	0	1	0	0		
Alessandro Boulevard East	+	5	56	554	0	0	4	0	0	41		0	0	1	0	0		
Alessandro Boulevard West	+	6	56	554	0	0	4	0	0	41		0	0	1	0	0		
Darwin Drive South	+	7	53.2	288	0	0	4	0	0	41		0	0	1	0	0		
Darwin Drive North	+	8	53.2	288	0	0	4	0	0	41		0	0	1	0	0		

CadnaA Vesrion 2021 MR 1 (32 Bit) (build: 183.5110)
Receiver Table

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
Lassalle01	+		63	-65.5	0	0		x	Total	1.52	r	480709.4	3753108	486.64
Lassalle02	+		62.2	-65.7	0	0		x	Total	1.52	r	480709.4	3753155	486.64
Lassalle03	+		61	-67	0	0		x	Total	1.52	r	480716.5	3753193	490.51
Lassalle04	+		59.9	-67.1	0	0		x	Total	1.52	r	480716.8	3753220	490.55
Lassalle05	+		59.4	-67.3	0	0		x	Total	1.52	r	480717.3	3753235	490.58
Lassalle06	+		59.2	-67.4	0	0		x	Total	1.52	r	480717.3	3753249	490.62
Lassalle07	+		59.5	-67.2	0	0		x	Total	1.52	r	480715.7	3753265	490.63
Lassalle08	+		59	-67.3	0	0		x	Total	1.52	r	480716.8	3753277	490.69
Lassalle09	+		59.4	-67	0	0		x	Total	1.52	r	480716.8	3753314	491.43
Lassalle10	+		59.7	-66.8	0	0		x	Total	1.52	r	480717.3	3753328	491.75
Lassalle11	+		60.4	-66.6	0	0		x	Total	1.52	r	480717.3	3753340	492
Lassalle12	+		61.3	-66.1	0	0		x	Total	1.52	r	480716.8	3753358	492.13
Lassalle13	+		61.7	-65	0	0		x	Total	1.52	r	480717.3	3753380	492.26
Bay01	+		62.6	-61.9	0	0		x	Total	1.52	r	481087.4	3753401	492.1
Bay02	+		62.1	-62.3	0	0		x	Total	1.52	r	481070	3753400	492.1
Bay03	+		61.8	-62.4	0	0		x	Total	1.52	r	481054.3	3753401	492.49
Bay04	+		62.2	-62.5	0	0		x	Total	1.52	r	481007.1	3753401	492.92
Bay05	+		62.2	-62.5	0	0		x	Total	1.52	r	480992.1	3753401	493.04
Bay06	+		62.2	-62.6	0	0		x	Total	1.52	r	480979.7	3753400	493.19
Bay07	+		62	-62.6	0	0		x	Total	1.52	r	480948.2	3753400	493.74
Bay08	+		62.1	-62.4	0	0		x	Total	1.52	r	480783	3753401	492.78
Bay09	+		61.4	-63.1	0	0		x	Total	1.52	r	480767.1	3753399	492.48
Bay10	+		61.1	-63.6	0	0		x	Total	1.52	r	480741.2	3753397	492.4
Park01			58.4	-62.8	0	0		x	Total	1.52	r	481074.5	3753039	486.15
Alessandro01			55.4	-66.4	0	0		x	Total	1.52	r	480945.3	3753038	488.53
Alessandro02			55.3	-66.4	0	0		x	Total	1.52	r	480972.6	3753038	488.18
Darwin01	+		58.7	-62	0	0		x	Total	1.52	r	481080.2	3753188	487.65
Darwin02	+		58.6	-62.1	0	0		x	Total	1.52	r	481080	3753206	487.52
Darwin03	+		59	-61.8	0	0		x	Total	1.52	r	481081.1	3753222	487.98
Darwin04			58.6	-62.1	0	0		x	Total	1.52	r	481082.1	3753238	488.12
Darwin05			58.8	-61.9	0	0		x	Total	1.52	r	481085.1	3753254	488.37
Darwin06			59.1	-61.8	0	0		x	Total	1.52	r	481089.7	3753270	488.87
Darwin07			59.4	-61.5	0	0		x	Total	1.52	r	481095.5	3753285	489.01
Darwin08			59.2	-61.7	0	0		x	Total	1.52	r	481102.3	3753301	489.04

Darco Tract 38123
Traffic Impact Analysis
City of Moreno Valley, California

Prepared for:
D.R. HORTON
2280 Wardlow Circle, Suite 100

Prepared by:
TJW ENGINEERING, INC.
9841 Irvine Center Dr, Suite 200
Irvine, CA 92618

September 22, 2021

TJW ENGINEERING, INC.
TRAFFIC ENGINEERING &
TRANSPORTATION PLANNING
CONSULTANTS

September 22, 2021

Mr. Michael Lloyd, P.E.,
Engineering Division Manager/ Assistant City Engineer
14177 Frederick Street
Moreno Valley, CA 92553

Subject: **Traffic Impact Analysis: Darco Tract 38123, City of Moreno Valley CA**

Dear Mr. Lloyd:

TJW ENGINEERING, INC. (TJW) is pleased to present you with this traffic impact analysis for the proposed **Darco Tract 38123** the project located east of Lassalle Street between Bay Avenue and Alessandro Boulevard in the City of Moreno Valley.

This traffic study has been prepared to meet the traffic study requirements for the City of Moreno Valley and assesses the projected traffic operations associated with the proposed project and its impact on the local street network. This report is being submitted to you for review and forwarding to the City of Moreno Valley.

Please contact us at (949) 878-3509 if you have any questions regarding this analysis.
Sincerely,

Thomas Wheat, PE, TE
President

David Chew, PTP
Transportation Planner

Registered Civil Engineer *#69467*
Registered Traffic Engineer *#2565*

Thomas Joseph Wheat
No. 69467
Exp. 06/30/22
CIVIL

Thomas Joseph Wheat
No. 2565
Exp. 06/30/22
TRAFFIC

Daniel Flores, EIT
Project Engineer

Darco Tract 38123
Traffic Impact Analysis
City of Moreno Valley, California

Prepared for:

D.R. Horton
2280 Wardlow Circle, Suite 100
Corona, CA 92878

Prepared by:

TJW ENGINEERING, INC.
TRAFFIC ENGINEERING &
TRANSPORTATION PLANNING
CONSULTANTS

9841 Irvine Center Dr. Suite 200
Irvine, CA 92618
Thomas Wheat, PE, TE
David Chew, PTP
Daniel Flores, EIT

September 22, 2021

Table of Contents .... Page

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

List of Tables .... Page

List of Exhibits .... Page

Appendices .... Page

1.0 EXECUTIVE SUMMARY

This traffic impact analysis (TIA) analyzes the projected traffic operations associated with the proposed **Darco Tract 38123** project located east of Lassalle Street between Bay Avenue and Alessandro Boulevard. The purpose of this TIA is to evaluate potential circulation system deficiencies that may result from development of the proposed project, and to recommend improvements to achieve acceptable operations, if applicable. This analysis has been prepared in coordination with the City of Moreno Valley via a scoping agreement (See ***Appendix A***) and is pursuant to applicable City of Moreno Valley and County of Riverside traffic impact analysis guidelines.

The proposed project consists of 195 single family residential homes. The site is currently zoned as Community Commercial (CC)/ Residential – Up to 5 DU/AC and classified as Commercial Land Use in the City of Moreno Valley General Plan Land Use Map. The project site is currently vacant. The proposed project land use is permitted in the zone and does not require a zone change or General Plan amendment.

The proposed project is anticipated to be built and generating trips in 2023. A growth rate of 2% was used to account future traffic volumes.

The proposed project is projected to generate 144 total AM peak hour trips, 193 total PM peak hour trips and 1,841 total daily trips.

The following intersection in the vicinity of the project site have been included in the intersection level of service (LOS) analysis:

1. Lasselle Street/Cottonwood Avenue
2. Lasselle Street/Bay Avenue
3. Lasselle Street/Alessandro Boulevard

This traffic analysis follows the *City of Moreno Valley Traffic Impact Analysis Preparation Guide* (August 2007) and *County of Riverside Transportation Department Traffic Impact Analysis Preparation Guide* (April 2008).

The study intersections and roadway segments are analyzed for the following study scenarios:

- Existing Project Baseline (2021) Traffic Conditions;
- Opening Year (2023) Without Project Conditions (Existing + Ambient + Cumulative);
- Opening Year (2023) With Project Conditions (Existing + Ambient + Cumulative + Project)

Existing Project Baseline (2021) Traffic Conditions

The study intersections are currently operating at an acceptable LOS during the AM and PM peak hours for *existing* conditions.

Opening Year (2023) Without Project Conditions

The study intersections are projected to operate at an acceptable LOS during the AM and PM peak hours for

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

opening year (2023) without project conditions.

Opening Year (2023) with Project (OYP) Conditions

The study intersections are projected to operate at an acceptable LOS during the AM and PM peak hours for *opening year (2023) with project* conditions.

1.2 ON-SITE ROADWAY AND SITE ACCESS IMPROVEMENTS

Wherever necessary, roadways adjacent to the proposed project site and site access points will be constructed in compliance with recommended roadway classifications and respective cross-sections in the City of Moreno Valley General Plan or as directed by the City Engineer.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City sight distance standards at the time of final grading, landscaping and street improvement plans.

Signing/striping should be implemented in conjunction with detailed construction plans for the project site.

1.3 SUMMARY OF VEHICLES MILES TRAVELED ANALYSIS (VMT)

Consistent with the new metric of VMT for analysis of transportation impacts, this analysis follows VMT guidelines set forth by the *City of Moreno Valley Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (June, 18st, 2020).* For land use projects, using the WRCOG VMT Screening Tool the project is located in a low VMT area and is presumed to cause a less than significant impact.

Using the WRCOG VMT Screening Tool the project is located in a low VMT area, the proposed land use is consistent with both the existing zoning and the other existing land uses already in the traffic analysis zones (TAZ). The proposed residential project is consistent with both; therefore, the project is presumed to have a less than significant transportation impact per City guidelines.

2.0 INTRODUCTION

This traffic impact analysis (TIA) analyzes the projected traffic operations associated with the proposed **Darco Tract 38123** project located east of Lassalle Street between Bay Avenue and Alessandro Boulevard. The purpose of this TIA is to evaluate potential circulation system deficiencies that may result from development of the proposed project, and to recommend improvements to achieve acceptable operations, if applicable. This analysis has been prepared in coordination with the City of Moreno Valley via a scoping agreement (See ***Appendix A***) and is pursuant to applicable City of Moreno Valley and County of Riverside impact analysis guidelines.

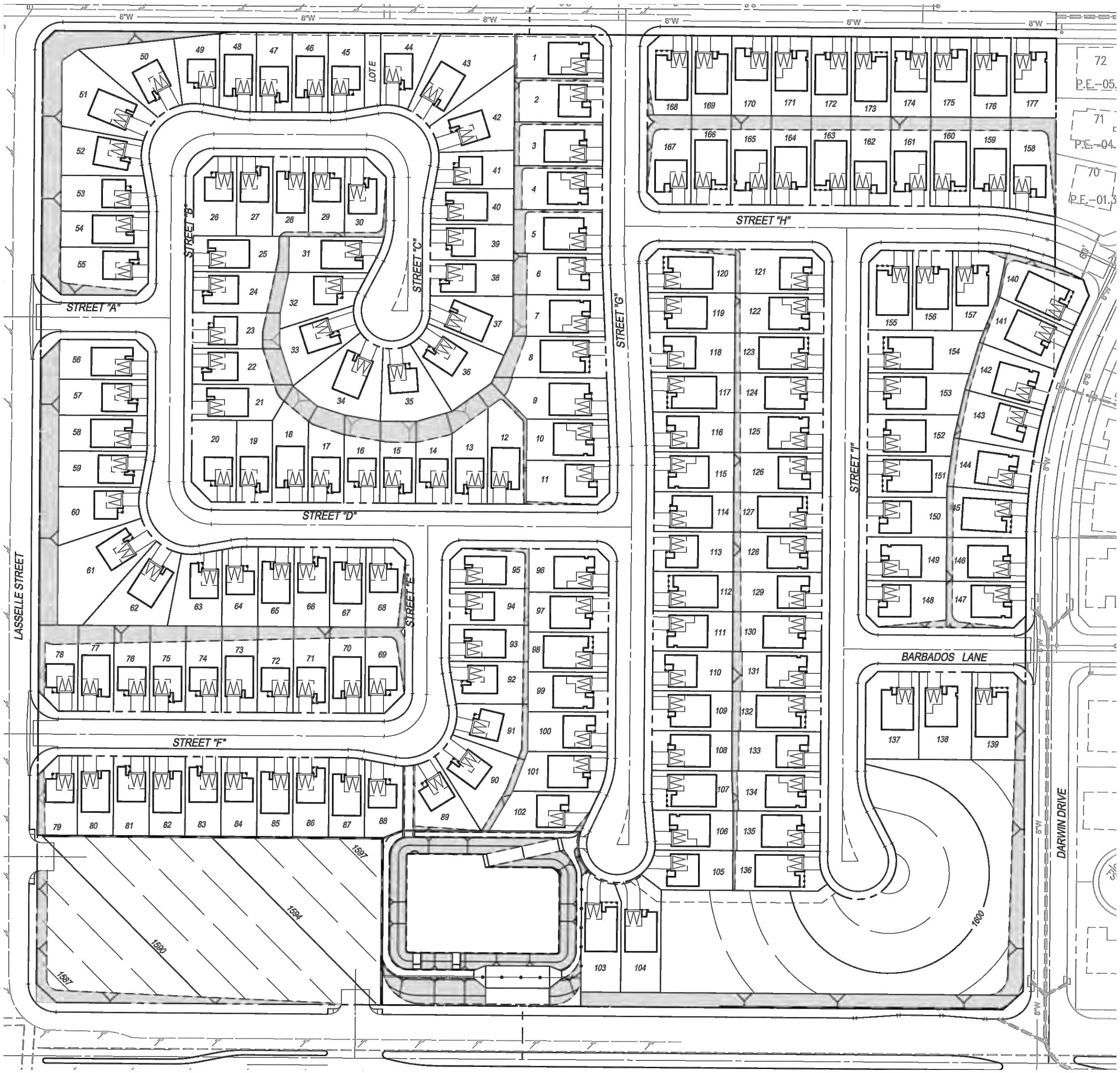
2.1 PROJECT DESCRIPTION

The proposed project consists of a 195 single family residential homes. The site is currently zoned as Community Commercial (CC)/ Residential – Up to 5 DU/AC and classified as Commercial Land Use in the City of Moreno Valley General Plan Land Use Map. The project site is currently vacant. The proposed project land use is permitted in the zone and does not require a zone change or General Plan amendment.

Site access is planning to have a five full access driveways two on Lasselle Street, one on Bay Avenue and two on Darwin Drive.

The proposed project is anticipated to be built and generating trips in 2023. A growth rate of 2% was used to account future traffic volumes.

Exhibit 1 shows the proposed project site plan.



TJW ENGINEERING, INC.

Exhibit 1: Proposed Project Site Plan

DRH-21-001: Draco Tract 31589 Traffic Impact Analysis

Not to Scale

2.2 STUDY AREA

The following intersection in the vicinity of the project site have been included in the intersection level of service (LOS) analysis:

1. Lasselle Street/Cottonwood Avenue
2. Lasselle Street/Bay Avenue
3. Lasselle Street/Alessandro Boulevard

This traffic analysis follows the *City of Moreno Valley Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (October 21st, 2020).*

The study intersections and roadway segments are all located within the City of Moreno Valley.

Exhibit 2 shows the location of the study intersections which are analyzed for the following study scenarios:

- Existing Project Baseline Year (2021) Traffic Conditions;
- Opening Year (2023) Without Project Conditions (Existing + Ambient + Cumulative);
- Opening Year (2023) With Project Conditions (Existing + Ambient + Cumulative + Project)

Traffic operations are evaluated for the following time periods:

- Weekday AM Peak Hour occurring within 7:00 AM to 9:00 AM; and
- Weekday PM Peak Hour occurring within 4:00 PM to 6:00 PM.

2.3 ANALYSIS METHODOLOGY

2.3.1 Intersection Analysis Methodology

Level of Service (LOS) is commonly used to describe the quality of flow on roadways and at intersections using a range of LOS from LOS A (free flow with little congestion) to LOS F (severely congested conditions). The definitions for LOS for interruption of traffic flow differ depending on the type of traffic control (traffic signal, unsignalized intersection with side street stops, unsignalized intersection with all-way stops). The *Highway Capacity Manual (HCM) 6* (Transportation Research Board, 2016) methodology expresses the LOS of an intersection in terms of delay time for the intersection approaches. The HCM methodology utilizes different procedures for different types of intersection control.

The City of Moreno Valley traffic study guidelines require signalized intersection operations be analyzed utilizing the HCM 6th Edition methodology. Intersection LOS for signalized intersections is based on the intersections average control delay for all movements at the intersection during the peak hour. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Legend:

- - - - Project Site

(#) Study Intersection Location

Exhibit 2: Proposed Project Location

Table 1 describes the general characteristics of traffic flow and accompanying delay ranges at signalized intersections.

Table 1:

HCM – LOS & Delay Ranges – Signalized Intersections

Level Of Service	Description	Delay (in seconds)
A	Very favorable progression; most vehicles arrive during green signal and do not stop. Short cycle lengths.	0 – 10.00
B	Good progression, short cycle lengths. More vehicles stop than for LOS A.	10.01 – 20.00
C	Fair progression; longer cycle lengths. Individual cycle failures may begin to appear. The number of vehicles stopping is significant, though many vehicles still pass through without stopping.	20.01 – 35.00
D	Progression less favorable, longer cycle length and high flow/capacity ratio. The proportion of vehicles that pass through without stopping diminishes. Individual cycle failures are obvious.	35.01 – 55.00
E	Severe congestion with some long standing queues on critical approaches. Poor progression, long cycle lengths and high flow/capacity ratio. Individual cycle failures are frequent.	55.01 – 80.00
F	Very poor progression, long cycle lengths and many individual cycle failures. Arrival flow rates exceed capacity of intersection.	> 80.01

Source: Transportation Research Board, *Highway Capacity Manual*, HCM6 Edition (Washington D.C., 2016).

Collected peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. It is a common practice in LOS analysis to conservatively use a peak 15-minute flow rate applied to the entire hour to derive flow rates in vehicles per hour that are used in the LOS analysis. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume. PHF = [Hourly Volume]/[4 * Peak 15-Minute Volume]. The use of a 15-minute PHF produces a more detailed and conservative analysis compared to analyzing vehicles per hour. Existing PHFs, obtained from the existing traffic counts have been used for all analysis scenarios in this study.

The City of Moreno Valley traffic study guidelines also require unsignalized intersection operations be analyzed utilizing the HCM 6th Edition methodology. Intersection operation for unsignalized intersections is based on the weighted average control delay expressed in seconds per vehicle.

At a two-way or side-street stop-controlled intersection, LOS is calculated for each stop-controlled minor street movement, for the left-turn movement(s) from the major street, and for the intersection as a whole. For approaches consisting of a single lane, the delay is calculated as the average of all movements in that lane. For all-way stop-controlled intersection, LOS is computed for the intersection as a whole.

This analysis utilizes *PTV Vistro 2021* analysis software for the signalized intersection. Vistro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis specified in Chapter 16 of the HCM. The level of service and capacity analysis performed within Vistro takes the optimization and coordination of signalized intersections within a network into consideration.

2.3.2 Vehicle Miles Traveled (VMT) Analysis

Senate Bill (SB) 743 was adopted in 2013 requiring the Governor's Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts. For land use projects, OPR has identified Vehicle Miles Traveled (VMT) as the new metric for transportation analysis under CEQA. The regulatory changes to the CEQA guidelines that implement SB 743 were approved on December 28th, 2018 with an implementation date of July 1st, 2020 as the new metric.

Consistent with the new metric of VMT for analysis of transportation impacts, this analysis follows the VMT guidelines set forth by the *City of Moreno Valley Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (October 21st, 2020).*

2.4 PERFORMANCE CRITERIA

2.4.1 Level of Service (LOS) Criteria

The City of Moreno Valley has established level of service "D" or better as acceptable LOS for all intersections that are adjacent to freeway on/off ramps and/or adjacent to employment generating land uses. The City of Moreno Valley has established level of service "C" or better as acceptable LOS for all other intersections along the designated street and highway system in the General Plan Traffic/Circulation Element. For the purposes of the project study area, level of service "C" is considered acceptable LOS.

2.5 THRESHOLDS OF SIGNIFICANCE

According to guidelines, a project is considered to cause a significant impact to a transportation system if it:

- Conflicts with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel.
- Conflicts with an applicable congestion management program (CMP), including, but not limited to level of service standards, travel demand measures, or other standards established by the County Congestion Management Agency for roadways or highways.

Conflicts with adopted policies or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decreases the performance or safety of such facilities.

2.5.1 City of Moreno Valley

The following types of traffic impacts are considered to be "significant":

- When existing traffic conditions exceed the General Plan target LOS.
- When project traffic plus ambient growth plus existing traffic will deteriorate the LOS to below the target LOS, and impacts cannot be mitigated though project conditions of approval.
- When cumulative traffic exceeds the target LOS, and impacts cannot be mitigated though the TUMF and/or DIF network (or other funding mechanism), project conditions of approval, or other

implementation mechanism.

The applicant will participate in the funding or construction of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of the Transportation Uniform Mitigation Fees (TUMF), City of Moreno Valley Development Impact Fees (DIF), or a fair share contribution as directed by the City. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with projected population increases. With regard to guidelines, the above fees will address the project's fair share toward infrastructure improvements designed to alleviate the cumulative impact.

3.0 EXISTING PROJECT BASELINE (2021) CONDITIONS

3.1 EXISTING CIRCULATION NETWORK/STUDY AREA CONDITIONS

The characteristics of the roadway system in the vicinity of the proposed project site are described in ***Table 2.***

Table 2:
Roadway Characteristics Within Study Area

Roadway	Classification[1]	Jurisdiction	Direction	Existing Travel Lanes	Median Type[2]	Speed Limit (mph)	On-Street Parking
Lasselle Street	Arterial	Moreno Valley	North-South	2-4	NM	40	No
Cottonwood Avenue	Minor Arterial	Moreno Valley	East-West	2-4	TWLTL, RM	45	No
Bay Avenue	Local Collector	Moreno Valley	East-West	2	NM	35	Yes
Alessandro Boulevard	Divided Major Arterial	Moreno Valley	East-West	2-6	TWLTL, NM	45	No

1: Sources: City of Moreno Valley General Plan (2006)
2: TWLTL = Two-Way Left-Turn Lane, RM = Raised Median, NM = No Median.

Exhibit 3 show existing conditions study area intersection and roadway geometry. City of Moreno Valley roadway classifications and cross sections are contained in ***Appendix A***.

3.2 CITY OF MORENO VALLEY GENERAL PLAN

The proposed project site is located within the City of Moreno Valley. ***Appendix A*** contains the current City of Moreno Valley General Plan street classifications and roadway cross sections.

3.3 EXISTING BICYCLE AND PEDESTRIAN FACILITIES

Class I on-street bicycle lanes exist on Cottonwood Avenue from Frederick Street to Nason Street.

Class II on-street bicycle lanes exist on of Lassell Street and Alessandro Boulevard.

Pedestrian facilities exist on Alessandro Boulevard along project frontage. There are marked crosswalks at the intersection. The City of Moreno Valley Bicycle Master Plan is contained in ***Appendix A***.

3.4 EXISTING PUBLIC TRANSIT SERVICES

The City of Moreno Valley is served by the Riverside Transit Agency (RTA) which provides local and regional bus service throughout Riverside County. The nearest transit bus stop is located south of the proposed project east and west of Alessandro Boulevard quarter mile from the project site (see **Exhibit 4**).

3.5 EXISTING PROJECT BASELINE (2021) TRAFFIC VOLUMES

To determine the existing operation of the study intersections, AM and PM peak period traffic volumes were estimated based on new traffic counts collected on Thursday, February 25, 2021 and historical data from November 2015. Historical data was grown by an ambient 2% growth rate to establish 2021 existing baseline conditions. A comparison of new traffic counts and established existing baseline conditions was conducted to determine an appropriate growth rate to account for the reduction in traffic volumes due to the COVID-19 situation. The subsequent growth rate was applied to new traffic counts to represent existing baseline conditions for those intersections that did not have historical data. A 1.15 average growth rate was applied to the AM Peak Hour and a 0.28 average growth rate was applied to the PM Peak Hour. Detailed traffic count data is provided in **Appendix B**. **Exhibit 5** shows existing AM and PM peak hour volumes at the study intersections.

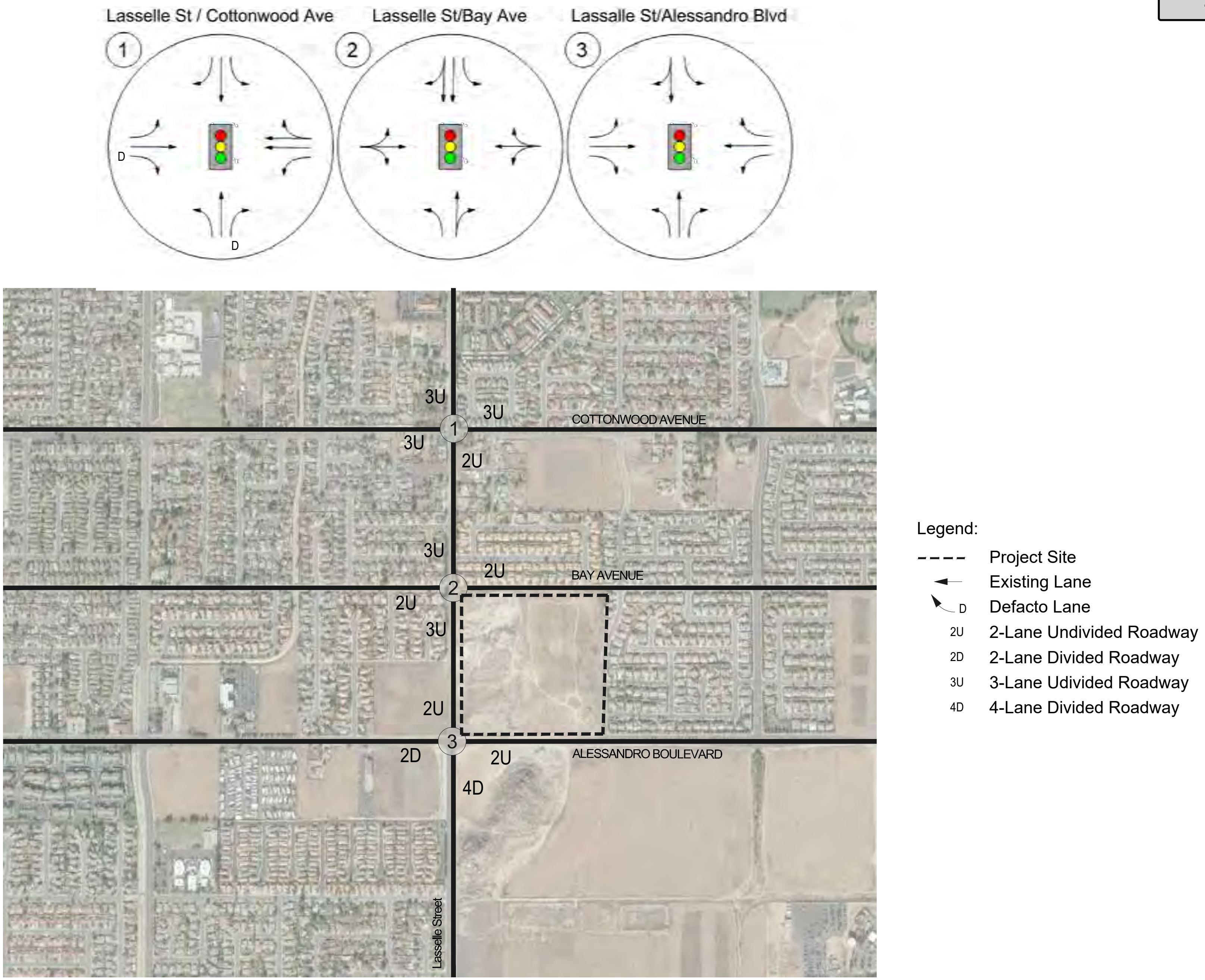
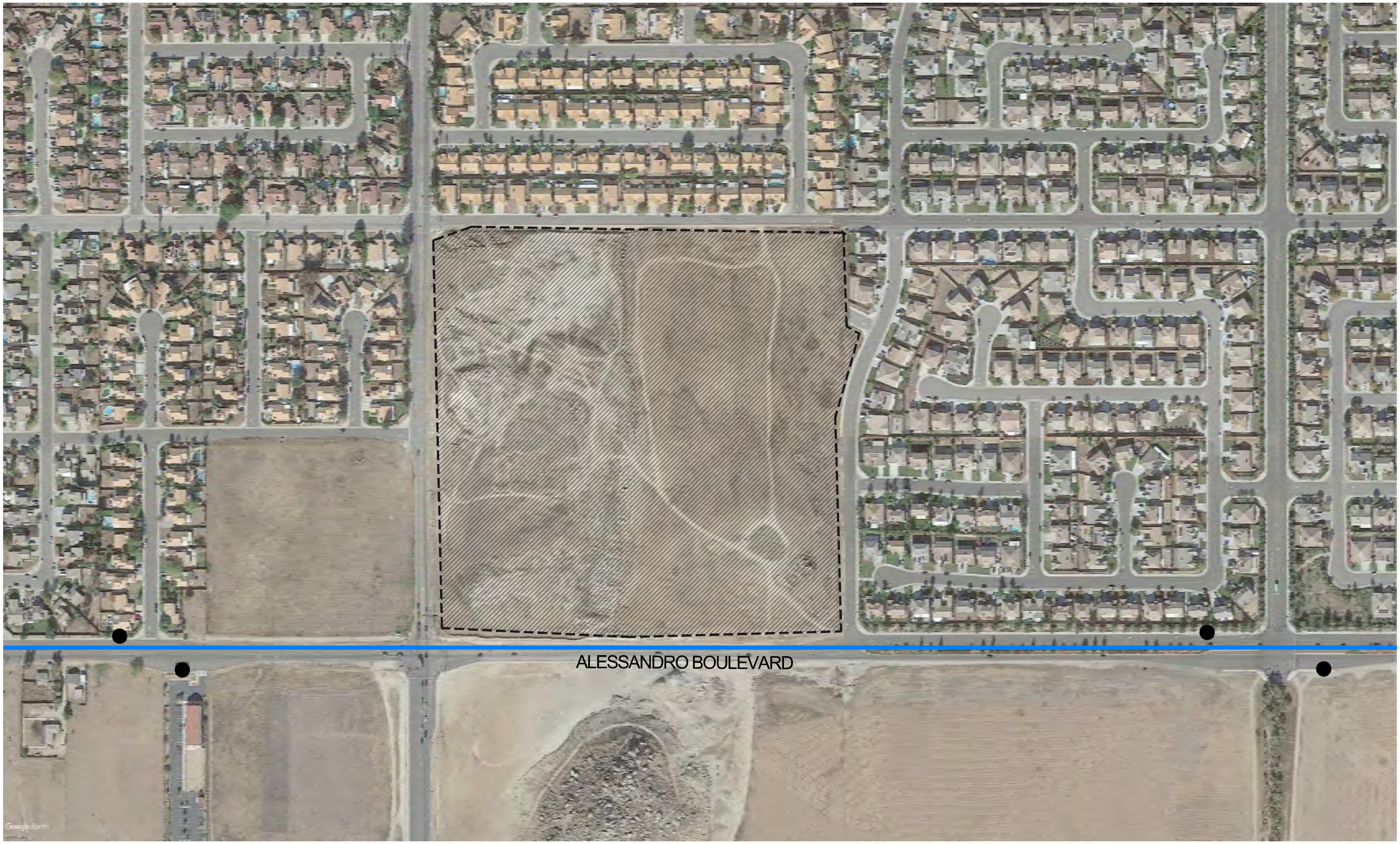


Exhibit 3: Existing Lane Geometry and Intersection Controls

Not to Scale



Legend:

▨ Project Site

Route 20

● Transit Stop

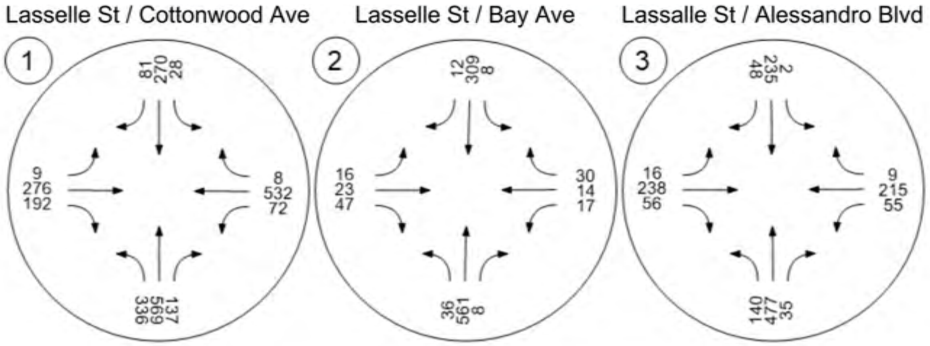
Not to Scale

Exhibit 4: Existing Transit Service

TJW ENGINEERING, INC.

DRH-21-001: Draco Tract 31589 Traffic Impact Analysis

AM PEAK HOUR



PM PEAK HOUR

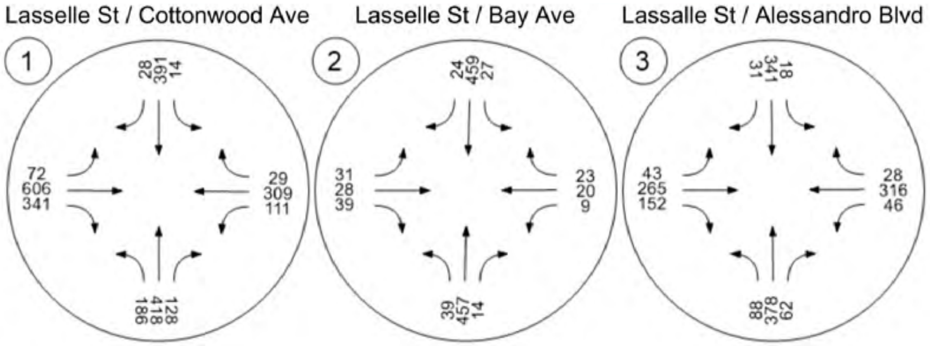


Exhibit 5: Existing AM/PM Peak Hour Intersection Volumes

Not to Scale

3.6 EXISTING PROJECT BASELINE (2021) CONDITIONS INTERSECTION LEVEL OF SERVICE ANALYSIS

Existing Project Baseline (2021) conditions AM and PM peak hour intersection analysis is shown in ***Table 3***. Calculations are based on the existing geometrics at the study area intersections as shown in ***Exhibit 3.*** HCM analysis sheets are provided in ***Appendix C***.

Table 3:
Intersection Analysis – Existing Project Baseline (2021) Conditions

Intersection	Control Type	Peak Hour	Existing Conditions	
			Delay[1]	LOS
#1 – Lasselle Street/Cottonwood Avenue	Signal	AM PM	30.9 28.6	C C
#2 – Lasselle Street/Bay Avenue	Signal	AM PM	8.2 8.3	A A
#3 – Lasselle Street/Alessandro Boulevard	Signal	AM PM	23.2 18.6	C B

1 = Per the Highway Capacity Manual 6th Edition, overall average delay and LOS are shown for signalized.

As shown in ***Table 3***, the study intersections are currently operating at an acceptable LOS during the AM and PM peak hours for *existing* conditions.

4.0 PROPOSED PROJECT

4.1 PROJECT DESCRIPTION

The proposed project consists of a 195 single family residential homes. The site is currently zoned as Community Commercial (CC)/ Residential – Up to 5 DU/AC and classified as Commercial Land Use in the City of Moreno Valley General Plan Land Use Map. The project site is currently vacant. The proposed project land use is permitted in the zone and does not require a zone change or General Plan amendment.

Site access is planning to have a five full access driveways two on Lasselle Street, one on Bay Avenue and two on Darwin Drive.

The proposed project is anticipated to be built and generating trips in 2023. A growth rate of 2% was used to account future traffic volumes.

Exhibit 1 previously showed the proposed project site plan.

4.2 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic, both inbound and outbound, produced by a development. Determining trip generation for a proposed project is based on projecting the amount of traffic that the specific land uses being proposed will produce. Industry standard *Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition, 2017)* trip generation rates were used to determine trip generation of for most of the proposed project land uses.

***Table* 4** summarizes the projected AM peak hour, PM peak hour and daily trip generation of the proposed project.

Table 4:
Proposed Project AM/PM Peak Hour Trip Generation

Proposed Land Use[1]	Qty	Unit[2]	Daily Trips (ADTs)		AM Peak Hour					PM Peak Hour				
			Rate	Volume	Rate	In:Out Split	Volume			Rate	In:Out Split	Volume		
							In	Out	Total			In	Out	Total
Single-Family Housing (210)	195	DU	9.44	1,8541	0.74	25:75	37	107	144	0.99	63:37	122	71	193
Total				**1,841**			**37**	**107**	**144**			**122**	**71**	**193**

1: Rates from ITE Trip Generation (10th Edition, 2017)
2: DU = Dwelling Units

As shown in **Table 4**, the proposed project is projected to generate 144 total AM peak hour trips, 193 total PM peak hour trips and 1,841 total daily trips.

4.3 PROJECT TRIP DISTRIBUTION

Projecting trip distribution involves the process of identifying probable destinations and traffic routes that will be utilized by the proposed project's traffic. The potential interaction between the proposed land use and surrounding regional access routes are considered to identify the probable routes onto which project traffic would distribute. The projected trip distribution for the proposed project is based on anticipated travel patterns to and from the project site.

Exhibit 6 shows the general projected AM and PM trip distribution of proposed project trips, respectively.

4.4 MODAL SPLIT

The traffic reducing potential of public transit, walking and bicycling have not been considered in this analysis since transit facilities in the study area are limited.

4.5 PROJECT TRIP ASSIGNMENT

Exhibit 7 shows the corresponding projected AM/PM peak hour net trip assignment of proposed project trips.

4.6 CUMULATIVE PROJECTS TRAFFIC

Guidelines require that other reasonably foreseeable development projects which are either approved or are currently being processed in the study area also be included as part of a cumulative analysis scenario. A list of cumulative projects was developed for this analysis through consultation with City of Moreno Valley staff, and obtainment of current development status reports. ***Exhibit 8*** shows the location of nearby cumulative developments. A summary of the cumulative projects land uses is shown in **Table 5.**

Table 5:
Cumulative Projects List

Project[1]		Land Use[2]	Qty	Units[3]	AM Peak Hour			PM Peak Hour			Daily
					In	Out	Total	In	Out	Total	
1	PEN18-0065	210	16	DU	3	9	12	10	6	16	151
2	PEN18-0163	210	107	DU	20	59	79	67	39	106	1,010
3	Moreno Valley Medical Plaza	720	217.00	TSF	470	133	603	210	541	751	7,552
4	PA16-0039, PEN18-0211	220	272	DU	29	96	125	96	56	152	1,991
5	PA14-0016, PEN19-0007	220	117	DU	12	42	54	41	25	66	856
6	PA06-0096, PEN18-0032	220	52	DU	6	18	24	18	11	29	381
7	PA06-0052, PEN19-0236	220	40	DU	4	14	18	14	8	22	293
8	PA15-0046	220	426	DU	45	151	196	150	89	239	3,118
9	PEN16-0123, PEN19-0007	220	220	DU	23	78	101	77	46	123	1,610
Total					612	600	1,212	683	821	1,504	16,962

1: List of cumulative projects provided by the City of Moreno Valley
2: Source: Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017.
3: DU = Dwelling Units; TSF = Thousand Square Feet

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

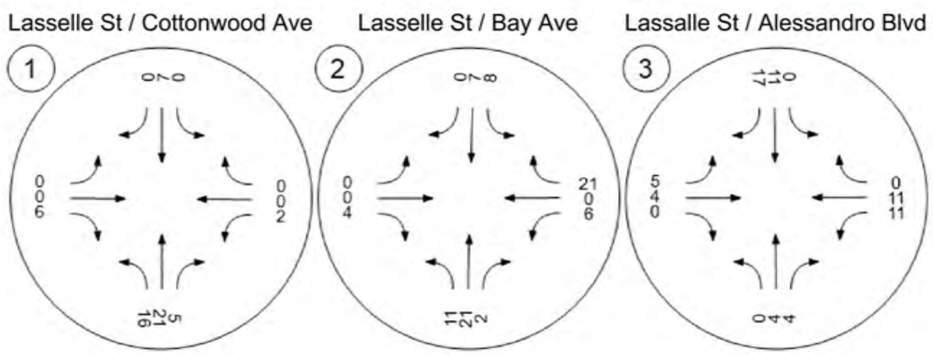
Legend:

----	Project Site
ⓘ#	Study Intersection Location

Not to Scale

Exhibit 6: Proposed Project Distribution

AM PEAK HOUR



PM PEAK HOUR

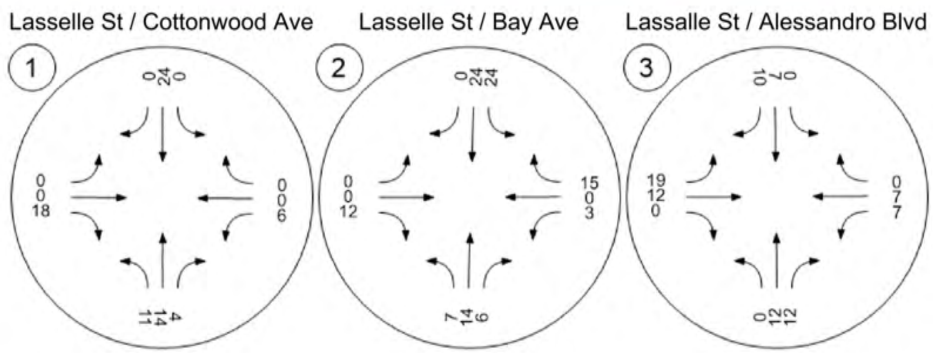
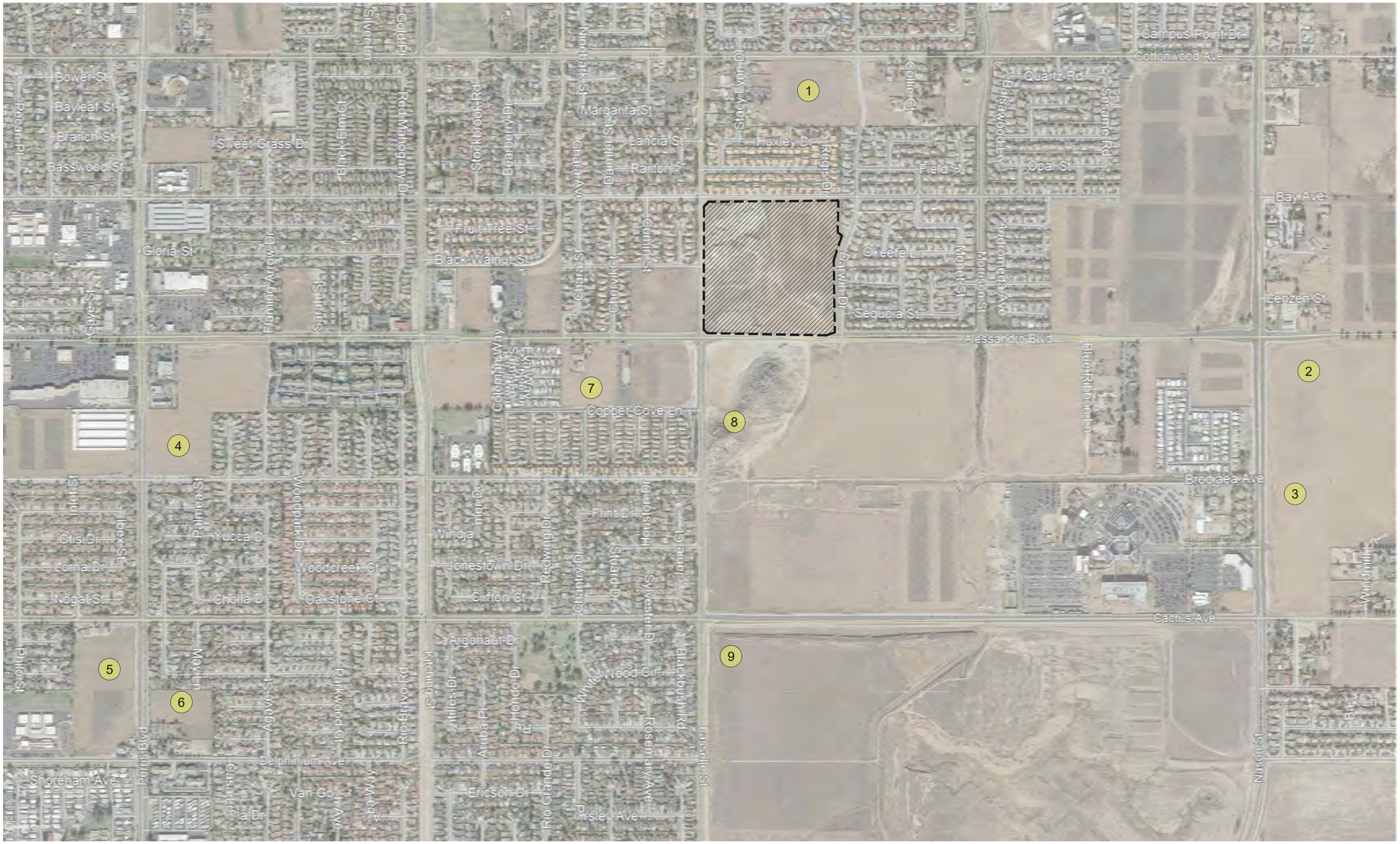


Exhibit 7: Projected Trip Assignment of Proposed Project Trips

Not to Scale



Legend:

- (X) Approximate Cumulative Project Locations
- ▨ Project Site

Exhibit 8: Project Location and Proposed Project Distribution

Not to Scale

TJW ENGINEERING, INC. DRH-21-001: Draco Tract 31589 Traffic Impact Analysis

6.0 OPENING YEAR (2023) WITHOUT PROJECT CONDITIONS (OY)

Opening year (2023) without project (OY) conditions analysis is intended to identify baseline conditions in the near-term without the proposed project.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for the *existing plus ambient plus cumulative* scenario are consistent with those previously shown in ***Exhibit 3***.

6.2 OY CONDITIONS TRAFFIC VOLUMES

OY volumes include background traffic plus the addition of the traffic projected to be generated by cumulative projects. Since the proposed project is expected to be built and generating trips in 2023, *OY* volumes include a growth rate of 2% per year for five years, applied to existing volumes.

OY Volumes = (Existing (2021) Counts * 1.02^2) + Cumulative Traffic

Exhibit 9 shows *OY* AM and PM peak hour volumes at the study intersections.

6.3 OY INTERSECTION LEVEL OF SERVICE ANALYSIS

OY conditions AM and PM peak hour intersection analysis is shown in ***Table 6***. Calculations are based on the existing geometrics at the study area intersections as shown in ***Exhibit 3.*** HCM analysis sheets are provided in ***Appendix C***.

Table 6:

Intersection Analysis – OY Conditions

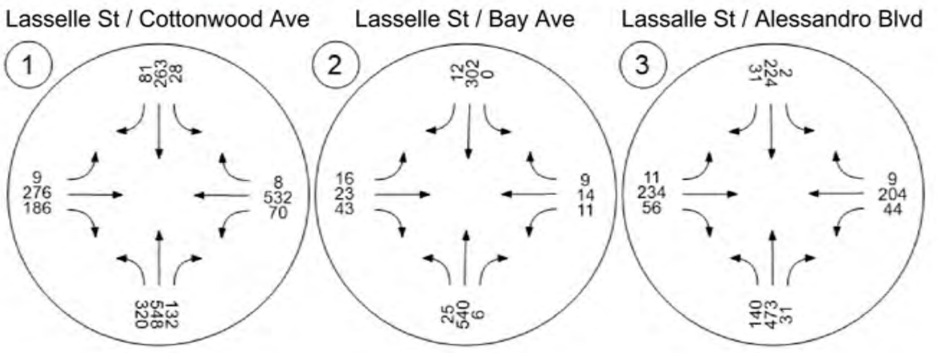
Intersection	Control Type	Peak Hour	OY Conditions	
			Delay[1]	LOS
#1 - Lasselle Street/Cottonwood Avenue	Signal	AM PM	33.6 31.4	C C
#2 - Lasselle Street/Bay Avenue	Signal	AM PM	8.2 8.4	A A
#3 – Lasselle Street/Alessandro Boulevard	Signal	AM PM	26.7 21.5	C C

Note: AWSC = All-Way Stop-Control, TWSC = Two-Way Stop-Control, Delay shown in seconds per vehicle.

1 = Per the Highway Capacity Manual 6th Edition, overall average delay and LOS are shown for signalized and all-way stop-controlled intersections. For intersections with one-or-two-way stop-control, the delay and LOS for the worst individual movement is shown.

As shown in ***Table 6,*** the study intersections are projected to continue to operate at an acceptable LOS during the AM and PM peak hours for *OY* conditions.

AM PEAK HOUR



PM PEAK HOUR

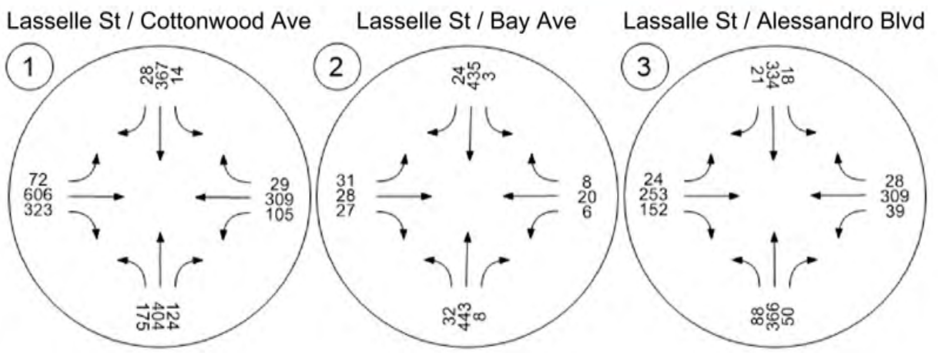


Exhibit 9: Opening Year AM/PM Peak Hour Intersection Volumes

Not to Scale

7.0 OPENING YEAR (2023) WITH PROJECT CONDITIONS (OYP)

Opening year (2023) with project conditions (OYP) conditions analysis is intended to identify the project-related cumulative impacts on the planned circulation system.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for the *OYP* scenario are consistent with those previously shown in ***Exhibit 3*** and do not assume recommended improvements identified in the OY*P* scenario.

7.2 OYP TRAFFIC VOLUMES

OYP volumes include background traffic plus the addition of the traffic projected to be generated by the proposed project and traffic projected to be generated by cumulative developments in the vicinity of the proposed project. Cumulative developments are projects which are in various stages of planning, entitlement and construction. Since the proposed project is expected to be built and generating trips in 2023, OY*P* volumes include an ambient growth rate of 2% per year for five year, applied to existing volumes.

OYP Volumes = (Existing (2021) Counts * 1.02^2) + Cumulative Projects Traffic + Project Traffic

The cumulative projects were previously discussed in *Section 4.6 Cumulative Projects Traffic.*

Exhibit 10 shows *OYP* AM and PM peak hour volumes at the study intersections.

7.3 OYP CONDITIONS INTERSECTION LEVEL OF SERVICE ANALYSIS

OYP conditions AM and PM peak hour intersection analysis is shown in ***Table 7***. HCM analysis sheets are provided in ***Appendix C.***

Table 7:

Intersection Analysis – OYP Conditions

Intersection	Control Type	Peak Hour	OY Conditions		OYP Conditions			
			Delay[1]	LOS	Delay[1]	LOS	Change	Impact?
#1 – Lasselle St/Cottonwood Ave	Signal	AM	33.6	C	34.1	C	0.5	No
		PM	31.4	C	33.2	C	1.8	No
#2 – Lasselle St/Bay Ave	Signal	AM	8.2	A	9.7	A	1.5	No
		PM	8.4	A	10.0	A	1.6	No
#3 - Lasselle St/Alessandro Blvd	Signal	AM	26.7	C	28.9	C	2.2	No
		PM	21.5	C	21.8	C	0.3	No

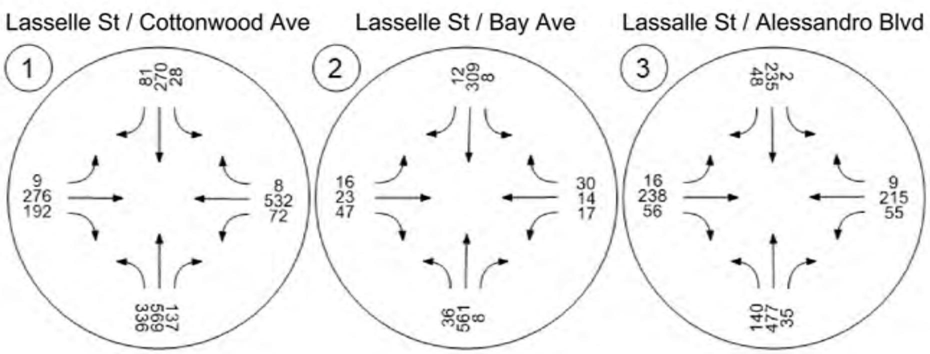
Note: AWSC = All-Way Stop-Control, TWSC = Two-Way Stop-Control, OWSC = One-Way Stop Control, Delay shown in seconds per vehicle.

1 = Per the Highway Capacity Manual 6th Edition, overall average delay and LOS are shown for signalized and all-way stop-controlled intersections. For intersections with one-or-two-way stop-control, the delay and LOS for the worst individual movement is shown.

As shown in ***Table 7***, the study intersections are projected to continue to operate at an acceptable LOS during the AM and PM peak hours for *OYP* conditions.

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

AM PEAK HOUR



PM PEAK HOUR

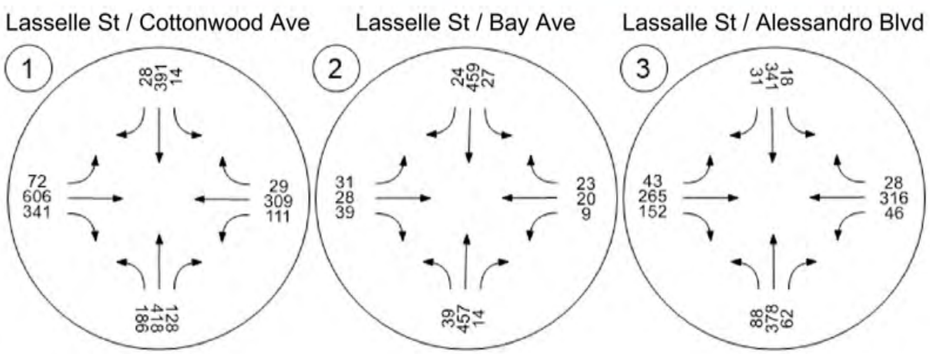


Exhibit 10: Opening Year Plus Project AM/PM Peak Hour Intersection Volumes

Not to Scale

8.0 VEHICLE MILES TRAVELED (VMT) ANALYSIS

Senate Bill (SB) 743 was adopted in 2013 requiring the Governor's Office of Planning and Research (OPR) to identify new metrics for identifying and mitigating transportation impacts within the California Environmental Quality Act (CEQA). For land use projects, OPR has identified Vehicle Miles Traveled (VMT) as the new metric for transportation analysis under CEQA. The regulatory changes to the CEQA guidelines that implement SB 743 were approved on December 28th, 2018 with an implementation date of July 1st, 2020 as the new metric.

8.1 VEHICLE MILES TRAVELED (VMT) ANALYSIS

Consistent with the new metric of VMT for analysis of transportation impacts, this analysis follows VMT guidelines set forth by the *City of Moreno Valley Traffic Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled (VMT) and Level of Service Assessment (June, 18st, 2020).* For land use projects, using the WRCOG VMT Screening Tool the project is located in a low VMT area and is presumed to cause a less than significant impact.

Using the WRCOG VMT Screening Tool the project is located in a low VMT area, the proposed land use is consistent with both the existing zoning and the other existing land uses already in the traffic analysis zones (TAZ). The proposed residential project is consistent with both; therefore, the project is presumed to have a less than significant transportation impact per City guidelines.

Appendices

APPENDIX A

SCOPING AGREEMENT AND MORENO VALLEY ROADWAY CLASSIFICATIONS AND CROSS SECTIONS

TJW ENGINEERING, INC.
TRAFFIC ENGINEERING &
TRANSPORTATION PLANNING
CONSULTANTS

January 26, 2021

Ms. Megan Whieldon
D.R. HORTON
2280 Wardlow Circle, Suite 100
Corona, CA 92878

SUBJECT: Darco Tract 31589 Traffic Impact Analysis Scoping Agreement, City of Moreno Valley

Dear Ms. Whieldon,

*TJW Engineering, Inc. (*TJW*)* will be preparing a traffic impact analysis (TIA) for the proposed multi-family residential project located at the northeast corner of Alessandro Boulevard and Lasselle Street in the City of Moreno Valley. The proposed project includes 195 multi family dwelling units.

Site access will be provided via five (5) full access driveways, two (2) along Lasselle Street one (1) along Bay Avenue, and two (2) along Darwin Drive. The proposed site plan has been attached to this letter. The following scope of work has been prepared based on the City of Moreno Valley Traffic Impact Study Guidelines June 2020. The Traffic Impact Study Scope form is also attached for reference.

SCOPE OF WORK

Trip Generation and Distribution Assumptions

Trip generation for the proposed project will be developed using rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition). The trip generation rates and anticipated trip generation for the project are attached. The project is anticipated to generate 1,841 daily trips, 144 AM peak hour trips, and 193 PM peak hour trips.

Proposed Land Use[1]	Qty	Unit[2]	Daily Trips (ADTs)		AM Peak Hour					PM Peak Hour				
			Rate	Volume	Rate	In:Out Split	Volume			Rate	In:Out Split	Volume		
							In	Out	Total			In	Out	Total
Single-Family Housing (210)	195	DU	9.44	1,8541	0.74	25:75	37	107	144	0.99	63:37	122	71	193
Total				**1,841**			**37**	**107**	**144**			**122**	**71**	**193**

1: Rates from ITE Trip Generation (10th Edition, 2017)
2: DU = Dwelling Units

Trip Distribution Assumptions

Project trip distributions will be based on the surrounding regional access routes to identify probable routes onto which project traffic would distribute. The anticipated travel patterns to and from the project site are shown in the attached exhibit.

Vehicle Miles Traveled Analysis

For purposes of SB 743 compliance, a VMT analysis shall be conducted for land use projects as deemed necessary by the Planning and Engineering Departments. As stated in City Traffic Impact Analysis guidelines, it is anticipated that the proposed project will be screened out per the following screening step:

Step 2: Low VMT Area Screening

Residential and office projects located within a low VMT-generating area may be presumed to have a less than significant impact absent substantial evidence to the contrary. In addition, other employment-related and mixed-use land use projects may qualify for the use of screening if the project can reasonably be expected to generate VMT per resident, per worker, or per service population that is similar to the existing land uses in the low VMT area.

For this screening in the WRCOG area, the RIVTAM travel forecasting model was used to measure VMT performance for individual jurisdictions and for individual traffic analysis zones (TAZs). TAZs are geographic polygons similar to Census block groups used to represent areas of homogenous travel behavior. Total daily VMT per service population (population plus employment) was estimated for each TAZ. This presumption may not be appropriate if the project land uses would alter the existing built environment in such a way as to increase the rate or length of vehicle trips

Study Area

The study area shall generally include intersections in which the proposed project may create a significant impact. As such, TJW proposes to include the following intersections and roadway segment:

Study Intersections
1. Lasselle St / Cottonwood St
2. Lasselle St / Bay Ave
3. Lasselle St / Alessandro Blvd

Cumulative Projects

TJW requests that the City provide a list of cumulative projects in the study or provide a link or copy of the latest development status report that the City has. TJW will utilize this list to determine which cumulative projects should be included in the cumulative conditions analysis. Additionally, if the City has any information on the cumulative projects such as trip generation and trip distribution patterns for each project, or prior completed traffic studies, TJW requests that this information be forwarded to us electronically.

Analysis Methodology and Scenarios

The analysis of traffic and level of service will be provided for the following scenarios and will include an assessment of traffic mitigation measures if any are required.

1. Existing Traffic Conditions (Existing)
2. Opening Year (2023) Without Project Conditions (Existing + Ambient + Cumulative)
3. Opening Year (2023) With Project Conditions (Existing + Ambient + Cumulative + Project)

The TIA will analyze study intersections during the AM and PM peak hours. Intersection level of service (LOS) will be calculated using the Highway Capacity Manual 6 (HCM 6) analysis methodologies.

Volume Development

Due to the ongoing COVID-19 situation, traffic volumes have been lower than average. TJW proposes the following approach to establish baseline conditions:

1. Historical counts from one intersection Lasselle St at Alessandro Blvd (2015) will be used with a 2% annual growth rate to establish Existing (2021) Baseline Conditions. Counts will be obtained from nearby projects.
2. Conduct new 2021 traffic counts at all study intersection between the hours of 7 AM and 9 AM for the AM peak hour and between the hours of 4 PM and 6 PM for the PM peak hour.
3. Compare new 2021 traffic counts to established Existing (2021) Baseline Conditions for intersections with historical data and determine an average growth rate.
4. Apply determined average growth rate to 2021 counts for all intersection to establish a 2021 baseline condition.

Project Opening Year is assumed to be 2023, and traffic volumes will be developed by applying an annual growth rate to account for ambient growth. An appropriate growth rate will be determined by comparing historical data to the established 2021 Baseline Condition volumes.

Project Impact Assessment and Mitigation Measures

Intersection LOS without the project will be compared to the intersection LOS with the project for each of the analysis scenarios to determine potential traffic/infrastructure deficiencies. Determination of traffic/infrastructure deficiencies will be made based on the City's general plan threshold standards. If the level of service analysis shows that the project causes a deficiency at a study facility, feasible improvements will be recommended. As applicable, the project's fair share will be estimated as part of the mitigation section (fair share is 100% for direct impacts).

If you have any questions regarding this scope of work or project, please feel free to contact me at David@tjwengineering.com or at (949) 878-3509.

Sincerely,

David Chew, PTP
Transportation Planning Manager
TJW Engineering, Inc.

EXHIBIT A

Project Scoping Form

This scoping form shall be submitted to the Lead Agency to assist in identifying infrastructure improvements that may be required to support traffic from the proposed project.

Project Identification:

Approved

2/23/20

Case Number:	
Related Cases:	
SP No.	
EIR No.	
GPA No.	
CZ No.	
Project Name:	Darco Tract 31589
Project Address:	Northeast corner of Alessandro Blvd and Lasselle St
Project Opening Year:	2023
Project Description:	195 single family residential units

	Consultant:	Developer:
Name:	TJW Engineering	D.R. Horton
Address:	Venture 6, Ste 225	2280 Wardlow Circle, Ste 100
	Irvine, CA 92618	Corona, CA 92878
Telephone:	(949) 878-3509	(951) 739-5485
Email:	David@tjwengineering.com	MKWhieldon@drhorton.com

Trip Generation Information:

Trip Generation Data Source: ITE Trip Generation 10th Edition

Current General Plan Land Use: CC/R5

Proposed General Plan Land Use: R5

Current Zoning: CC/R5

Proposed Zoning: R5

	Existing Trip Generation			Proposed Trip Generation		
	In	Out	Total	In	Out	Total
AM Trips	0	0	0	37	107	144
PM Trips	0	0	0	122	71	193

Trip Internalization: ☐ Yes ☒ No (______% Trip Discount)

Pass-By Allowance: ☐ Yes ☒ No (______% Trip Discount)

Potential Screening Checks

Is your project screened from specific analyses (see Page 3 of the guidelines related to LOS assessment and Pages 22-23 for VMT screening criteria).

Is the project screened from LOS assessment? ☐ Yes ☒ No

LOS screening justification (see Page 3 of the guidelines): ____________________

Is the project screened from VMT assessment? ☒ Yes ☐ No

VMT screening justification (see Pages 22-23 of the guidelines): ______________
Low VMT area screening using WRCOG screening tool.

Level of Service Scoping

- Proposed Trip Distribution (Attach Graphic for Detailed Distribution):

North	South	East	West
20 %	20 %	10 %	50 %

Link level of service and data collection:

_____ will be required

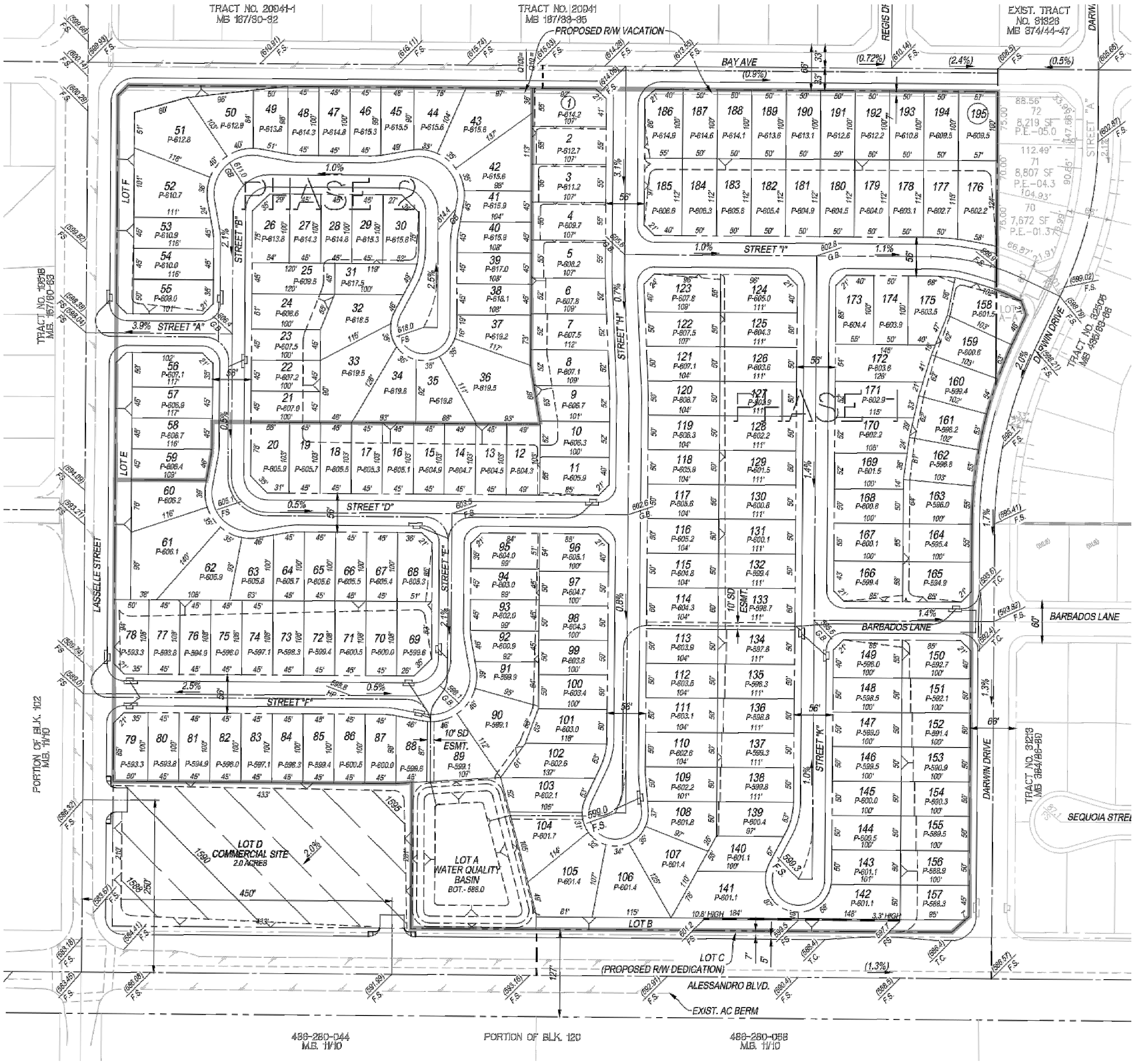
_____ will not be required

- Attach list of study intersections (and roadway segments if applicable)
- Attach site plan
- Other specific items to be addressed:
    - Site access
    - On-site circulation
    - Parking
    - Consistency with Plans supporting Bikes/Peds/Transit
    - Other _____________________
- Date of Traffic Counts ___________________________
- Attach proposed analysis scenarios (years plus proposed forecasting approach)
- Attach proposed phasing approach (if the project is phased)

VMT Scoping

For projects that are not screened, identify the following:

- Travel Demand Forecasting Model Used ______________________
- Attach WRCOG Screening VMT Assessment output or describe why it is not appropriate for use
- Attach proposed Model Land Use Inputs and Assumed Conversion Factors (attach)

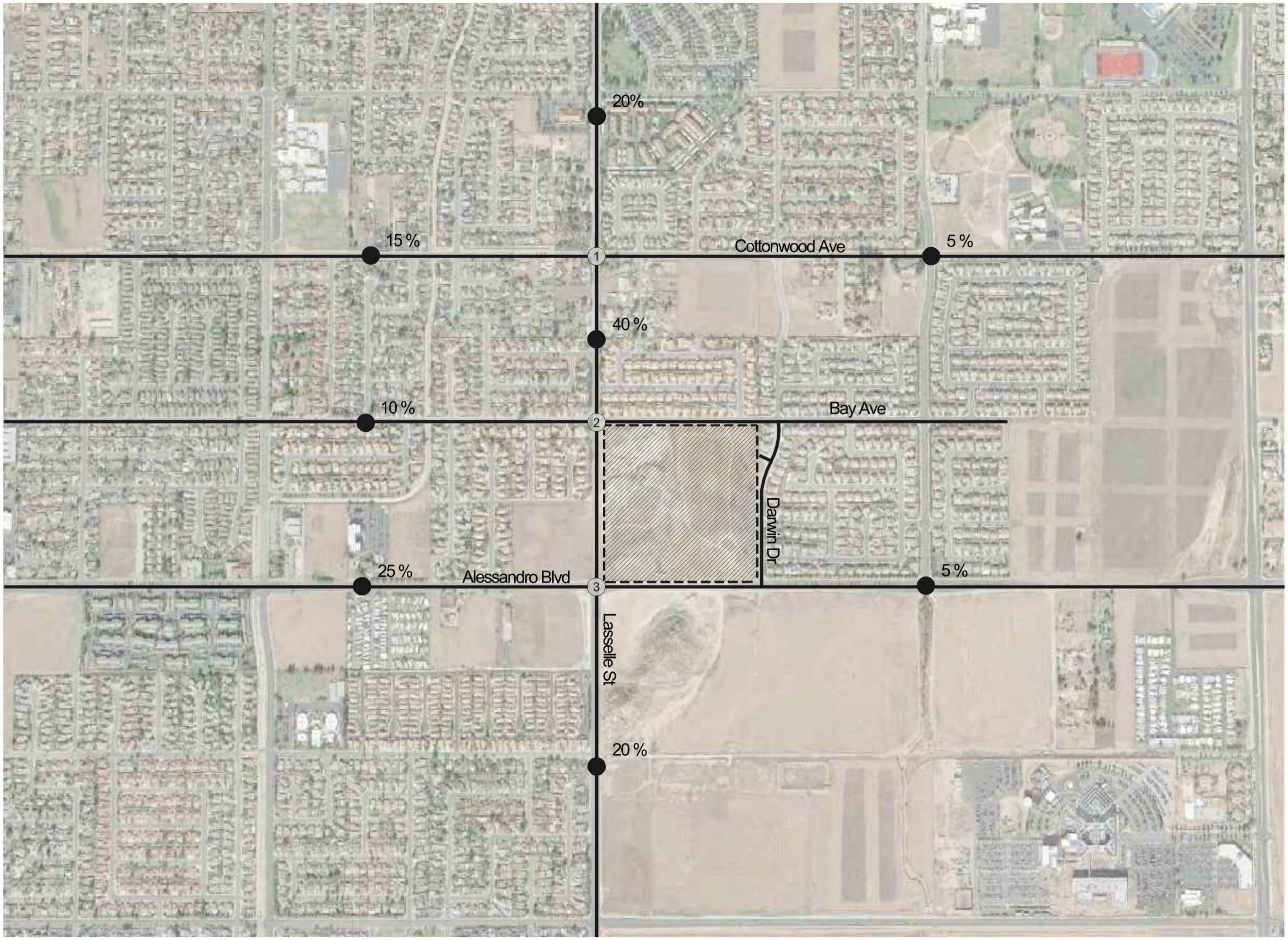


TJW ENGINEERING, INC.

Exhibit 1: Proposed Project Site Plan

DRH-21-001: Draco Tract 31589 Traffic Impact Analysis

Not to Scale



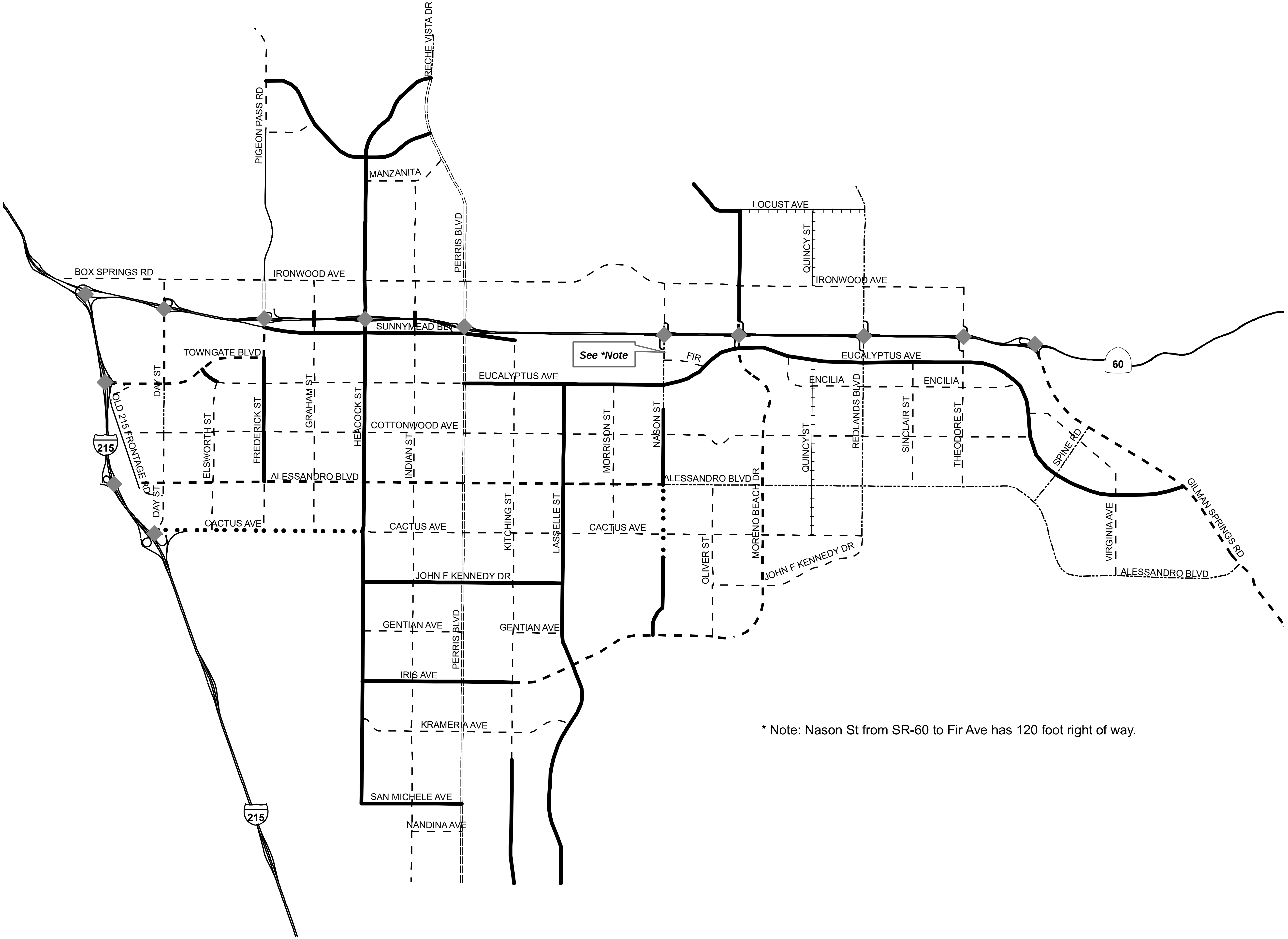
Legend:

---- Project Site

(#) Study Intersection Location

Not to Scale

Exhibit 2: Project Location and Proposed Project Distribution



* Note: Nason St from SR-60 to Fir Ave has 120 foot right of way.

MORENO VALLEY

FIGURE 9-1
CIRCULATION PLAN

Street Classification

- ═ Freeway
- ━ ━ Divided Major Arterial
- • • • Divided Major Arterial - Reduced Cross Section
- ==== Divided Arterial - 6 lane
- -·-·- Divided Arterial - 4 lane
- ━ Arterial
- - - - Minor Arterial
- — Minor Arterial - Pigeon Pass Cross Section
- ┼┼┼ Collector
- ▌ Freeway Overpass
- ◆ Freeway Interchange

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

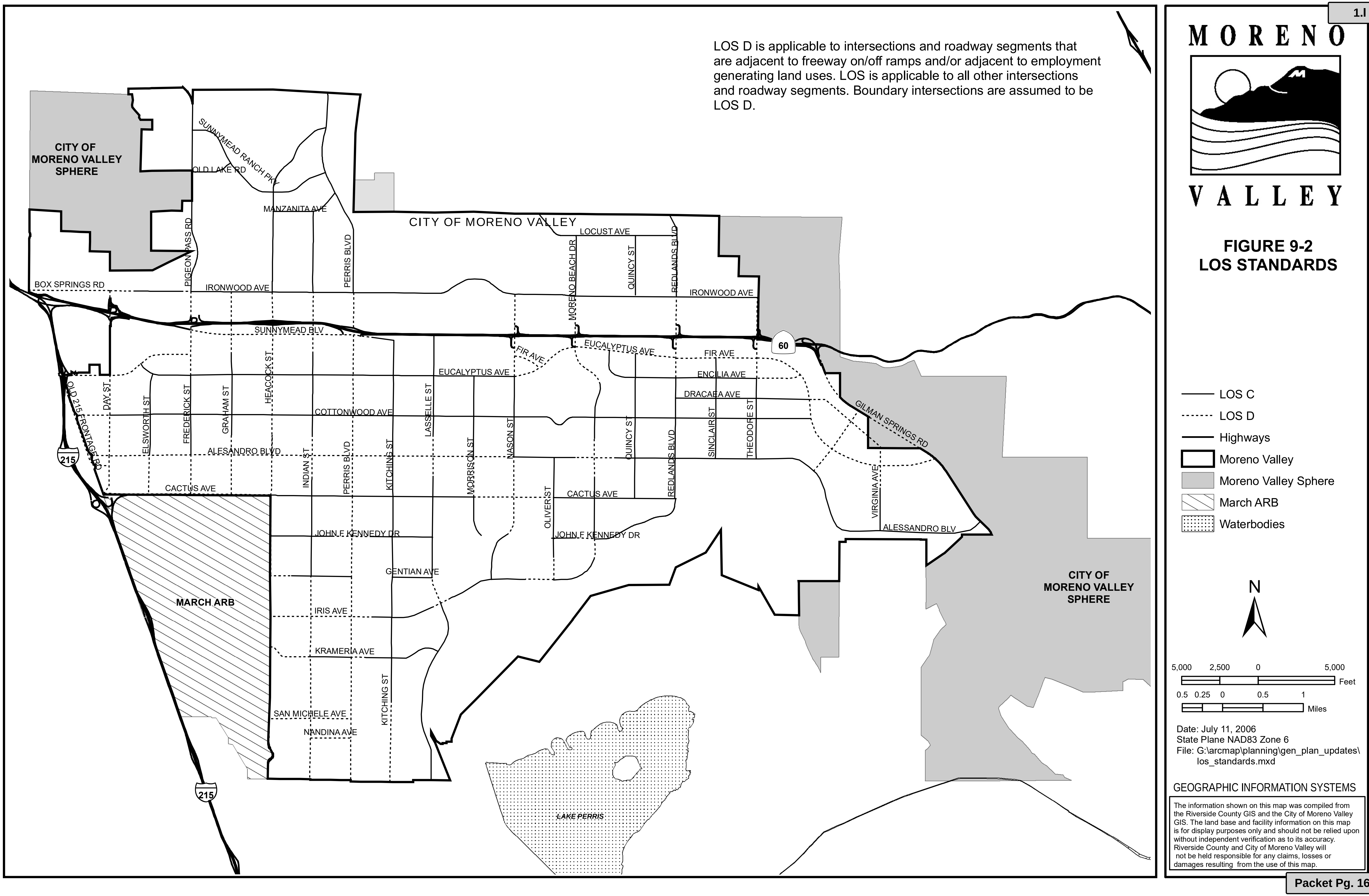
Date: July 11, 2006
State Plane NAD83 Zone 6
File: G:\arcmap\planning\gen_plan_updates\
circ_plan_fig91.mxd

GEOGRAPHIC INFORMATION SYSTEMS

The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

MORENO VALLEY

FIGURE 9-2
LOS STANDARDS



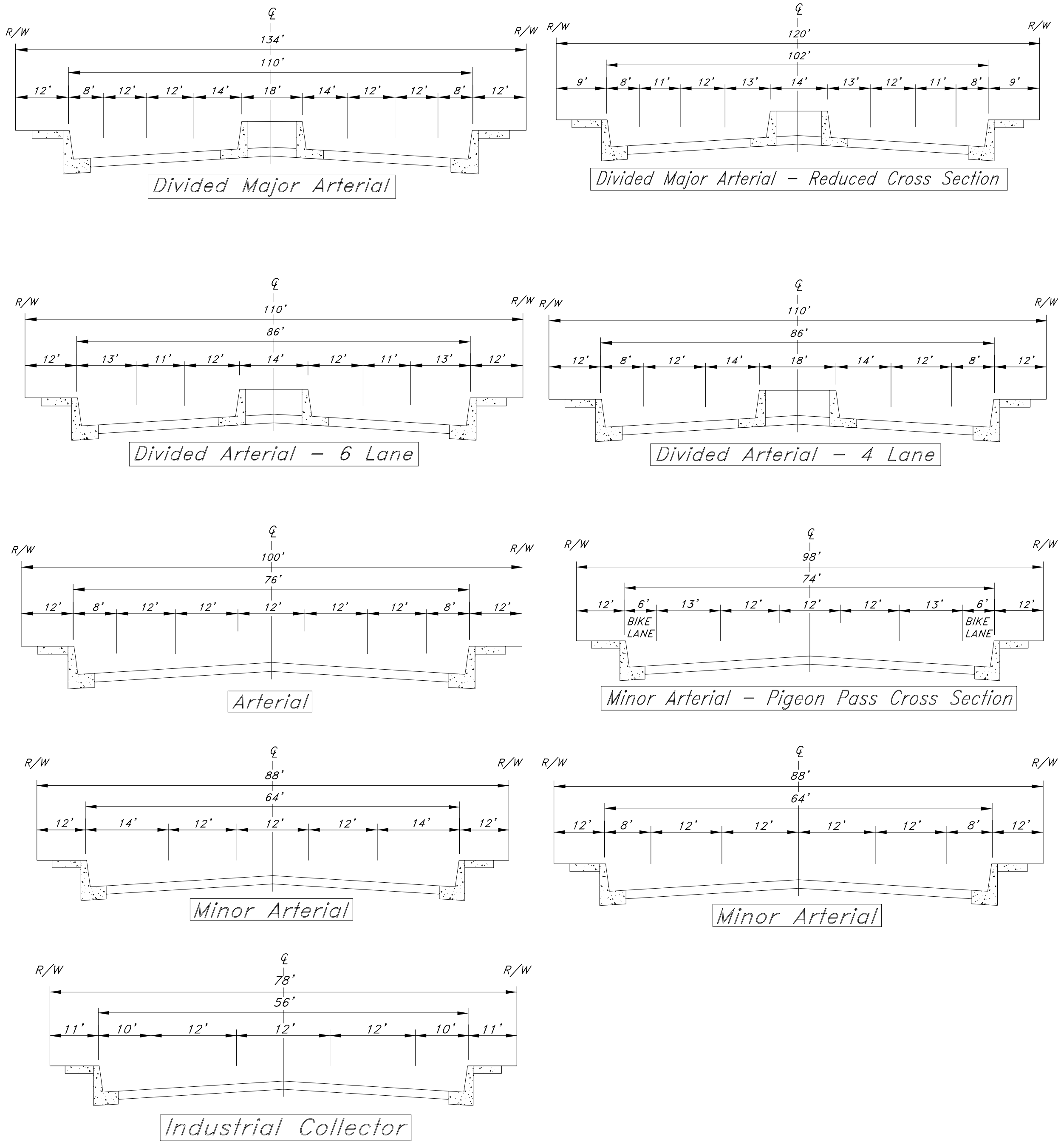
LOS D is applicable to intersections and roadway segments that are adjacent to freeway on/off ramps and/or adjacent to employment generating land uses. LOS is applicable to all other intersections and roadway segments. Boundary intersections are assumed to be LOS D.

Date: July 11, 2006
State Plane NAD83 Zone 6
File: G:\arcmap\planning\gen_plan_updates\
los_standards.mxd

GEOGRAPHIC INFORMATION SYSTEMS

Figure 9-3

PROPOSED CITY OF MORENO VALLEY GENERAL PLAN ROADWAY CROSS-SECTIONS



NOT TO SCALE

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

APPENDIX B

EXISTING TRAFFIC COUNTS

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE:	LOCATION:	Moreno Valley	PROJECT #:	SC
Thu, Feb 25, 21	NORTH & SOUTH:	Lasselle	LOCATION #:	1
	EAST & WEST:	Alessandro	CONTROL:	SIGNAL

NOTES:

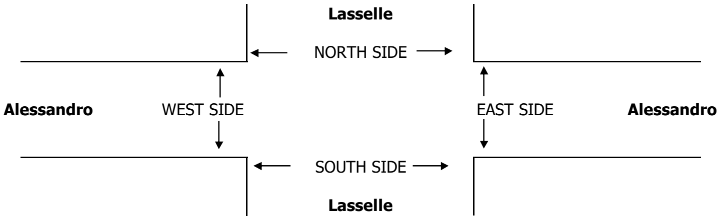
AM
PM
MD
OTHER
OTHER

▲ N
◀ W
E ▶
S ▼

☑ Add U-Turns to Left Turns

		NORTHBOUND Lasselle			SOUTHBOUND Lasselle			EASTBOUND Alessandro			WESTBOUND Alessandro			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	1	1	1	1	1	0	1	1	1	1	1	1	
AM	7:00 AM	20	49	9	2	22	6	1	25	13	6	44	1	198
	7:15 AM	39	57	9	7	29	10	2	27	15	7	59	2	263
	7:30 AM	33	63	9	1	27	10	0	27	22	5	63	0	260
	7:45 AM	38	57	20	1	33	10	0	30	27	7	62	0	285
	8:00 AM	33	47	20	3	22	6	2	39	19	10	53	1	255
	8:15 AM	28	44	14	7	24	9	2	29	20	9	44	3	233
	8:30 AM	14	31	15	2	21	3	2	35	13	10	59	5	210
	8:45 AM	33	65	16	1	27	6	4	34	21	9	62	1	279
	VOLUMES	238	413	112	24	205	60	13	246	150	63	446	13	1,983
	APPROACH %	31%	54%	15%	8%	71%	21%	3%	60%	37%	12%	85%	2%	
	APP/DEPART	763	/	439	289	/	418	409	/	382	522	/	744	0
	BEGIN PEAK HR		7:15 AM											
	VOLUMES	143	224	58	12	111	36	4	123	83	29	237	3	1,063
	APPROACH %	34%	53%	14%	8%	70%	23%	2%	59%	40%	11%	88%	1%	
	PEAK HR FACTOR		0.924			0.864			0.875			0.975		0.932
	APP/DEPART	425	/	231	159	/	223	210	/	193	269	/	416	0
PM	4:00 PM	34	82	21	6	67	4	11	82	55	23	57	5	447
	4:15 PM	27	64	24	4	68	4	14	91	42	19	78	4	439
	4:30 PM	37	71	20	1	65	8	9	117	60	27	51	6	472
	4:45 PM	24	75	22	5	61	2	17	123	59	21	62	8	479
	5:00 PM	39	71	26	2	51	6	15	107	57	13	65	4	456
	5:15 PM	31	65	20	1	64	5	13	107	66	15	53	3	443
	5:30 PM	27	79	28	2	69	11	11	79	55	27	52	7	447
	5:45 PM	42	52	25	4	85	6	17	78	65	23	50	2	449
	VOLUMES	261	559	186	25	530	46	107	784	459	168	468	39	3,632
	APPROACH %	26%	56%	18%	4%	88%	8%	8%	58%	34%	25%	69%	6%	
	APP/DEPART	1,006	/	705	601	/	1,157	1,350	/	995	675	/	775	0
	BEGIN PEAK HR		4:30 PM											
	VOLUMES	131	282	88	9	241	21	54	454	242	76	231	21	1,850
	APPROACH %	26%	56%	18%	3%	89%	8%	7%	61%	32%	23%	70%	6%	
	PEAK HR FACTOR		0.921			0.916			0.942			0.901		0.966
	APP/DEPART	501	/	357	271	/	559	750	/	551	328	/	383	0

	U-TURNS				
	NB	SB	EB	WB	TTL
	0	0	0	0	
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
VOLUMES	0	0	0	0	0
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
VOLUMES	0	0	0	0	0



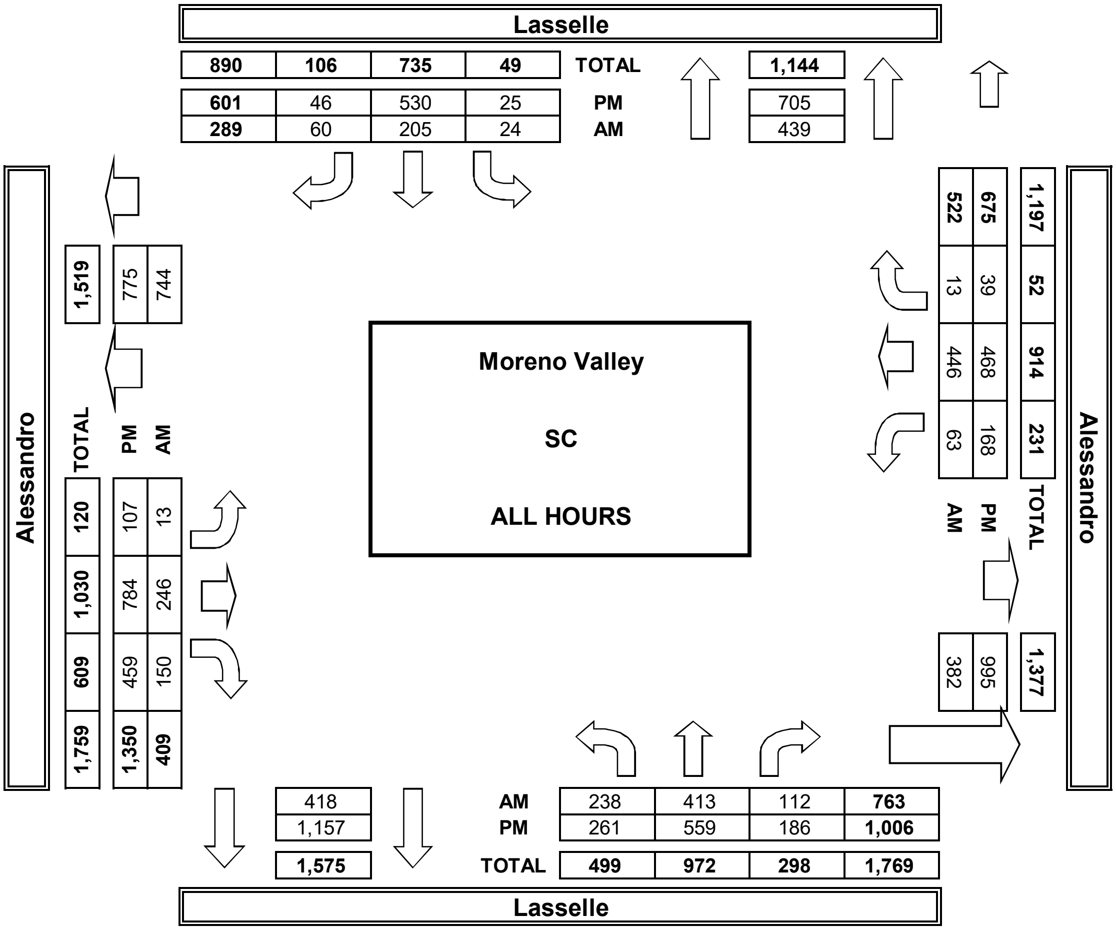
		PEDESTRIAN + BIKE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL
AM	7:00 AM	0	0	0	0	0
	7:15 AM	0	0	0	0	0
	7:30 AM	0	0	0	0	0
	7:45 AM	0	0	0	0	0
	8:00 AM	0	0	0	0	0
	8:15 AM	0	0	0	0	0
	8:30 AM	0	0	0	0	0
	8:45 AM	0	0	0	0	0
	TOTAL	0	0	0	0	0
	AM BEGIN PEAK HR			7:15 AM		
PM	4:00 PM	0	0	0	0	0
	4:15 PM	0	0	0	0	0
	4:30 PM	0	0	0	0	0
	4:45 PM	0	0	0	0	0
	5:00 PM	0	0	0	0	0
	5:15 PM	0	0	0	0	0
	5:30 PM	0	0	0	0	0
	5:45 PM	0	0	0	0	0
	TOTAL	0	0	0	0	0
	PM BEGIN PEAK HR			4:30 PM		

		PEDESTRIAN CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL
AM	7:00 AM	0	0	0	0	0
	7:15 AM	0	0	0	0	0
	7:30 AM	0	0	0	0	0
	7:45 AM	0	0	0	0	0
	8:00 AM	0	0	0	0	0
	8:15 AM	0	0	0	0	0
	8:30 AM	0	0	0	0	0
	8:45 AM	0	0	0	0	0
	TOTAL	0	0	0	0	0
	AM BEGIN PEAK HR	0	0	0	0	0
PM	4:00 PM	0	0	0	0	0
	4:15 PM	0	0	0	0	0
	4:30 PM	0	0	0	0	0
	4:45 PM	0	0	0	0	0
	5:00 PM	0	0	0	0	0
	5:15 PM	0	0	0	0	0
	5:30 PM	0	0	0	0	0
	5:45 PM	0	0	0	0	0
	TOTAL	0	0	0	0	0
	PM BEGIN PEAK HR	0	0	0	0	0

		BICYCLE CROSSINGS				
		NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	0	0	0	0
	7:15 AM	0	0	0	0	0
	7:30 AM	0	0	0	0	0
	7:45 AM	0	0	0	0	0
	8:00 AM	0	0	0	0	0
	8:15 AM	0	0	0	0	0
	8:30 AM	0	0	0	0	0
	8:45 AM	0	0	0	0	0
	TOTAL	0	0	0	0	0
	AM BEGIN PEAK HR					
PM	4:00 PM	0	0	0	0	0
	4:15 PM	0	0	0	0	0
	4:30 PM	0	0	0	0	0
	4:45 PM	0	0	0	0	0
	5:00 PM	0	0	0	0	0
	5:15 PM	0	0	0	0	0
	5:30 PM	0	0	0	0	0
	5:45 PM	0	0	0	0	0
	TOTAL	0	0	0	0	0

AimTD LLC

TURNING MOVEMENT COUNTS



Morunning Valley

Moreno Valley

SC

ALL HOURS

Lasselle (north)

890	**106**	**735**	**49**	**TOTAL**
601	46	530	25	**PM**
289	60	205	24	**AM**

1,144	**TOTAL**
705	**PM**
439	**AM**

Alessandro (west)

TOTAL	**1,519**		
PM	775		
AM	744		

TOTAL	**120**	**1,030**	**609**	**1,759**
PM	107	784	459	**1,350**
AM	13	246	150	**409**

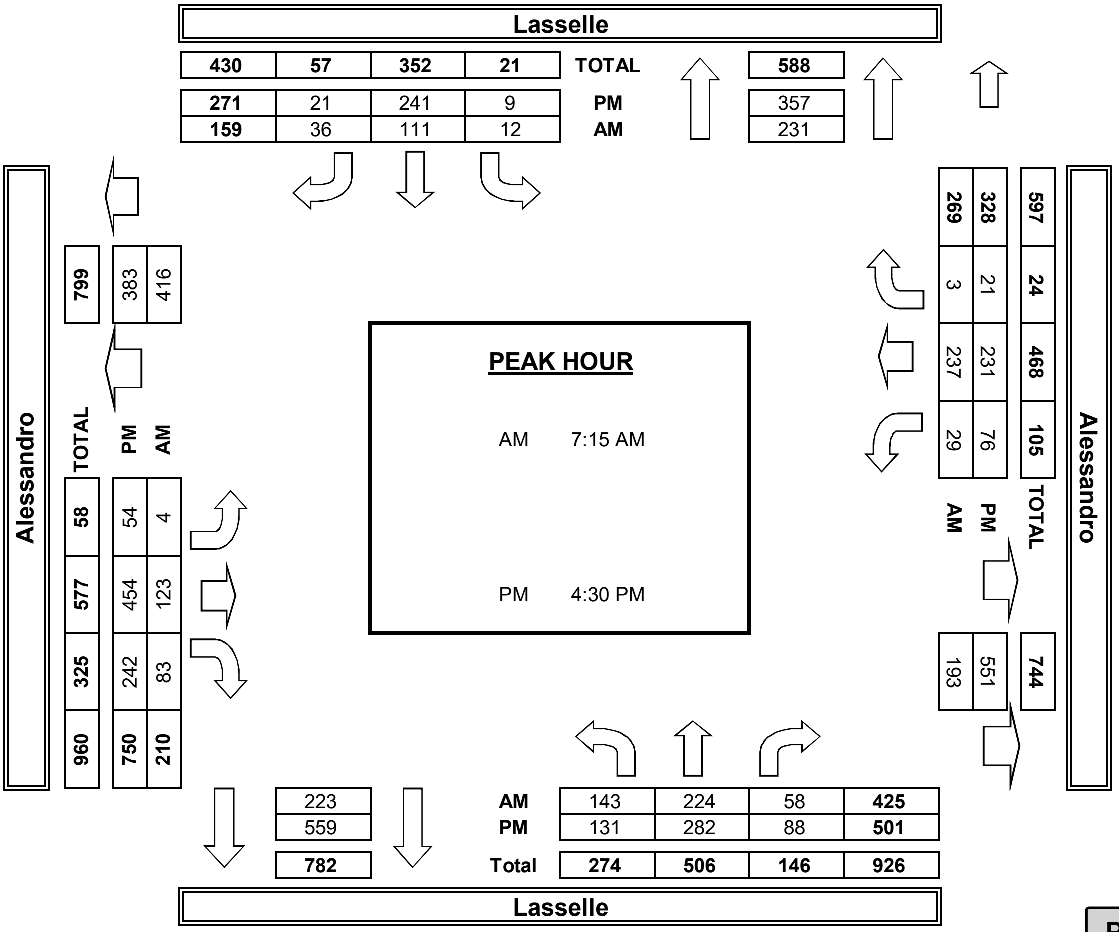
Alessandro (east)

AM	**522**	13	446	63
PM	**675**	39	468	168
TOTAL	**1,197**	**52**	**914**	**231**

AM	382
PM	995
TOTAL	**1,377**

Lasselle (south)

418	**AM**	238	413	112	**763**
1,157	**PM**	261	559	186	**1,006**
1,575	**TOTAL**	**499**	**972**	**298**	**1,769**



PEAK HOUR

AM 7:15 AM

PM 4:30 PM

Lasselle (north)

430	**57**	**352**	**21**	**TOTAL**
271	21	241	9	**PM**
159	36	111	12	**AM**

588	**TOTAL**
357	**PM**
231	**AM**

Alessandro (west)

TOTAL	**799**
PM	383
AM	416

TOTAL	**58**	**577**	**325**	**960**
PM	54	454	242	**750**
AM	4	123	83	**210**

Alessandro (east)

AM	**269**	3	237	29
PM	**328**	21	231	76
TOTAL	**597**	**24**	**468**	**105**

AM	193
PM	551
TOTAL	**744**

Lasselle (south)

223	**AM**	143	224	58	**425**
559	**PM**	131	282	88	**501**
782	**Total**	**274**	**506**	**146**	**926**

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Thu, Feb 25, 21	LOCATION: Moreno Valley	PROJECT #:	SC
	NORTH & SOUTH: Lasselle	LOCATION #:	2
	EAST & WEST: Bay	CONTROL:	SIGNAL

NOTES:

AM
PM
MD
OTHER
OTHER

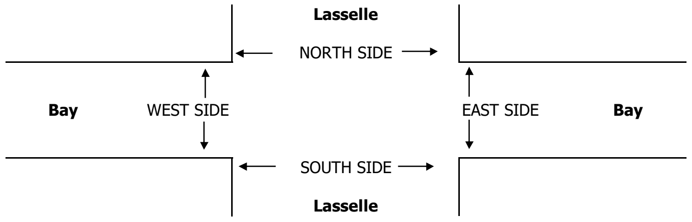
▲ N
◀ W
E ▶
S ▼

☑ Add U-Turns to Left Turns

		NORTHBOUND Lasselle			SOUTHBOUND Lasselle			EASTBOUND Bay			WESTBOUND Bay			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	1	1	0	1	2	0	0	1	0	0	1	0	
AM	7:00 AM	5	44	0	0	28	0	2	7	2	0	0	1	89
	7:15 AM	4	59	0	0	38	3	1	1	7	2	1	2	118
	7:30 AM	0	61	1	0	23	0	2	1	5	3	4	0	100
	7:45 AM	2	55	2	0	38	2	2	1	5	0	1	1	109
	8:00 AM	4	43	0	0	24	1	2	1	5	1	1	0	82
	8:15 AM	2	44	1	0	32	1	2	3	8	0	0	0	93
	8:30 AM	2	40	0	0	28	0	3	2	0	1	2	0	78
	8:45 AM	1	67	1	0	27	2	1	1	4	1	0	0	105
	VOLUMES	20	413	5	0	238	9	15	17	36	8	9	4	774
	APPROACH %	5%	94%	1%	0%	96%	4%	22%	25%	53%	38%	43%	19%	
	APP/DEPART	438	/	432	247	/	282	68	/	22	21	/	38	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	11	219	3	0	127	5	7	10	19	5	6	4	416
	APPROACH %	5%	94%	1%	0%	96%	4%	19%	28%	53%	33%	40%	27%	
	PEAK HR FACTOR		0.925			0.805			0.818			0.536		0.881
	APP/DEPART	233	/	230	132	/	151	36	/	13	15	/	22	0
PM	4:00 PM	2	89	1	0	64	4	3	3	7	1	6	1	181
	4:15 PM	5	69	0	1	66	3	6	4	7	3	1	1	166
	4:30 PM	1	92	0	1	68	6	8	4	9	0	2	2	193
	4:45 PM	7	85	3	1	58	4	6	8	6	1	2	3	184
	5:00 PM	8	85	1	0	52	4	3	3	5	0	3	0	164
	5:15 PM	4	78	1	0	72	3	3	11	6	1	6	2	187
	5:30 PM	8	84	1	1	73	5	6	6	5	1	5	2	197
	5:45 PM	4	61	3	1	93	5	11	1	4	3	1	2	189
	VOLUMES	39	643	10	5	546	34	46	40	49	10	26	13	1,461
	APPROACH %	6%	93%	1%	1%	93%	6%	34%	30%	36%	20%	53%	27%	
	APP/DEPART	692	/	702	585	/	605	135	/	55	49	/	99	0
	BEGIN PEAK HR		5:00 PM											
	VOLUMES	24	308	6	2	290	17	23	21	20	5	15	6	737
	APPROACH %	7%	91%	2%	1%	94%	6%	36%	33%	31%	19%	58%	23%	
	PEAK HR FACTOR		0.899			0.780			0.800			0.722		0.935
	APP/DEPART	338	/	337	309	/	315	64	/	29	26	/	56	0

U-TURNS

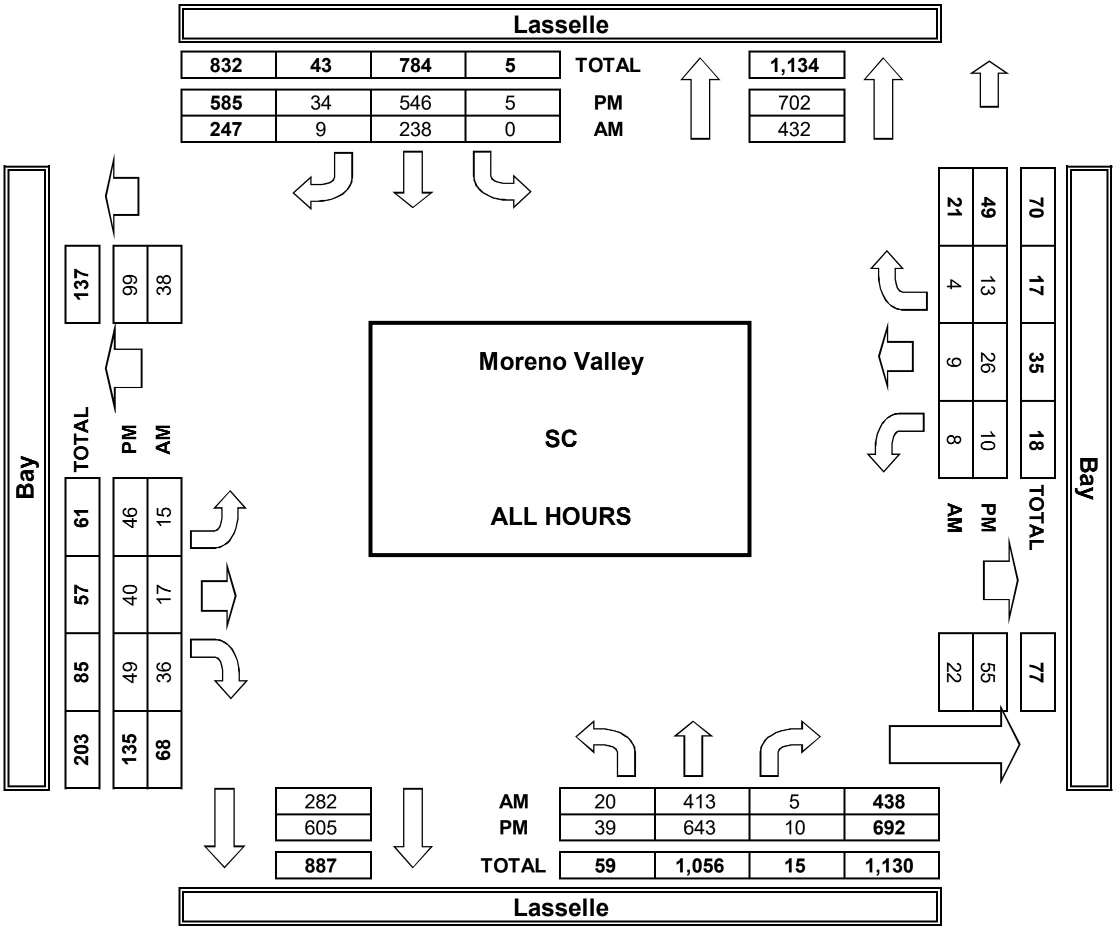
NB	SB	EB	WB	TTL
0	0	0	0	
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

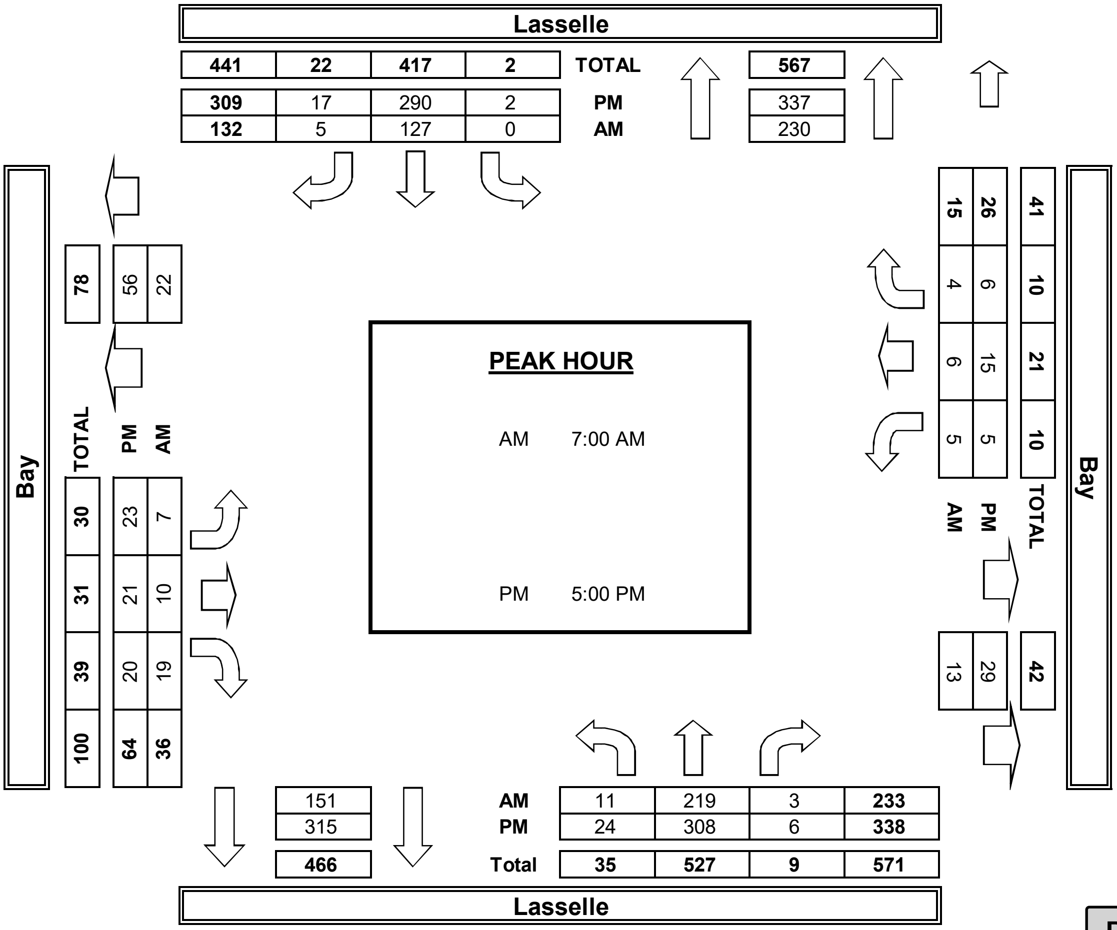


		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AM BEGIN PEAK HR			7:00 AM			0	0	0	0	0					
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PM BEGIN PEAK HR			5:00 PM			0	0	0	0	0					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Thu, Feb 25, 21	LOCATION:	Moreno Valley	PROJECT #:	SC
	NORTH & SOUTH:	Lasselle	LOCATION #:	3
	EAST & WEST:	Cottonwood	CONTROL:	SIGNAL

NOTES:

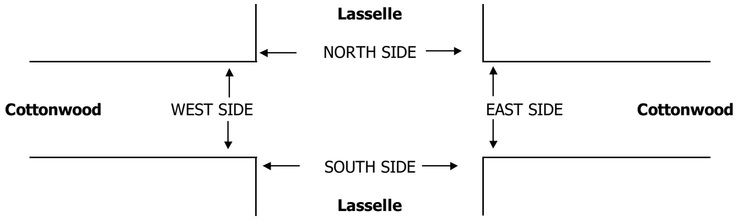
AM
PM
MD
OTHER
OTHER

▲ N
◀ W
E ▶
S ▼

☑ Add U-Turns to Left Turns

		NORTHBOUND Lasselle			SOUTHBOUND Lasselle			EASTBOUND Cottonwood			WESTBOUND Cottonwood			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	1	1	0	1	1	1	1	2	0	1	2	0	
AM	7:00 AM	8	36	2	1	18	3	3	9	5	1	14	0	100
	7:15 AM	12	52	3	0	30	3	0	11	4	3	16	0	134
	7:30 AM	9	54	0	0	16	0	0	6	5	6	24	0	120
	7:45 AM	10	44	3	0	24	4	1	19	4	5	16	2	132
	8:00 AM	6	40	3	1	23	6	3	12	4	4	13	2	117
	8:15 AM	9	36	1	1	23	4	0	16	7	1	19	1	118
	8:30 AM	8	31	2	2	17	2	3	22	9	0	19	2	117
	8:45 AM	13	57	1	0	17	2	3	16	7	7	16	1	140
	VOLUMES	75	350	15	5	168	24	13	111	45	27	137	8	978
	APPROACH %	17%	80%	3%	3%	85%	12%	8%	66%	27%	16%	80%	5%	
	APP/DEPART	440	/	371	197	/	240	169	/	131	172	/	236	0
	BEGIN PEAK HR		7:15 AM											
	VOLUMES	37	190	9	1	93	13	4	48	17	18	69	4	503
	APPROACH %	16%	81%	4%	1%	87%	12%	6%	70%	25%	20%	76%	4%	
	PEAK HR FACTOR		0.881			0.811			0.719			0.758		0.938
	APP/DEPART	236	/	198	107	/	128	69	/	58	91	/	119	0
PM	4:00 PM	16	65	8	3	45	2	2	27	18	5	29	0	220
	4:15 PM	9	59	6	2	44	6	6	32	18	6	24	3	215
	4:30 PM	11	77	6	4	51	0	5	36	12	10	22	3	237
	4:45 PM	15	74	3	1	41	2	6	41	17	8	29	1	238
	5:00 PM	9	70	6	3	40	3	5	31	13	6	29	7	222
	5:15 PM	8	65	9	1	48	3	2	45	22	2	33	3	241
	5:30 PM	13	61	12	4	64	3	2	33	18	3	29	4	246
	5:45 PM	10	57	5	5	64	4	6	36	18	10	29	7	251
	VOLUMES	91	528	55	23	397	23	34	281	136	50	224	28	1,870
	APPROACH %	14%	78%	8%	5%	90%	5%	8%	62%	30%	17%	74%	9%	
	APP/DEPART	674	/	590	443	/	583	451	/	359	302	/	338	0
	BEGIN PEAK HR		5:00 PM											
	VOLUMES	40	253	32	13	216	13	15	145	71	21	120	21	960
	APPROACH %	12%	78%	10%	5%	89%	5%	6%	63%	31%	13%	74%	13%	
	PEAK HR FACTOR		0.945			0.829			0.837			0.880		0.956
	APP/DEPART	325	/	289	242	/	308	231	/	190	162	/	173	0

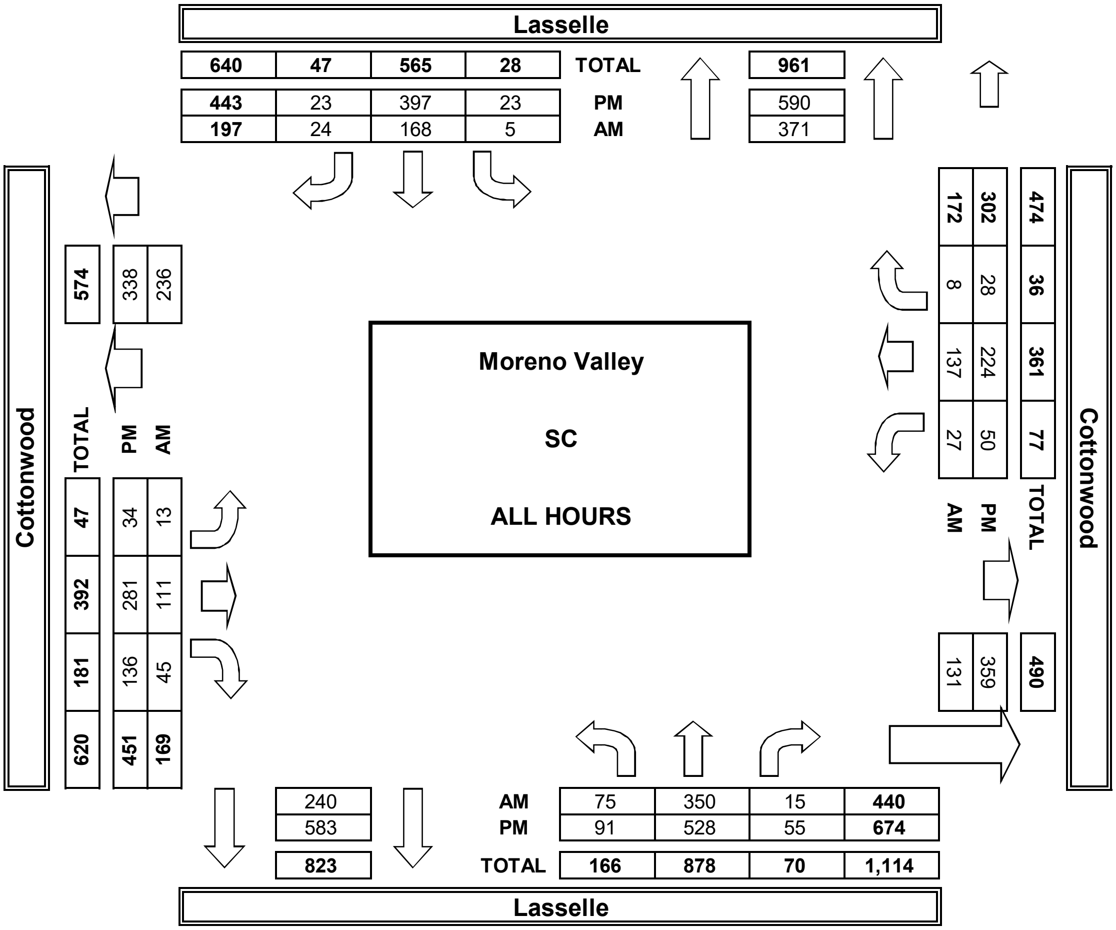
U-TURNS				
NB	SB	EB	WB	TTL
0	0	0	0	
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0



		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS				
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS	TOTAL
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	AM BEGIN PEAK HR			7:15 AM			0	0	0	0	0					
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PM BEGIN PEAK HR			5:00 PM			0	0	0	0	0					

AimTD LLC

TURNING MOVEMENT COUNTS



Moreno Valley

SC

ALL HOURS

Lasselle (north)

640	**47**	**565**	**28**	TOTAL
443	23	397	23	PM
197	24	168	5	AM

961	TOTAL
590	PM
371	AM

Cottonwood (west)

574	338	236

TOTAL	PM	AM
47	34	13
392	281	111
181	136	45
620	**451**	**169**

Cottonwood (east)

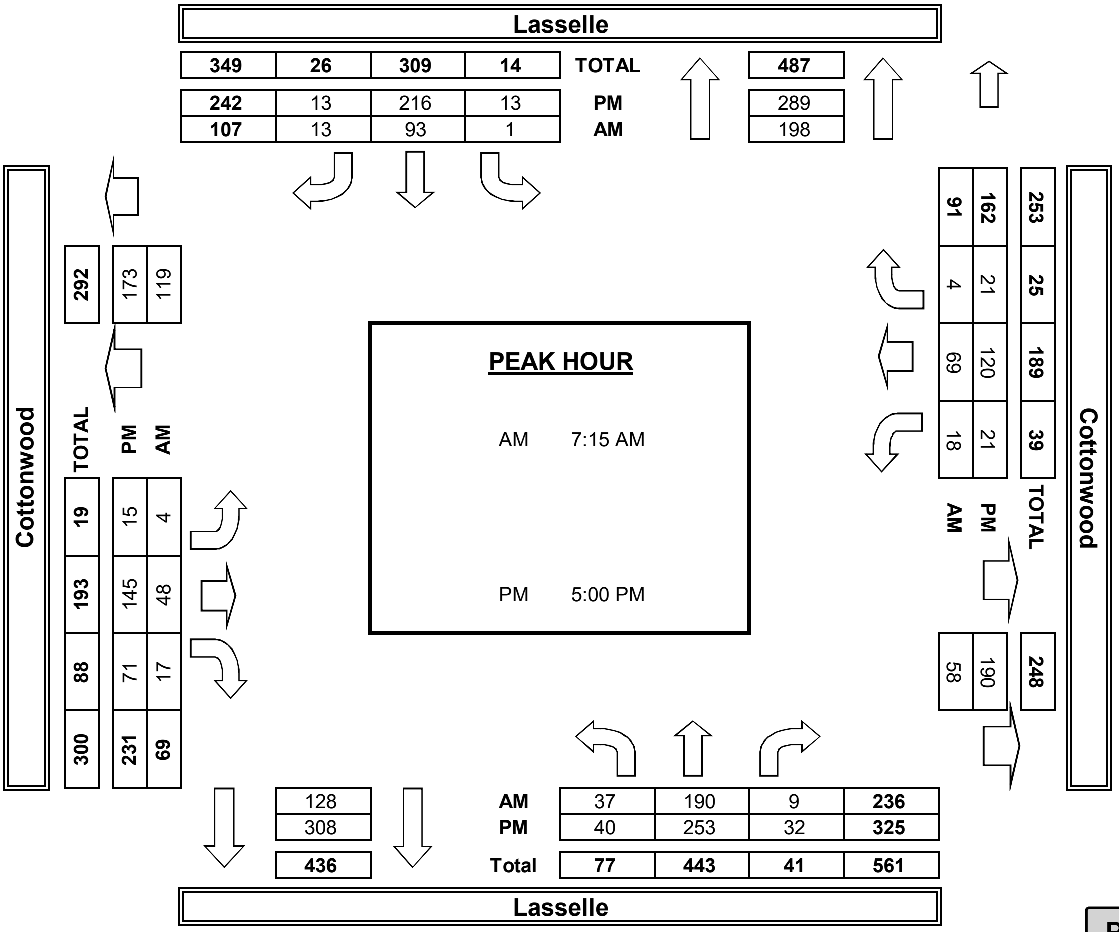
AM	PM	TOTAL
172	**302**	**474**
8	28	**36**
137	224	**361**
27	50	**77**

131	359	**490**

Lasselle (south)

240	AM	
583	PM	
823	TOTAL	

AM	75	350	15	**440**
PM	91	528	55	**674**
TOTAL	**166**	**878**	**70**	**1,114**



PEAK HOUR

AM 7:15 AM

PM 5:00 PM

Lasselle (north)

349	**26**	**309**	**14**	TOTAL
242	13	216	13	PM
107	13	93	1	AM

487	TOTAL
289	PM
198	AM

Cottonwood (west)

292	173	119

TOTAL	PM	AM
19	15	4
193	145	48
88	71	17
300	**231**	**69**

Cottonwood (east)

AM	PM	TOTAL
91	**162**	**253**
4	21	**25**
69	120	**189**
18	21	**39**

58	190	**248**

Lasselle (south)

128	AM	
308	PM	
436	Total	

AM	37	190	9	**236**
PM	40	253	32	**325**
Total	**77**	**443**	**41**	**561**

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 pacific@aimtd.com

DATE:
Wed, Nov 4, 15

LOCATION: Moreno Valley
NORTH & SOUTH: Lasselle
EAST & WEST: Alessandro

PROJECT #: SC0749
LOCATION #: 5
CONTROL: SIGNAL

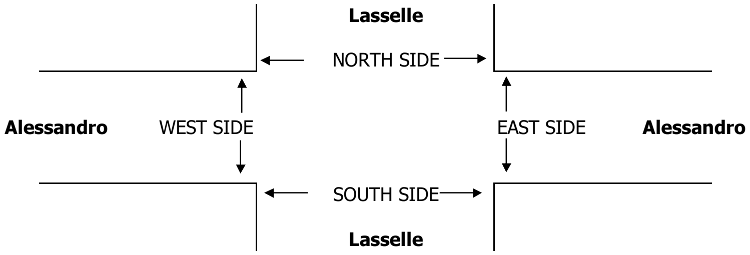
NOTES:

AM
PM
MD
OTHER
OTHER

▲
N
◄ W
E ►
S
▼

☑ Add U-Turns to Left Turn

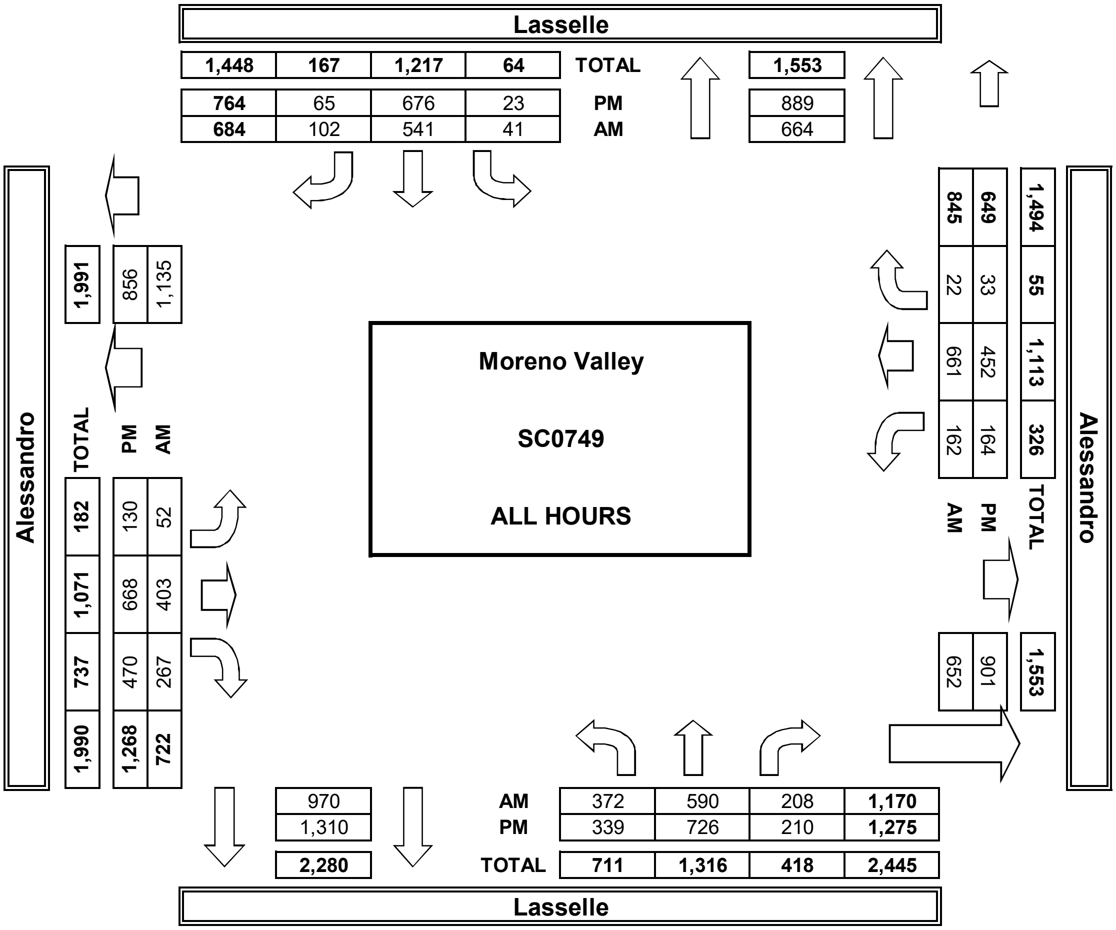
		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				U-TURNS			
		Lasselle			Lasselle			Alessandro			Alessandro							
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
	LANES:	1	1	1	1	1	0	1	1	1	1	1	1		0	0	0	0
AM	7:00 AM	48	69	26	5	51	23	2	35	20	22	72	1	374	0	0	0	0
	7:15 AM	53	84	31	4	69	9	5	42	30	18	82	4	431	0	0	0	0
	7:30 AM	43	97	35	4	118	14	15	53	51	26	112	5	573	0	0	0	0
	7:45 AM	51	89	48	10	99	12	6	65	51	26	94	1	552	0	0	0	0
	8:00 AM	57	68	27	4	68	19	9	62	27	30	99	5	475	0	0	0	0
	8:15 AM	38	64	23	8	55	12	5	67	33	13	79	2	399	0	0	0	0
	8:30 AM	35	67	7	2	38	2	6	36	32	14	53	1	293	0	0	0	0
	8:45 AM	47	52	11	4	43	11	4	43	23	13	70	3	324	0	0	0	0
	VOLUMES	372	590	208	41	541	102	52	403	267	162	661	22	3,421	0	0	0	0
	APPROACH %	32%	50%	18%	6%	79%	15%	7%	56%	37%	19%	78%	3%					
	APP/DEPART	1,170	/	664	684	/	970	722	/	652	845	/	1,135	0				
	BEGIN PEAK HR		7:15 AM															
	VOLUMES	204	338	141	22	354	54	35	222	159	100	387	15	2,031				
	APPROACH %	30%	49%	21%	5%	82%	13%	8%	53%	38%	20%	77%	3%					
	PEAK HR FACTOR		0.908			0.790			0.852			0.878		0.886				
	APP/DEPART	683	/	388	430	/	613	416	/	385	502	/	645	0				
PM	4:00 PM	51	89	27	3	59	8	16	77	57	16	55	3	461	0	0	0	0
	4:15 PM	38	79	25	6	80	6	14	69	51	17	62	0	447	0	0	0	0
	4:30 PM	41	87	31	4	75	6	12	107	41	11	50	4	469	0	0	0	0
	4:45 PM	42	105	28	2	83	7	11	71	71	23	69	6	518	0	0	0	0
	5:00 PM	41	112	25	3	72	12	16	94	65	37	65	7	549	0	0	0	0
	5:15 PM	41	87	26	3	101	11	26	91	55	23	49	7	520	0	0	0	0
	5:30 PM	46	81	24	1	104	9	18	87	77	16	53	1	517	0	0	0	0
	5:45 PM	39	86	24	1	102	6	17	72	53	21	49	5	475	0	0	0	0
	VOLUMES	339	726	210	23	676	65	130	668	470	164	452	33	3,956	0	0	0	0
	APPROACH %	27%	57%	16%	3%	88%	9%	10%	53%	37%	25%	70%	5%					
	APP/DEPART	1,275	/	889	764	/	1,310	1,268	/	901	649	/	856	0				
	BEGIN PEAK HR		4:45 PM															
	VOLUMES	170	385	103	9	360	39	71	343	268	99	236	21	2,104				
	APPROACH %	26%	59%	16%	2%	88%	10%	10%	50%	39%	28%	66%	6%					
	PEAK HR FACTOR		0.924			0.887			0.937			0.817		0.958				
	APP/DEPART	658	/	477	408	/	727	682	/	455	356	/	445	0				



		PEDESTRIAN + BIKE CROSSINGS					PEDESTRIAN CROSSINGS					BICYCLE CROSSINGS			
		N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	N SIDE	S SIDE	E SIDE	W SIDE	TOTAL	NS	SS	ES	WS
AM	7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM	4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AimTD LLC

TURNING MOVEMENT COUNTS



Moreno Valley

SC0749

ALL HOURS

Lasselle (north leg)

TOTAL	**1,448**	**167**	**1,217**	**64**		**1,553**
PM	**764**	65	676	23		889
AM	**684**	102	541	41		664

Alessandro (west leg)

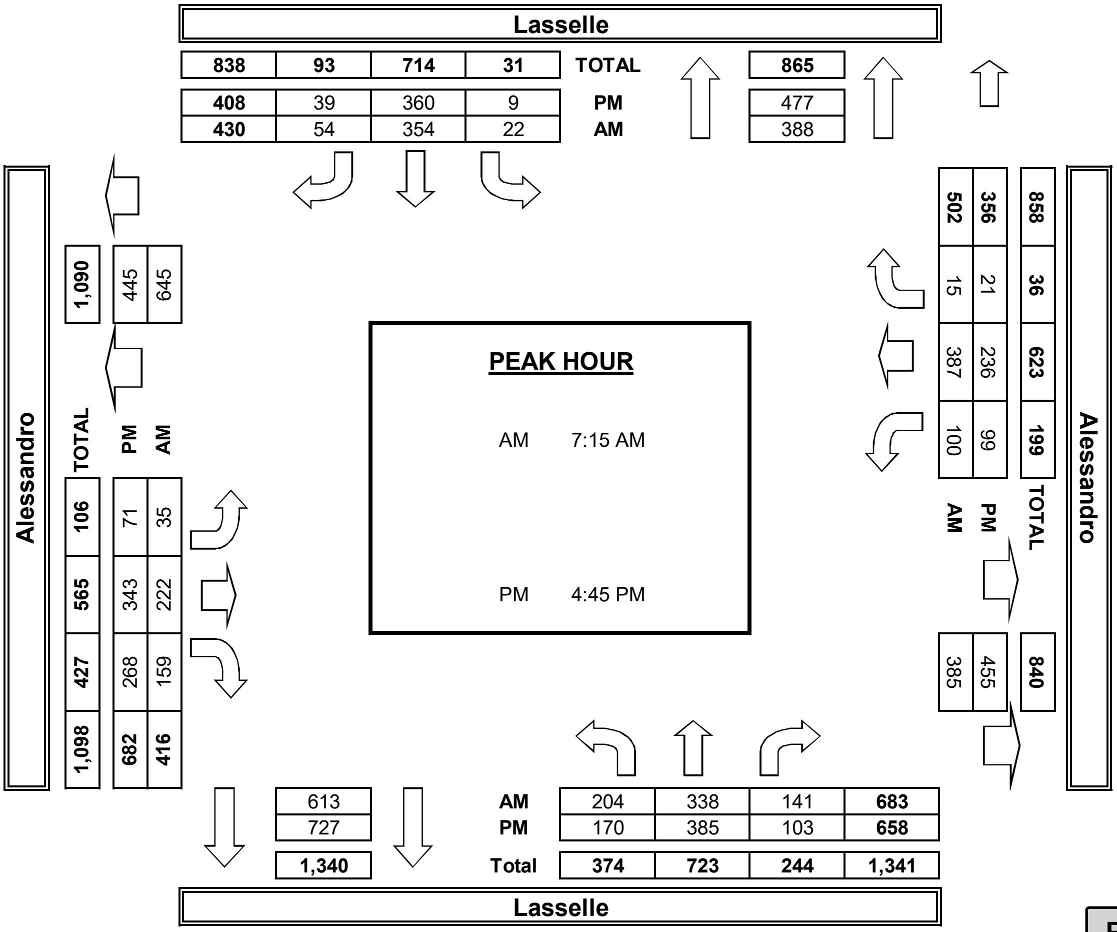
TOTAL	**1,991**		**182**	**1,071**	**737**	**1,990**
PM	856		130	668	470	**1,268**
AM	1,135		52	403	267	**722**

Alessandro (east leg)

TOTAL	**1,553**		**326**	**1,113**	**55**	**1,494**
PM	901		164	452	33	**649**
AM	652		162	661	22	**845**

Lasselle (south leg)

AM	970	372	590	208	**1,170**
PM	1,310	339	726	210	**1,275**
TOTAL	**2,280**	**711**	**1,316**	**418**	**2,445**



PEAK HOUR

AM 7:15 AM

PM 4:45 PM

Lasselle (north leg)

TOTAL	**838**	**93**	**714**	**31**		**865**
PM	**408**	39	360	9		477
AM	**430**	54	354	22		388

Alessandro (west leg)

TOTAL	**1,090**		**106**	**565**	**427**	**1,098**
PM	445		71	343	268	**682**
AM	645		35	222	159	**416**

Alessandro (east leg)

TOTAL	**840**		**199**	**623**	**36**	**858**
PM	455		99	236	21	**356**
AM	385		100	387	15	**502**

Lasselle (south leg)

AM	613	204	338	141	**683**
PM	727	170	385	103	**658**
Total	**1,340**	**374**	**723**	**244**	**1,341**

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

APPENDIX C

HCM ANALYSIS WORKSHEETS

EXISTING PROJECT BASELINE (2021) CONDITIONS

Intersection Level Of Service Report
Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	30.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.550

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	308	482	125	26	239	78	9	265	179	62	510	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	308	482	125	26	239	78	9	265	179	62	510	6
Peak Hour Factor	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	83	129	34	7	64	21	2	71	48	17	137	2
Total Analysis Volume [veh/h]	330	517	134	28	256	84	10	284	192	67	547	6
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	95
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	24	43	0	9	28	0	10	26	0	17	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	95	95	95	95	95	95	95	95	95	95	95	95
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	19	32	32	3	15	15	1	40	40	5	44	44
g / C, Green / Cycle	0.20	0.33	0.33	0.03	0.16	0.16	0.01	0.42	0.42	0.05	0.46	0.46
(v / s)_i Volume / Saturation Flow Rate	0.18	0.27	0.08	0.02	0.13	0.05	0.01	0.15	0.12	0.04	0.15	0.15
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1893
c, Capacity [veh/h]	365	631	536	52	303	257	24	801	681	90	870	866
d1, Uniform Delay [s]	37.11	29.18	23.16	45.59	38.87	35.48	46.56	18.71	18.06	44.64	16.38	16.38
k, delay calibration	0.14	0.19	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.65	4.59	0.24	8.35	6.47	0.73	10.62	1.23	1.03	11.68	0.96	0.97
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.91	0.82	0.25	0.54	0.85	0.33	0.41	0.35	0.28	0.75	0.32	0.32
d, Delay for Lane Group [s/veh]	47.76	33.76	23.40	53.93	45.34	36.21	57.18	19.94	19.10	56.32	17.35	17.35
Lane Group LOS	D	C	C	D	D	D	E	B	B	E	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	8.43	11.29	2.19	0.76	6.13	1.73	0.30	4.17	2.74	1.79	3.71	3.70
50th-Percentile Queue Length [ft/ln]	210.79	282.33	54.85	18.90	153.24	43.13	7.46	104.28	68.48	44.76	92.72	92.45
95th-Percentile Queue Length [veh/ln]	13.19	16.80	3.95	1.36	10.19	3.11	0.54	7.51	4.93	3.22	6.68	6.66
95th-Percentile Queue Length [ft/ln]	329.84	420.11	98.73	34.01	254.75	77.64	13.43	187.70	123.27	80.56	166.90	166.40

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	47.76	33.76	23.40	53.93	45.34	36.21	57.18	19.94	19.10	56.32	17.35	17.35
Movement LOS	D	C	C	D	D	D	E	B	B	E	B	B
d_A, Approach Delay [s/veh]	37.05			43.91			20.37			21.56		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	30.87											
Intersection LOS	C											
Intersection V/C	0.550											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	38.97	38.97	38.97	38.97
I_p,int, Pedestrian LOS Score for Intersection	2.596	2.538	2.727	2.525
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	820	505	463	610
d_b, Bicycle Delay [s]	16.54	26.57	28.09	22.96
I_b,int, Bicycle LOS Score for Intersection	3.178	2.167	2.362	2.071
Bicycle LOS	C	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.370

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑↱			↰ ↑ ↑↱			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	24	472	6	0	273	11	15	22	41	11	13	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	472	6	0	273	11	15	22	41	11	13	9
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	134	2	0	77	3	4	6	12	3	4	3
Total Analysis Volume [veh/h]	27	536	7	0	310	12	17	25	47	12	15	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	10	29	0	9	28	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	52	0	50	50	6	6
g / C, Green / Cycle	0.03	0.74	0.00	0.72	0.72	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.01	0.29	0.00	0.09	0.09	0.05	0.02
s, saturation flow rate [veh/h]	1810	1896	1810	1900	1875	1720	1813
c, Capacity [veh/h]	56	1409	3	1357	1339	205	220
d1, Uniform Delay [s]	33.42	3.24	0.00	3.13	3.13	30.99	30.04
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.29	0.80	0.00	0.18	0.18	1.44	0.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.48	0.39	0.00	0.12	0.12	0.43	0.17
d, Delay for Lane Group [s/veh]	39.72	4.03	0.00	3.31	3.32	32.43	30.40
Lane Group LOS	D	A	A	A	A	C	C
Critical Lane Group	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.52	1.55	0.00	0.46	0.45	1.50	0.58
50th-Percentile Queue Length [ft/ln]	13.10	38.80	0.00	11.39	11.34	37.61	14.46
95th-Percentile Queue Length [veh/ln]	0.94	2.79	0.00	0.82	0.82	2.71	1.04
95th-Percentile Queue Length [ft/ln]	23.57	69.85	0.00	20.51	20.41	67.70	26.02

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

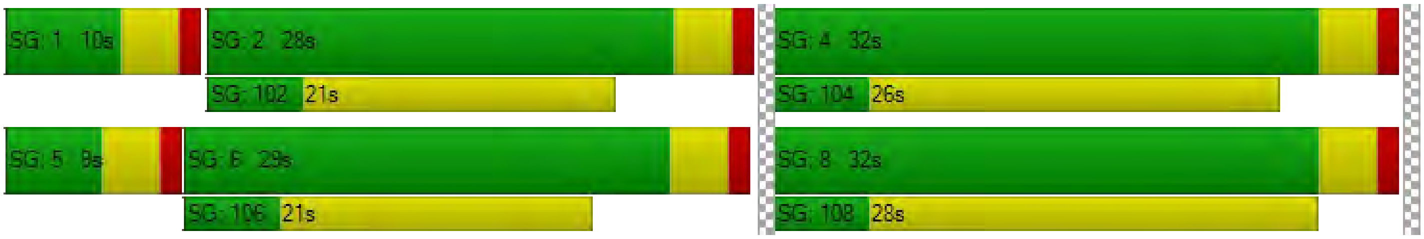
d_M, Delay for Movement [s/veh]	39.72	4.03	4.03	0.00	3.31	3.32	32.43	32.43	32.43	30.40	30.40	30.40
Movement LOS	D	A	A	A	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	5.73			3.31			32.43			30.40		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	8.19											
Intersection LOS	A											
Intersection V/C	0.370											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	26.61	26.61	26.61	26.61
I_p,int, Pedestrian LOS Score for Intersection	2.442	2.543	1.762	1.743
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	714	685	799	799
d_b, Bicycle Delay [s]	14.49	15.14	12.63	12.63
I_b,int, Bicycle LOS Score for Intersection	2.500	1.825	1.706	1.621
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Level Of Service Report
Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	23.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.349

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↱			↰↱			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	80	409	19	2	200	28	9	103	37	39	149	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	80	409	19	2	200	28	9	103	37	39	149	9
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	109	5	1	53	7	2	27	10	10	40	2
Total Analysis Volume [veh/h]	85	436	20	2	213	30	10	110	39	42	159	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	95
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	14	40	40	10	36	0	9	36	0	9	36	36
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	29	29	0	27	0	0	27	0	0	19	19
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	95	95	95	95	95	95	95	95	95	95	95
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00
g_i, Effective Green Time [s]	6	67	75	0	62	1	8	8	3	10	14
g / C, Green / Cycle	0.06	0.71	0.79	0.00	0.65	0.01	0.08	0.08	0.04	0.11	0.15
(v / s)_i Volume / Saturation Flow Rate	0.05	0.23	0.01	0.00	0.13	0.01	0.06	0.02	0.02	0.08	0.01
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1859	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	112	1346	1271	7	1209	24	158	134	66	202	246
d1, Uniform Delay [s]	43.94	5.26	2.19	47.26	6.69	46.56	42.45	40.99	45.22	41.48	34.41
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.07	0.64	0.02	19.88	0.37	10.62	5.42	1.18	9.70	6.70	0.07
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.76	0.32	0.02	0.28	0.20	0.41	0.70	0.29	0.64	0.79	0.04
d, Delay for Lane Group [s/veh]	54.02	5.90	2.21	67.14	7.06	57.18	47.88	42.17	54.92	48.18	34.48
Lane Group LOS	D	A	A	E	A	E	D	D	D	D	C
Critical Lane Group	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.23	2.69	0.05	0.09	1.70	0.30	2.62	0.86	1.15	3.97	0.20
50th-Percentile Queue Length [ft/ln]	55.67	67.17	1.35	2.13	42.46	7.40	65.60	21.52	28.72	99.34	5.03
95th-Percentile Queue Length [veh/ln]	4.01	4.84	0.10	0.15	3.06	0.53	4.72	1.55	2.07	7.15	0.36
95th-Percentile Queue Length [ft/ln]	100.20	120.90	2.42	3.83	76.43	13.32	118.09	38.73	51.70	178.81	9.05

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	54.02	5.90	2.21	67.14	7.06	7.06	57.18	47.88	42.17	54.92	48.18	34.48
Movement LOS	D	A	A	E	A	A	E	D	D	D	D	C
d_A, Approach Delay [s/veh]	13.32			7.55			47.06			48.87		
Approach LOS	B			A			D			D		
d_I, Intersection Delay [s/veh]	23.23											
Intersection LOS	C											
Intersection V/C	0.349											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	38.97	38.97	38.97	38.97
I_p,int, Pedestrian LOS Score for Intersection	2.407	2.286	2.311	2.219
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	757	673	673	673
d_b, Bicycle Delay [s]	18.36	20.92	20.92	20.92
I_b,int, Bicycle LOS Score for Intersection	2.452	1.964	1.822	1.908
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Level Of Service Report

Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	28.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.702

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	168	361	113	12	309	27	69	581	310	97	296	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	168	361	113	12	309	27	69	581	310	97	296	27
Peak Hour Factor	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	93	29	3	80	7	18	150	80	25	77	7
Total Analysis Volume [veh/h]	174	374	117	12	320	28	71	601	321	100	306	28
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	14	33	0	9	28	0	10	33	0	10	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	85	85	85	85	85	85	85	85	85	85	85	85
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	10	25	25	1	16	16	4	37	37	6	38	38
g / C, Green / Cycle	0.12	0.29	0.29	0.02	0.19	0.19	0.05	0.43	0.43	0.07	0.45	0.45
(v / s)_i Volume / Saturation Flow Rate	0.10	0.20	0.07	0.01	0.17	0.02	0.04	0.32	0.20	0.06	0.09	0.09
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1845
c, Capacity [veh/h]	212	561	476	29	369	313	95	816	694	129	853	828
d1, Uniform Delay [s]	36.75	26.36	22.82	41.52	33.27	28.16	39.82	20.27	17.30	38.87	14.20	14.21
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.75	1.38	0.27	9.19	6.26	0.12	11.24	5.86	2.21	9.36	0.52	0.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.82	0.67	0.25	0.41	0.87	0.09	0.75	0.74	0.46	0.77	0.20	0.20
d, Delay for Lane Group [s/veh]	44.50	27.74	23.09	50.71	39.53	28.28	51.06	26.13	19.51	48.23	14.72	14.75
Lane Group LOS	D	C	C	D	D	C	D	C	B	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.92	6.63	1.77	0.31	6.69	0.46	1.69	10.02	4.39	2.28	1.87	1.84
50th-Percentile Queue Length [ft/ln]	98.04	165.86	44.35	7.87	167.29	11.47	42.22	250.55	109.70	57.08	46.71	45.90
95th-Percentile Queue Length [veh/ln]	7.06	10.86	3.19	0.57	10.93	0.83	3.04	15.21	7.82	4.11	3.36	3.30
95th-Percentile Queue Length [ft/ln]	176.47	271.47	79.84	14.16	273.35	20.64	76.00	380.34	195.58	102.75	84.08	82.61

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	44.50	27.74	23.09	50.71	39.53	28.28	51.06	26.13	19.51	48.23	14.73	14.75
Movement LOS	D	C	C	D	D	C	D	C	B	D	B	B
d_A, Approach Delay [s/veh]		31.31			39.03			25.77			22.45	
Approach LOS		C			D			C			C	
d_I, Intersection Delay [s/veh]	28.63											
Intersection LOS	C											
Intersection V/C	0.702											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.03	34.03	34.03	34.03
I_p,int, Pedestrian LOS Score for Intersection	2.573	2.515	2.738	2.555
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	682	564	682	682
d_b, Bicycle Delay [s]	18.49	21.93	18.49	18.49
I_b,int, Bicycle LOS Score for Intersection	2.657	2.154	3.198	1.918
Bicycle LOS	B	B	C	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	8.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.306

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↱			↰ ↑ ↱			✛			✛		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	31	394	8	3	371	22	29	27	26	6	19	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	31	394	8	3	371	22	29	27	26	6	19	8
Peak Hour Factor	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	105	2	1	99	6	8	7	7	2	5	2
Total Analysis Volume [veh/h]	33	421	9	3	397	24	31	29	28	6	20	9
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing		0			0			0			0	
v_di, Inbound Pedestrian Volume crossing m		0			0			0			0	
v_co, Outbound Pedestrian Volume crossing		0			0			0			0	
v_ci, Inbound Pedestrian Volume crossing mi		0			0			0			0	
v_ab, Corner Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			0	

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	9	28	0	10	29	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	52	0	50	50	6	6
g / C, Green / Cycle	0.03	0.74	0.00	0.71	0.71	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.02	0.23	0.00	0.11	0.11	0.05	0.02
s, saturation flow rate [veh/h]	1810	1893	1810	1900	1862	1724	1829
c, Capacity [veh/h]	64	1400	10	1349	1322	213	213
d1, Uniform Delay [s]	33.22	3.08	34.72	3.32	3.33	30.94	30.03
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.17	0.57	14.52	0.25	0.26	1.27	0.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.51	0.31	0.29	0.16	0.16	0.41	0.16
d, Delay for Lane Group [s/veh]	39.38	3.64	49.24	3.57	3.58	32.22	30.39
Lane Group LOS	D	A	D	A	A	C	C
Critical Lane Group	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.63	1.17	0.09	0.64	0.63	1.48	0.55
50th-Percentile Queue Length [ft/ln]	15.74	29.20	2.25	15.94	15.78	36.99	13.68
95th-Percentile Queue Length [veh/ln]	1.13	2.10	0.16	1.15	1.14	2.66	0.99
95th-Percentile Queue Length [ft/ln]	28.33	52.55	4.05	28.69	28.41	66.58	24.63

Movement, Approach, & Intersection Results

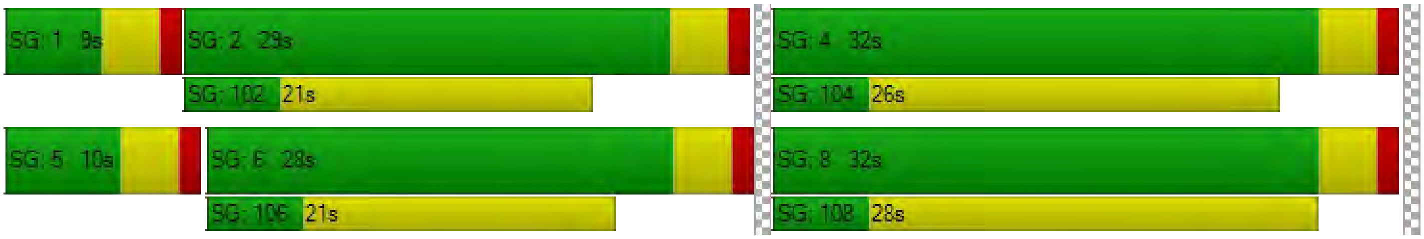
d_M, Delay for Movement [s/veh]	39.38	3.64	3.64	49.24	3.58	3.58	32.22	32.22	32.22	30.39	30.39	30.39
Movement LOS	D	A	A	D	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	6.19			3.90			32.22			30.39		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	8.34											
Intersection LOS	A											
Intersection V/C	0.306											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	26.61	26.61	26.61	26.61
I_p,int, Pedestrian LOS Score for Intersection	2.419	2.563	1.771	1.747
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	685	714	799	799
d_b, Bicycle Delay [s]	15.14	14.49	12.63	12.63
I_b,int, Bicycle LOS Score for Intersection	2.324	1.909	1.705	1.617
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Level Of Service Report
Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	18.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.355

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑↱			↰ ↑ ↱			↰ ↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	51	324	41	17	277	17	19	186	91	27	154	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	324	41	17	277	17	19	186	91	27	154	27
Peak Hour Factor	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	85	11	4	72	4	5	49	24	7	40	7
Total Analysis Volume [veh/h]	53	339	43	18	290	18	20	195	95	28	161	28
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	65
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	9	23	23	10	24	0	12	23	0	9	20	20
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	14	14	0	14	0	0	14	0	0	10	10
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	65	65	65	65	65	65	65	65	65	65	65
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00
g_i, Effective Green Time [s]	3	37	43	1	35	2	9	9	2	9	15
g / C, Green / Cycle	0.05	0.56	0.66	0.02	0.54	0.02	0.14	0.14	0.03	0.15	0.23
(v / s)_i Volume / Saturation Flow Rate	0.03	0.18	0.03	0.01	0.16	0.01	0.10	0.06	0.02	0.08	0.02
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1881	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	90	1064	1056	43	1004	46	264	224	59	277	373
d1, Uniform Delay [s]	30.37	7.69	4.02	31.44	8.48	31.34	26.98	25.72	31.02	26.01	19.65
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.06	0.79	0.07	6.56	0.79	6.31	4.05	1.27	5.74	1.92	0.08
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.59	0.32	0.04	0.42	0.31	0.43	0.74	0.42	0.47	0.58	0.08
d, Delay for Lane Group [s/veh]	36.43	8.48	4.09	37.99	9.27	37.65	31.03	26.99	36.76	27.93	19.74
Lane Group LOS	D	A	A	D	A	D	C	C	D	C	B
Critical Lane Group	Yes	No	No	No	Yes	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.91	2.12	0.15	0.33	2.00	0.36	2.86	1.27	0.51	2.36	0.32
50th-Percentile Queue Length [ft/ln]	22.72	53.10	3.73	8.35	49.97	9.03	71.55	31.77	12.77	59.03	8.10
95th-Percentile Queue Length [veh/ln]	1.64	3.82	0.27	0.60	3.60	0.65	5.15	2.29	0.92	4.25	0.58
95th-Percentile Queue Length [ft/ln]	40.89	95.58	6.72	15.04	89.94	16.25	128.79	57.18	22.98	106.26	14.58

Movement, Approach, & Intersection Results

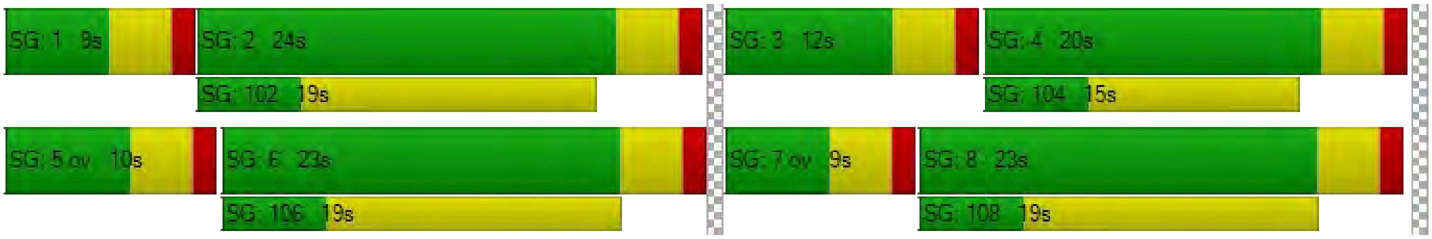
d_M, Delay for Movement [s/veh]	36.43	8.48	4.09	37.99	9.27	9.27	37.65	31.03	26.99	36.76	27.93	19.74
Movement LOS	D	A	A	D	A	A	D	C	C	D	C	B
d_A, Approach Delay [s/veh]	11.45			10.86			30.22			28.01		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	18.61											
Intersection LOS	B											
Intersection V/C	0.355											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	24.19	24.19	24.19	24.19
I_p,int, Pedestrian LOS Score for Intersection	2.392	2.273	2.336	2.231
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	583	614	583	491
d_b, Bicycle Delay [s]	16.34	15.64	16.34	18.53
I_b,int, Bicycle LOS Score for Intersection	2.277	2.098	2.071	1.918
Bicycle LOS	B	B	B	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



OY CONDITIONS

Intersection Level Of Service Report

Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	33.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.582

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	308	482	125	26	239	78	9	265	179	62	510	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	47	2	1	14	0	0	0	0	5	1	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	320	548	132	28	263	81	9	276	186	70	532	8
Peak Hour Factor	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	86	147	35	8	71	22	2	74	50	19	143	2
Total Analysis Volume [veh/h]	343	588	142	30	282	87	10	296	200	75	571	9
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing		0			0			0			0	
v_di, Inbound Pedestrian Volume crossing m		0			0			0			0	
v_co, Outbound Pedestrian Volume crossing		0			0			0			0	
v_ci, Inbound Pedestrian Volume crossing mi		0			0			0			0	
v_ab, Corner Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			0	

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	100
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	29	48	0	9	28	0	10	26	0	17	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	100	100	100	100	100	100	100	100	100	100	100	100
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	21	35	35	3	17	17	1	41	41	5	45	45
g / C, Green / Cycle	0.21	0.35	0.35	0.03	0.17	0.17	0.01	0.40	0.40	0.05	0.45	0.45
(v / s)_i Volume / Saturation Flow Rate	0.19	0.31	0.09	0.02	0.15	0.05	0.01	0.16	0.12	0.04	0.15	0.15
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1890
c, Capacity [veh/h]	380	669	569	53	327	278	24	767	652	99	846	841
d1, Uniform Delay [s]	38.58	30.42	23.03	47.96	40.31	36.28	49.01	21.10	20.33	46.65	18.20	18.20
k, delay calibration	0.18	0.22	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.51	7.61	0.23	8.98	6.75	0.64	10.95	1.47	1.22	10.95	1.11	1.12
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.90	0.88	0.25	0.56	0.86	0.31	0.41	0.39	0.31	0.75	0.34	0.34
d, Delay for Lane Group [s/veh]	51.10	38.03	23.26	56.93	47.05	36.92	59.97	22.57	21.55	57.60	19.31	19.32
Lane Group LOS	D	D	C	E	D	D	E	C	C	E	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	9.40	14.30	2.39	0.85	7.13	1.86	0.31	4.86	3.18	2.08	4.32	4.30
50th-Percentile Queue Length [ft/ln]	235.02	357.38	59.77	21.36	178.31	46.49	7.84	121.60	79.59	52.00	107.97	107.49
95th-Percentile Queue Length [veh/ln]	14.43	20.50	4.30	1.54	11.51	3.35	0.56	8.48	5.73	3.74	7.73	7.70
95th-Percentile Queue Length [ft/ln]	360.73	512.40	107.59	38.46	287.80	83.68	14.11	212.02	143.26	93.60	193.17	192.50

Movement, Approach, & Intersection Results

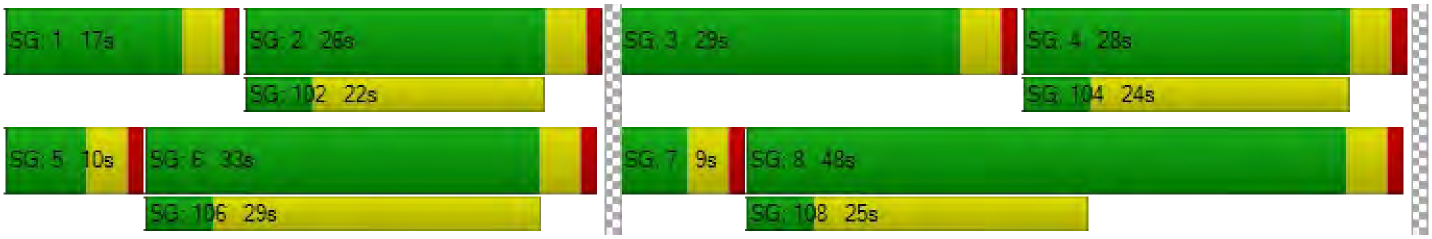
d_M, Delay for Movement [s/veh]	51.10	38.03	23.26	56.93	47.05	36.92	59.97	22.57	21.55	57.60	19.32	19.32
Movement LOS	D	D	C	E	D	D	E	C	C	E	B	B
d_A, Approach Delay [s/veh]	40.25			45.59			22.91			23.70		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	33.61											
Intersection LOS	C											
Intersection V/C	0.582											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	41.44	41.44	41.44	41.44
I_p,int, Pedestrian LOS Score for Intersection	2.624	2.568	2.747	2.548
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	879	480	440	580
d_b, Bicycle Delay [s]	15.71	28.91	30.45	25.24
I_b,int, Bicycle LOS Score for Intersection	3.330	2.218	2.395	2.100
Bicycle LOS	C	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.417

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	24	472	6	0	273	11	15	22	41	11	13	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	49	0	0	18	1	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	540	6	0	302	12	16	23	43	11	14	9
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	153	2	0	86	3	5	7	12	3	4	3
Total Analysis Volume [veh/h]	28	613	7	0	343	14	18	26	49	12	16	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	10	29	0	9	28	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	2	52	0	50	50	6	6
g / C, Green / Cycle	0.03	0.74	0.00	0.71	0.71	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.02	0.33	0.00	0.09	0.09	0.05	0.02
s, saturation flow rate [veh/h]	1810	1896	1810	1900	1874	1719	1818
c, Capacity [veh/h]	57	1407	3	1353	1334	208	222
d1, Uniform Delay [s]	33.39	3.47	0.00	3.21	3.21	30.97	29.97
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.26	1.00	0.00	0.20	0.21	1.51	0.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.49	0.44	0.00	0.13	0.13	0.45	0.17
d, Delay for Lane Group [s/veh]	39.64	4.47	0.00	3.42	3.42	32.48	30.33
Lane Group LOS	D	A	A	A	A	C	C
Critical Lane Group	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.54	1.92	0.00	0.52	0.52	1.57	0.59
50th-Percentile Queue Length [ft/ln]	13.53	47.91	0.00	12.99	12.92	39.35	14.83
95th-Percentile Queue Length [veh/ln]	0.97	3.45	0.00	0.94	0.93	2.83	1.07
95th-Percentile Queue Length [ft/ln]	24.36	86.24	0.00	23.38	23.25	70.84	26.69

Movement, Approach, & Intersection Results

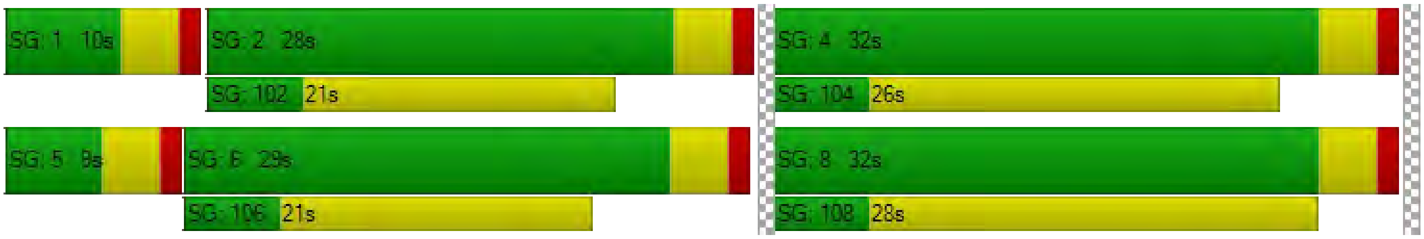
d_M, Delay for Movement [s/veh]	39.64	4.47	4.47	0.00	3.42	3.42	32.48	32.48	32.48	30.33	30.33	30.33
Movement LOS	D	A	A	A	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	5.99			3.42			32.48			30.33		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	8.16											
Intersection LOS	A											
Intersection V/C	0.417											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	26.61	26.61	26.61	26.61
I_p,int, Pedestrian LOS Score for Intersection	2.479	2.574	1.765	1.744
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	714	685	799	799
d_b, Bicycle Delay [s]	14.49	15.14	12.63	12.63
I_b,int, Bicycle LOS Score for Intersection	2.629	1.854	1.713	1.622
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report

Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	26.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.462

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑↱			↰ ↑ ↱			↰ ↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	80	409	19	2	200	28	9	103	37	39	149	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	57	47	11	0	16	2	2	127	18	3	49	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	140	473	31	2	224	31	11	234	56	44	204	9
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	126	8	1	60	8	3	62	15	12	54	2
Total Analysis Volume [veh/h]	149	504	33	2	239	33	12	249	60	47	217	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	95
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	14	40	40	10	36	0	9	36	0	9	36	36
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	29	29	0	27	0	0	27	0	0	19	19
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	95	95	95	95	95	95	95	95	95	95	95
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	10	60	68	0	51	1	15	15	4	17	17
g / C, Green / Cycle	0.10	0.63	0.71	0.00	0.54	0.01	0.16	0.16	0.04	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	0.08	0.27	0.02	0.00	0.15	0.01	0.13	0.04	0.03	0.11	0.01
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1860	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	183	1203	1153	7	997	28	296	252	70	340	289
d1, Uniform Delay [s]	41.90	8.71	3.97	47.26	11.99	46.42	39.01	35.20	45.15	36.20	32.27
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.50	1.07	0.05	19.88	0.68	9.85	6.35	0.48	10.64	1.99	0.05
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.82	0.42	0.03	0.28	0.27	0.43	0.84	0.24	0.67	0.64	0.03
d, Delay for Lane Group [s/veh]	50.41	9.78	4.02	67.14	12.66	56.27	45.36	35.69	55.78	38.20	32.32
Lane Group LOS	D	A	A	E	B	E	D	D	E	D	C
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	3.75	4.69	0.16	0.09	2.94	0.35	5.83	1.19	1.29	4.80	0.19
50th-Percentile Queue Length [ft/ln]	93.68	117.13	3.90	2.13	73.54	8.64	145.67	29.68	32.33	119.90	4.83
95th-Percentile Queue Length [veh/ln]	6.75	8.23	0.28	0.15	5.29	0.62	9.79	2.14	2.33	8.39	0.35
95th-Percentile Queue Length [ft/ln]	168.63	205.87	7.02	3.83	132.37	15.55	244.64	53.43	58.20	209.69	8.69

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	50.41	9.78	4.02	67.14	12.66	12.66	56.27	45.36	35.69	55.78	38.20	32.32
Movement LOS	D	A	A	E	B	B	E	D	D	E	D	C
d_A, Approach Delay [s/veh]	18.33			13.06			43.96			41.00		
Approach LOS	B			B			D			D		
d_I, Intersection Delay [s/veh]	26.68											
Intersection LOS	C											
Intersection V/C	0.462											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	38.97	38.97	38.97	38.97
I_p,int, Pedestrian LOS Score for Intersection	2.471	2.334	2.428	2.271
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	757	673	673	673
d_b, Bicycle Delay [s]	18.36	20.92	20.92	20.92
I_b,int, Bicycle LOS Score for Intersection	2.692	2.012	2.089	2.012
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report

Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	31.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.762

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	168	361	113	12	309	27	69	581	310	97	296	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	28	6	2	46	0	0	2	0	4	1	1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	175	404	124	14	367	28	72	606	323	105	309	29
Peak Hour Factor	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	45	105	32	4	95	7	19	157	84	27	80	8
Total Analysis Volume [veh/h]	181	418	128	14	380	29	75	627	334	109	320	30
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	14	33	0	9	28	0	10	32	0	11	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	85	85	85	85	85	85	85	85	85	85	85	85
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	10	28	28	1	19	19	5	33	33	7	35	35
g / C, Green / Cycle	0.12	0.32	0.32	0.02	0.22	0.22	0.05	0.39	0.39	0.08	0.42	0.42
(v / s)_i Volume / Saturation Flow Rate	0.10	0.22	0.08	0.01	0.20	0.02	0.04	0.33	0.21	0.06	0.09	0.09
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1844
c, Capacity [veh/h]	214	616	524	33	426	362	100	744	633	141	788	764
d1, Uniform Delay [s]	36.80	24.93	21.12	41.40	32.05	26.11	39.68	23.52	19.86	38.54	16.10	16.11
k, delay calibration	0.11	0.14	0.11	0.11	0.13	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.83	1.75	0.24	8.64	8.01	0.09	10.79	11.15	3.13	8.66	0.66	0.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.85	0.68	0.24	0.43	0.89	0.08	0.75	0.84	0.53	0.77	0.22	0.23
d, Delay for Lane Group [s/veh]	45.63	26.68	21.36	50.03	40.07	26.20	50.47	34.67	23.00	47.20	16.76	16.80
Lane Group LOS	D	C	C	D	D	C	D	C	C	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	4.14	7.31	1.85	0.36	8.08	0.45	1.77	12.40	5.09	2.46	2.14	2.10
50th-Percentile Queue Length [ft/ln]	103.46	182.73	46.33	8.98	201.89	11.31	44.22	310.07	127.35	61.40	53.59	52.60
95th-Percentile Queue Length [veh/ln]	7.45	11.74	3.34	0.65	12.74	0.81	3.18	18.18	8.80	4.42	3.86	3.79
95th-Percentile Queue Length [ft/ln]	186.22	293.57	83.39	16.16	318.40	20.36	79.60	454.46	219.88	110.51	96.47	94.67

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	45.63	26.68	21.36	50.03	40.07	26.20	50.47	34.67	23.00	47.20	16.77	16.80
Movement LOS	D	C	C	D	D	C	D	C	C	D	B	B
d_A, Approach Delay [s/veh]	30.46			39.44			32.05			24.00		
Approach LOS	C			D			C			C		
d_I, Intersection Delay [s/veh]	31.40											
Intersection LOS	C											
Intersection V/C	0.762											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.03	34.03	34.03	34.03
I_p,int, Pedestrian LOS Score for Intersection	2.601	2.545	2.757	2.579
Crosswalk LOS	B	B	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	682	564	658	682
d_b, Bicycle Delay [s]	18.49	21.93	19.16	18.49
I_b,int, Bicycle LOS Score for Intersection	2.759	2.258	3.269	1.938
Bicycle LOS	C	B	C	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	8.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.337

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	31	394	8	3	371	22	29	27	26	6	19	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	33	0	0	49	1	1	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	443	8	3	435	24	31	28	27	6	20	8
Peak Hour Factor	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	118	2	1	116	6	8	7	7	2	5	2
Total Analysis Volume [veh/h]	34	474	9	3	465	26	33	30	29	6	21	9
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	75
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	9	28	0	10	29	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	75	75	75	75	75	75	75
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	57	0	54	54	6	6
g / C, Green / Cycle	0.03	0.75	0.00	0.73	0.73	0.08	0.08
(v / s)_i Volume / Saturation Flow Rate	0.02	0.26	0.00	0.13	0.13	0.05	0.02
s, saturation flow rate [veh/h]	1810	1894	1810	1900	1865	1724	1837
c, Capacity [veh/h]	64	1427	10	1375	1350	205	205
d1, Uniform Delay [s]	35.61	3.06	37.19	3.29	3.30	33.40	32.36
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.63	0.64	15.29	0.29	0.29	1.54	0.40
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.53	0.34	0.30	0.18	0.18	0.45	0.18
d, Delay for Lane Group [s/veh]	42.24	3.70	52.48	3.58	3.59	34.94	32.76
Lane Group LOS	D	A	D	A	A	C	C
Critical Lane Group	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.70	1.40	0.10	0.79	0.78	1.69	0.61
50th-Percentile Queue Length [ft/ln]	17.50	35.08	2.39	19.74	19.53	42.18	15.32
95th-Percentile Queue Length [veh/ln]	1.26	2.53	0.17	1.42	1.41	3.04	1.10
95th-Percentile Queue Length [ft/ln]	31.50	63.15	4.30	35.53	35.15	75.92	27.58

Movement, Approach, & Intersection Results

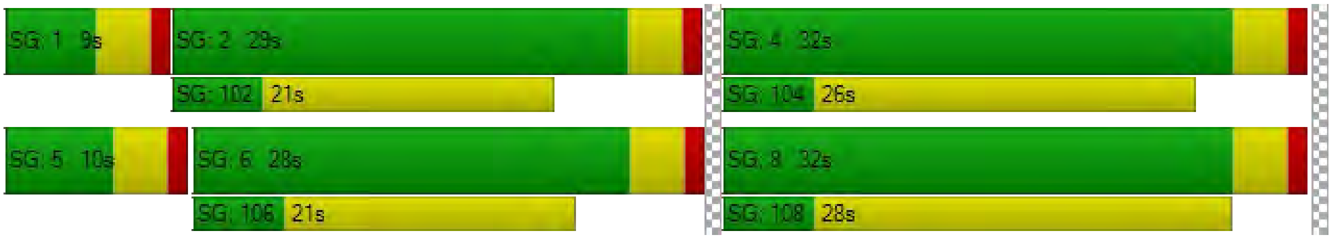
d_M, Delay for Movement [s/veh]	42.24	3.70	3.70	52.48	3.58	3.59	34.94	34.94	34.94	32.76	32.76	32.76
Movement LOS	D	A	A	D	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	6.24			3.88			34.94			32.76		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	8.37											
Intersection LOS	A											
Intersection V/C	0.337											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	29.07	29.07	29.07	29.07
I_p,int, Pedestrian LOS Score for Intersection	2.463	2.602	1.778	1.752
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	640	666	746	746
d_b, Bicycle Delay [s]	17.36	16.69	14.75	14.75
I_b,int, Bicycle LOS Score for Intersection	2.413	1.967	1.711	1.619
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	21.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.492

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑↱			↰ ↑ ↱			↰ ↑ ↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	51	324	41	17	277	17	19	186	91	27	154	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	35	29	7	0	46	3	4	59	57	11	149	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	88	366	50	18	334	21	24	253	152	39	309	28
Peak Hour Factor	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	96	13	5	87	5	6	66	40	10	81	7
Total Analysis Volume [veh/h]	92	383	52	19	349	22	25	265	159	41	323	29
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	65
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	9	23	23	10	24	0	12	23	0	9	20	20
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	14	14	0	14	0	0	14	0	0	10	10
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	65	65	65	65	65	65	65	65	65	65	65
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00
g_i, Effective Green Time [s]	4	32	39	2	30	2	12	12	3	13	19
g / C, Green / Cycle	0.07	0.50	0.60	0.02	0.45	0.03	0.19	0.19	0.04	0.20	0.29
(v / s)_i Volume / Saturation Flow Rate	0.05	0.20	0.03	0.01	0.20	0.01	0.14	0.10	0.02	0.17	0.02
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1880	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	123	942	968	44	850	55	365	310	77	389	469
d1, Uniform Delay [s]	29.87	10.40	5.41	31.39	12.20	31.13	24.75	23.62	30.62	24.88	16.74
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	8.71	1.30	0.11	6.42	1.63	5.89	2.75	1.31	5.64	4.64	0.05
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.75	0.41	0.05	0.43	0.44	0.46	0.73	0.51	0.53	0.83	0.06
d, Delay for Lane Group [s/veh]	38.58	11.70	5.52	37.81	13.83	37.02	27.50	24.93	36.26	29.52	16.79
Lane Group LOS	D	B	A	D	B	D	C	C	D	C	B
Critical Lane Group	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	1.61	3.10	0.24	0.35	3.30	0.44	3.62	2.02	0.73	4.98	0.30
50th-Percentile Queue Length [ft/ln]	40.27	77.43	5.93	8.75	82.44	10.96	90.41	50.60	18.17	124.62	7.55
95th-Percentile Queue Length [veh/ln]	2.90	5.57	0.43	0.63	5.94	0.79	6.51	3.64	1.31	8.65	0.54
95th-Percentile Queue Length [ft/ln]	72.49	139.37	10.67	15.75	148.39	19.73	162.74	91.07	32.71	216.16	13.59

Movement, Approach, & Intersection Results

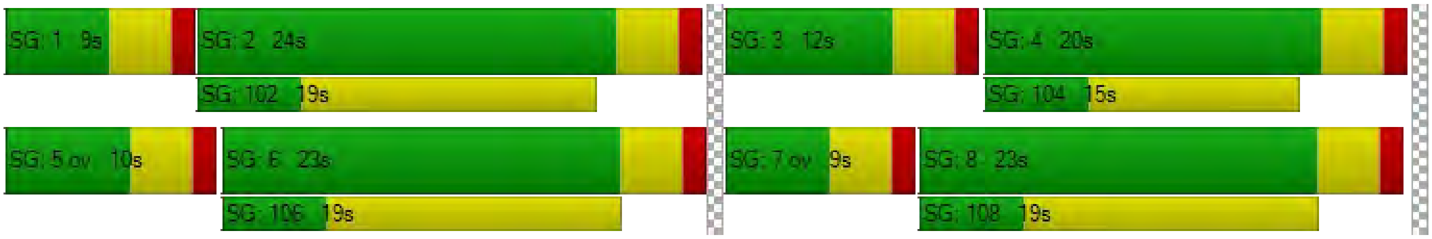
d_M, Delay for Movement [s/veh]	38.58	11.70	5.52	37.81	13.83	13.83	37.02	27.50	24.93	36.26	29.52	16.79
Movement LOS	D	B	A	D	B	B	D	C	C	D	C	B
d_A, Approach Delay [s/veh]	15.78			15.00			27.12			29.28		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.52											
Intersection LOS	C											
Intersection V/C	0.492											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	24.19	24.19	24.19	24.19
I_p,int, Pedestrian LOS Score for Intersection	2.466	2.328	2.476	2.294
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	583	614	583	491
d_b, Bicycle Delay [s]	16.34	15.64	16.34	18.53
I_b,int, Bicycle LOS Score for Intersection	2.429	2.203	2.300	2.208
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

OYP CONDITIONS

Intersection Level Of Service Report
Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	34.1
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.601

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	308	482	125	26	239	78	9	265	179	62	510	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	68	7	1	21	0	0	0	6	7	1	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	336	569	137	28	270	81	9	276	192	72	532	8
Peak Hour Factor	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	90	153	37	8	72	22	2	74	52	19	143	2
Total Analysis Volume [veh/h]	361	611	147	30	290	87	10	296	206	77	571	9
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	95
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	24	43	0	9	28	0	10	26	0	17	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	95	95	95	95	95	95	95	95	95	95	95	95
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	20	34	34	3	17	17	1	37	37	5	41	41
g / C, Green / Cycle	0.21	0.36	0.36	0.03	0.18	0.18	0.01	0.39	0.39	0.06	0.43	0.43
(v / s)_i Volume / Saturation Flow Rate	0.20	0.32	0.09	0.02	0.15	0.05	0.01	0.16	0.13	0.04	0.15	0.15
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1890
c, Capacity [veh/h]	381	679	577	54	336	285	24	737	627	102	819	815
d1, Uniform Delay [s]	37.04	28.99	21.63	45.52	38.07	34.09	46.56	21.10	20.42	44.23	18.18	18.18
k, delay calibration	0.18	0.27	0.11	0.11	0.11	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	17.65	10.62	0.23	8.43	6.65	0.60	10.62	1.63	1.40	10.55	1.20	1.21
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.95	0.90	0.25	0.55	0.86	0.31	0.41	0.40	0.33	0.75	0.35	0.36
d, Delay for Lane Group [s/veh]	54.69	39.61	21.86	53.94	44.72	34.69	57.18	22.73	21.82	54.79	19.38	19.39
Lane Group LOS	D	D	C	D	D	C	E	C	C	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	9.97	14.69	2.32	0.81	6.92	1.74	0.30	4.74	3.21	2.02	4.20	4.18
50th-Percentile Queue Length [ft/ln]	249.26	367.32	57.89	20.19	173.11	43.53	7.46	118.52	80.29	50.46	104.94	104.48
95th-Percentile Queue Length [veh/ln]	15.15	20.98	4.17	1.45	11.24	3.13	0.54	8.31	5.78	3.63	7.56	7.52
95th-Percentile Queue Length [ft/ln]	378.72	524.48	104.21	36.34	281.00	78.35	13.43	207.79	144.53	90.83	188.90	188.07

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	54.69	39.61	21.86	53.94	44.72	34.69	57.18	22.73	21.82	54.79	19.38	19.39
Movement LOS	D	D	C	D	D	C	E	C	C	D	B	B
d_A, Approach Delay [s/veh]	42.14			43.26			23.04			23.53		
Approach LOS	D			D			C			C		
d_I, Intersection Delay [s/veh]	34.14											
Intersection LOS	C											
Intersection V/C	0.601											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	38.97	38.97	38.97	38.97
I_p,int, Pedestrian LOS Score for Intersection	2.634	2.574	2.752	2.548
Crosswalk LOS	B	B	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	820	505	463	610
d_b, Bicycle Delay [s]	16.54	26.57	28.09	22.96
I_b,int, Bicycle LOS Score for Intersection	3.406	2.231	2.404	2.102
Bicycle LOS	C	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	9.7
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.438

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑↱			↰ ↑ ↑↱			✛			✛		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	24	472	6	0	273	11	15	22	41	11	13	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	70	2	8	25	1	0	0	4	6	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	36	561	8	8	309	12	16	23	47	17	14	30
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	159	2	2	88	3	5	7	13	5	4	9
Total Analysis Volume [veh/h]	41	637	9	9	351	14	18	26	53	19	16	34
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	10	29	0	9	28	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	51	1	49	49	6	6
g / C, Green / Cycle	0.04	0.73	0.01	0.70	0.70	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.02	0.34	0.00	0.10	0.10	0.06	0.04
s, saturation flow rate [veh/h]	1810	1895	1810	1900	1875	1761	1799
c, Capacity [veh/h]	74	1382	24	1333	1315	213	221
d1, Uniform Delay [s]	32.99	3.90	34.31	3.46	3.46	30.97	30.46
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.28	1.14	9.51	0.22	0.22	1.52	0.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.55	0.47	0.38	0.14	0.14	0.46	0.31
d, Delay for Lane Group [s/veh]	39.27	5.03	43.83	3.67	3.68	32.49	31.26
Lane Group LOS	D	A	D	A	A	C	C
Critical Lane Group	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.77	2.30	0.21	0.58	0.57	1.64	1.10
50th-Percentile Queue Length [ft/ln]	19.33	57.52	5.17	14.38	14.30	41.05	27.58
95th-Percentile Queue Length [veh/ln]	1.39	4.14	0.37	1.04	1.03	2.96	1.99
95th-Percentile Queue Length [ft/ln]	34.79	103.54	9.31	25.89	25.73	73.90	49.65

Movement, Approach, & Intersection Results

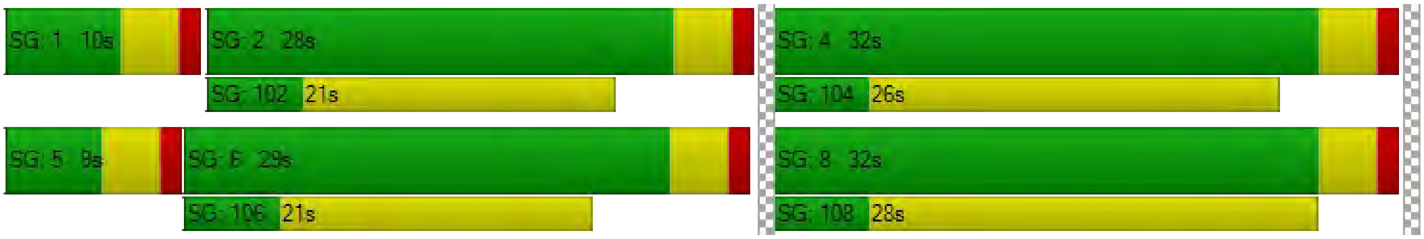
d_M, Delay for Movement [s/veh]	39.27	5.03	5.03	43.83	3.68	3.68	32.49	32.49	32.49	31.26	31.26	31.26
Movement LOS	D	A	A	D	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	7.08			4.64			32.49			31.26		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	9.70											
Intersection LOS	A											
Intersection V/C	0.438											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	26.61	26.61	26.61	26.61
I_p,int, Pedestrian LOS Score for Intersection	2.508	2.591	1.772	1.768
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	714	685	799	799
d_b, Bicycle Delay [s]	14.49	15.14	12.63	12.63
I_b,int, Bicycle LOS Score for Intersection	2.693	1.868	1.720	1.673
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	21.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.496

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↱			↰⬏			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	80	409	19	2	200	28	9	103	37	39	149	9
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	57	51	15	0	27	19	7	131	18	14	60	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	140	477	35	2	235	48	16	238	56	55	215	9
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	127	9	1	63	13	4	63	15	15	57	2
Total Analysis Volume [veh/h]	149	509	37	2	251	51	17	254	60	59	229	10
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	65
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	10	23	23	10	23	0	9	23	0	9	23	23
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	14	14	0	14	0	0	14	0	0	10	10
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	65	65	65	65	65	65	65	65	65	65	65
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00
g_i, Effective Green Time [s]	6	35	42	0	29	1	11	11	3	13	17
g / C, Green / Cycle	0.09	0.53	0.64	0.00	0.44	0.02	0.17	0.17	0.05	0.20	0.26
(v / s)_i Volume / Saturation Flow Rate	0.08	0.27	0.02	0.00	0.16	0.01	0.13	0.04	0.03	0.12	0.01
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1845	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	169	1006	1039	8	813	41	320	272	95	377	427
d1, Uniform Delay [s]	29.24	9.88	4.25	32.38	12.22	31.48	26.05	23.44	30.28	23.83	17.77
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	13.69	1.82	0.06	14.32	1.30	6.70	4.45	0.40	6.43	1.58	0.02
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.88	0.51	0.04	0.24	0.37	0.42	0.79	0.22	0.62	0.61	0.02
d, Delay for Lane Group [s/veh]	42.93	11.70	4.32	46.70	13.52	38.19	30.50	23.84	36.72	25.41	17.79
Lane Group LOS	D	B	A	D	B	D	C	C	D	C	B
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	2.77	4.08	0.14	0.06	2.65	0.31	3.70	0.73	1.04	3.19	0.11
50th-Percentile Queue Length [ft/ln]	69.14	102.06	3.39	1.55	66.28	7.86	92.48	18.32	26.02	79.84	2.69
95th-Percentile Queue Length [veh/ln]	4.98	7.35	0.24	0.11	4.77	0.57	6.66	1.32	1.87	5.75	0.19
95th-Percentile Queue Length [ft/ln]	124.45	183.70	6.11	2.79	119.30	14.15	166.47	32.97	46.83	143.71	4.85

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	42.93	11.70	4.32	46.70	13.52	13.52	38.19	30.50	23.84	36.72	25.41	17.79
Movement LOS	D	B	A	D	B	B	D	C	C	D	C	B
d_A, Approach Delay [s/veh]	18.00			13.74			29.69			27.39		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.30											
Intersection LOS	C											
Intersection V/C	0.496											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	24.19	24.19	24.19	24.19
I_p,int, Pedestrian LOS Score for Intersection	2.462	2.335	2.425	2.260
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	583	583	583	583
d_b, Bicycle Delay [s]	16.34	16.34	16.34	16.34
I_b,int, Bicycle LOS Score for Intersection	2.706	2.061	2.106	2.051
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report

Intersection 1: Lasselle Street / Cottonwood Avenue

Control Type:	Signalized	Delay (sec / veh):	33.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.787

Intersection Setup

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↱			↰ ↑ ↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	1	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			40.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lasselle Street			Lasselle Street			Cottonwood Avenue			Cottonwood Avenue		
Base Volume Input [veh/h]	168	361	113	12	309	27	69	581	310	97	296	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	42	10	2	70	0	0	2	18	10	1	1
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	186	418	128	14	391	28	72	606	341	111	309	29
Peak Hour Factor	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660	0.9660
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	108	33	4	101	7	19	157	88	29	80	8
Total Analysis Volume [veh/h]	193	433	133	14	405	29	75	627	353	115	320	30
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	0	5	7	0	5	7	0	5	7	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	14	33	0	9	28	0	10	32	0	11	33	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	20	0	0	19	0	0	17	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No		No	No		No	No		No	No	
Maximum Recall	No	No		No	No		No	No		No	No	
Pedestrian Recall	No	No		No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	C
C, Cycle Length [s]	85	85	85	85	85	85	85	85	85	85	85	85
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	10	29	29	1	20	20	5	32	32	7	34	34
g / C, Green / Cycle	0.12	0.34	0.34	0.02	0.24	0.24	0.05	0.38	0.38	0.08	0.40	0.40
(v / s)_i Volume / Saturation Flow Rate	0.11	0.23	0.08	0.01	0.21	0.02	0.04	0.33	0.22	0.06	0.09	0.09
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1900	1615	1810	1900	1615	1810	1900	1844
c, Capacity [veh/h]	214	639	543	33	448	381	100	715	608	148	765	743
d1, Uniform Delay [s]	37.07	24.31	20.45	41.40	31.60	25.32	39.68	24.74	21.21	38.37	16.75	16.77
k, delay calibration	0.11	0.16	0.11	0.11	0.16	0.11	0.11	0.50	0.50	0.11	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.90	1.86	0.23	8.64	9.83	0.08	10.79	14.28	4.02	8.52	0.71	0.74
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.90	0.68	0.24	0.43	0.90	0.08	0.75	0.88	0.58	0.78	0.23	0.23
d, Delay for Lane Group [s/veh]	49.97	26.17	20.68	50.03	41.43	25.40	50.47	39.02	25.23	46.88	17.46	17.50
Lane Group LOS	D	C	C	D	D	C	D	D	C	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh/ln]	4.65	7.50	1.89	0.36	8.80	0.44	1.77	13.29	5.72	2.58	2.21	2.16
50th-Percentile Queue Length [ft/ln]	116.21	187.60	47.22	8.98	219.98	11.09	44.22	332.16	143.09	64.49	55.15	54.11
95th-Percentile Queue Length [veh/ln]	8.18	12.00	3.40	0.65	13.66	0.80	3.18	19.26	9.65	4.64	3.97	3.90
95th-Percentile Queue Length [ft/ln]	204.61	299.91	85.00	16.16	341.60	19.96	79.60	481.60	241.17	116.08	99.26	97.40

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	49.97	26.17	20.68	50.03	41.43	25.40	50.47	39.02	25.23	46.88	17.48	17.50
Movement LOS	D	C	C	D	D	C	D	D	C	D	B	B
d_A, Approach Delay [s/veh]	31.26			40.66			35.22			24.75		
Approach LOS	C			D			D			C		
d_I, Intersection Delay [s/veh]	33.23											
Intersection LOS	C											
Intersection V/C	0.787											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	34.03	34.03	34.03	34.03
I_p,int, Pedestrian LOS Score for Intersection	2.617	2.555	2.766	2.583
Crosswalk LOS	B	B	C	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	682	564	658	682
d_b, Bicycle Delay [s]	18.49	21.93	19.16	18.49
I_b,int, Bicycle LOS Score for Intersection	2.812	2.299	3.300	1.943
Bicycle LOS	C	B	C	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Lasselle St/Bay Ave

Control Type:	Signalized	Delay (sec / veh):	10.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.375

Intersection Setup

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰ ↑↱			↰ ↑ ↑↱			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	1	1	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	49.21	350.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			25.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Volumes

Name	Lassalle Street			Lasselle Street			Bay Avenue			Bay Avenue		
Base Volume Input [veh/h]	31	394	8	3	371	22	29	27	26	6	19	8
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	7	47	6	24	73	1	1	0	12	3	0	15
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	39	457	14	27	459	24	31	28	39	9	20	23
Peak Hour Factor	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350	0.9350
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	122	4	7	123	6	8	7	10	2	5	6
Total Analysis Volume [veh/h]	42	489	15	29	491	26	33	30	42	10	21	25
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	6.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	1	6	0	5	2	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	5	7	0	5	7	0	0	7	0	0	7	0
Maximum Green [s]	30	30	0	30	30	0	0	30	0	0	30	0
Amber [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	13	25	0	13	25	0	0	32	0	0	32	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	16	0	0	16	0	0	23	0	0	21	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	L	C	C	C	C
C, Cycle Length [s]	70	70	70	70	70	70	70
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	3	50	2	49	49	6	6
g / C, Green / Cycle	0.04	0.71	0.03	0.70	0.70	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.02	0.27	0.02	0.14	0.14	0.06	0.03
s, saturation flow rate [veh/h]	1810	1890	1810	1900	1867	1743	1812
c, Capacity [veh/h]	75	1338	59	1328	1304	222	221
d1, Uniform Delay [s]	32.97	4.08	33.35	3.69	3.69	30.92	30.09
k, delay calibration	0.11	0.50	0.11	0.50	0.50	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	6.31	0.81	6.23	0.33	0.34	1.57	0.60
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.56	0.38	0.49	0.20	0.20	0.47	0.25
d, Delay for Lane Group [s/veh]	39.28	4.89	39.58	4.02	4.03	32.48	30.68
Lane Group LOS	D	A	D	A	A	C	C
Critical Lane Group	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	0.79	1.90	0.56	0.88	0.87	1.78	0.88
50th-Percentile Queue Length [ft/ln]	19.78	47.41	13.97	21.88	21.64	44.44	22.09
95th-Percentile Queue Length [veh/ln]	1.42	3.41	1.01	1.58	1.56	3.20	1.59
95th-Percentile Queue Length [ft/ln]	35.60	85.34	25.15	39.39	38.95	80.00	39.76

Movement, Approach, & Intersection Results

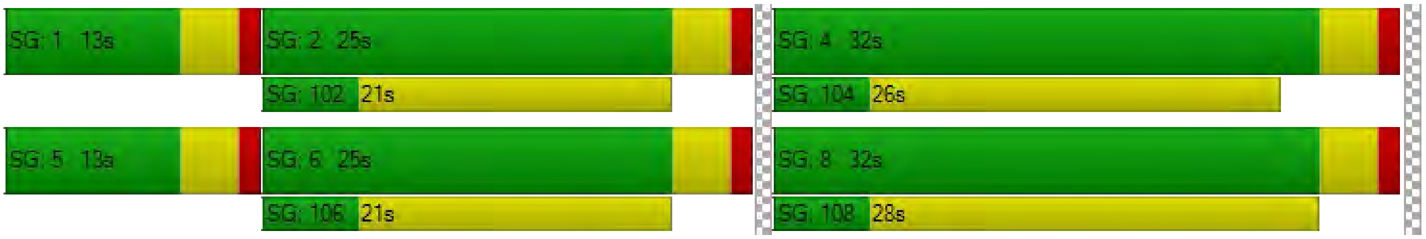
d_M, Delay for Movement [s/veh]	39.28	4.89	4.89	39.58	4.02	4.03	32.48	32.48	32.48	30.68	30.68	30.68
Movement LOS	D	A	A	D	A	A	C	C	C	C	C	C
d_A, Approach Delay [s/veh]	7.54			5.91			32.48			30.68		
Approach LOS	A			A			C			C		
d_I, Intersection Delay [s/veh]	9.95											
Intersection LOS	A											
Intersection V/C	0.375											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	26.61	26.61	26.61	26.61
I_p,int, Pedestrian LOS Score for Intersection	2.488	2.620	1.783	1.778
Crosswalk LOS	B	B	A	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	599	599	799	799
d_b, Bicycle Delay [s]	17.18	17.18	12.63	12.63
I_b,int, Bicycle LOS Score for Intersection	2.461	2.010	1.733	1.652
Bicycle LOS	B	B	A	A

Sequence

Ring 1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: Lassalle St/Alessandro Blvd

Control Type:	Signalized	Delay (sec / veh):	28.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.500

Intersection Setup

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	↰↑↱			↰↑↱			↰↑↱			↰↑↱		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0	1	0	1	1	0	1
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			45.00			50.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Lassalle Street			Lassalle Street			Alessandro Boulevard			Alessandro Boulevard		
Base Volume Input [veh/h]	51	324	41	17	277	17	19	186	91	27	154	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404	1.0404
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	35	41	19	0	53	13	23	71	57	18	156	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	88	378	62	18	341	31	43	265	152	46	316	28
Peak Hour Factor	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560	0.9560
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	99	16	5	89	8	11	69	40	12	83	7
Total Analysis Volume [veh/h]	92	395	65	19	357	32	45	277	159	48	331	29
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	95
Coordination Type	Time of Day Pattern Isolated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	8.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap
Signal Group	1	6	6	5	2	0	3	8	0	7	4	4
Auxiliary Signal Groups			6,7									4,5
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	7	7	5	7	0	5	7	0	5	7	7
Maximum Green [s]	30	30	30	30	30	0	30	30	0	30	30	30
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
All red [s]	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0
Split [s]	13	40	40	9	36	0	15	36	0	10	31	31
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	5
Pedestrian Clearance [s]	0	29	29	0	27	0	0	27	0	0	19	19
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Recall	No	No	No	No	No		No	No		No	No	No
Maximum Recall	No	No	No	No	No		No	No		No	No	No
Pedestrian Recall	No	No	No	No	No		No	No		No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	L	C	R	L	C	R
C, Cycle Length [s]	95	95	95	95	95	95	95	95	95	95	95
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
g_i, Effective Green Time [s]	6	55	62	2	50	4	19	19	4	19	19
g / C, Green / Cycle	0.07	0.57	0.66	0.02	0.53	0.04	0.20	0.20	0.04	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.05	0.21	0.04	0.01	0.21	0.02	0.15	0.10	0.03	0.17	0.02
s, saturation flow rate [veh/h]	1810	1900	1615	1810	1873	1810	1900	1615	1810	1900	1615
c, Capacity [veh/h]	120	1089	1056	40	990	68	376	319	71	378	321
d1, Uniform Delay [s]	43.70	10.95	5.93	45.99	13.34	45.17	35.85	33.97	45.14	36.97	31.09
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.72	0.94	0.11	8.55	1.17	10.23	2.84	1.20	10.86	6.49	0.12
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	0.36	0.06	0.48	0.39	0.66	0.74	0.50	0.68	0.88	0.09
d, Delay for Lane Group [s/veh]	53.42	11.89	6.04	54.53	14.51	55.40	38.68	35.17	55.99	43.46	31.21
Lane Group LOS	D	B	A	D	B	E	D	D	E	D	C
Critical Lane Group	Yes	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.39	4.22	0.42	0.52	4.66	1.19	5.94	3.18	1.32	8.01	0.55
50th-Percentile Queue Length [ft/ln]	59.81	105.57	10.59	13.06	116.60	29.82	148.51	79.41	33.08	200.24	13.77
95th-Percentile Queue Length [veh/ln]	4.31	7.59	0.76	0.94	8.21	2.15	9.94	5.72	2.38	12.65	0.99
95th-Percentile Queue Length [ft/ln]	107.66	189.82	19.07	23.52	205.14	53.68	248.45	142.94	59.54	316.28	24.78

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	53.42	11.89	6.04	54.53	14.51	14.51	55.40	38.68	35.17	55.99	43.46	31.21
Movement LOS	D	B	A	D	B	B	E	D	D	E	D	C
d_A, Approach Delay [s/veh]	18.12			16.37			39.09			44.06		
Approach LOS	B			B			D			D		
d_I, Intersection Delay [s/veh]	28.91											
Intersection LOS	C											
Intersection V/C	0.500											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	38.97	38.97	38.97	38.97
I_p,int, Pedestrian LOS Score for Intersection	2.498	2.372	2.516	2.323
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	757	673	673	568
d_b, Bicycle Delay [s]	18.36	20.92	20.92	24.37
I_b,int, Bicycle LOS Score for Intersection	2.470	2.233	2.353	2.233
Bicycle LOS	B	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Attachment: Appendix I - Traffic Impact Analysis [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

CITY OF MORENO VALLEY

NOTICE OF AVAILABILITY AND INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION (MND)

NOTICE IS HEREBY GIVEN that the City of Moreno Valley is considering a recommendation that the project herein identified will have no significant environmental impact in compliance with Section 15070 of the CEQA guidelines. A copy of the **MITIGATED NEGATIVE DECLARATION** and the **ENVIRONMENTAL CHECKLIST,** which supports the proposed findings, are on file at the City of Moreno Valley.

Item:	Tentative Tract No. 38123 (PEN21-0136) Conditional Use Permit for a Planned Unit Development (PEN21-0311)
Applicant:	Megan Whieldon, DR Horton
Property Owner:	Winco Holdings, Inc. and Equitable Moreno Valley II Partnership
APNs:	487-470-025, 487-470-028, 487-574-001, and 487-574-002
Location:	Northeast corner of Lasselle Street and Alessandro Boulevard
Proposal:	The applicant is requesting approval of the following entitlements: 1) a Tentative Tract Map 38123 to subdivide a 33.57-acre site into one hundred and seventy-seven (177) single-family lots with associated amenities and public improvements; and 2) a Conditional Use Permit for a Planned Unit Development to address development standards for the tract map.
Council District:	3

This Notice of Availability (NOA) has been prepared to notify agencies and interested parties that the City of Moreno Valley as the Lead Agency has prepared an Initial Study and Mitigated Negative Declaration pursuant to requirements of the California Environmental Quality Act (CEQA) to evaluate the potential environmental impacts associated with construction and operation of the Pilot Travel Center project as described below.

Project Description: The proposed project intends to develop a residential tract within the parcels as described in this notice. Overall, the project consists of the construction of 177 single-family homes on 33.57 acres. Site development would include the grading and construction of single-family residential lots, a water quality basin, an approximately two-acre park, underground utilities, street improvements, and off-site sewer improvements.

Project Location: The Project site is located on the northeast corner of Lasselle Street and Alessandro Boulevard in Moreno Valley, Riverside County, California. (Assessor Parcel Numbers (APN's): 487-470-025, 487-470-028, 487-574-001, and 487-574-002). The Project site is not included on any list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

Potential Environmental Impacts: The City of Moreno Valley has prepared an Initial Study to determine the environmental effects associated with the above actions and finds the issuance of a Mitigated Negative Declaration is the appropriate level of environmental review. The Initial Study/Mitigated Negative Declaration concludes that all potentially significant impacts of the Project would be mitigated to a less than significant level.

Public Review and Comment Deadline: Copies of the Initial Study/Mitigated Negative Declaration are available at the Planning Division at the address listed below. Pursuant to Section 15105(b) of the CEQA Guidelines, the City has established a 20-day public review period for the Initial Study/Mitigated Negative Declaration, which begins December 23, 2021 and ends January 12, 2022. Written comments on the Initial Study/Mitigated Negative Declaration must be received at the City of Moreno Valley Community Development Department by no later than the conclusion of the 20-day review period, 5:30 pm on January 12, 2022. Written comments on the Initial Study/Mitigated Negative Declaration should be addressed to:

Attachment: Exhibit B to Resolution 2022-06 - NOA to Adopt MND [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Kirt A. Coury, Contract Planner
14177 Frederick Street
Post Office Box 88005
Moreno Valley, California 92552 Phone: (951) 413-3201
Email: kirtc@moval.org

Document Availability: The Initial Study/Mitigated Negative Declaration, and all documents incorporated and/or referenced therein, can be reviewed during normal business hours (7:30 a.m. to 5:30 p.m., Monday through Thursday and Friday, 7:30 a.m. to 4:30 p.m.) at the City of Moreno Valley Planning Division counter, located at 14177 Frederick Street, Moreno Valley, CA 92553. The documents may also be reviewed at the Moreno Valley Library, located at 25480 Alessandro Boulevard, Moreno Valley, California.

/s/ Sean P. Kelleher	Press-Enterprise	December 23, 2021
Sean P. Kelleher Planning Official Community Development Department	Newspaper	Date of Publication

MITIGATION MONITORING AND REPORTING PROGRAM

Purpose of Mitigation Monitoring and Reporting Program: The California Environmental Quality Act (CEQA), Public Resources Code Section 21081.6, requires that a Mitigation Monitoring and Reporting Program (MMRP) be established upon completing findings. CEQA stipulates that "the public agency shall adopt a reporting or monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation."

This MMRP has been prepared in compliance with Section 21081.6 of CEQA to ensure that all required mitigation measures are implemented and completed according to schedule and maintained in a satisfactory manner during the construction of the project, as required. Table 1 has been prepared to assist the responsible parties in implementing the MMRP. The table identifies individual mitigation measures, monitoring/mitigation timing, the responsible agency for implementing the measure, and space to confirm implementation of the mitigation measures. The numbering of mitigation measures follows the numbering sequence found in the Initial Study/Mitigated Negative Declaration (IS/MND).

The City of Moreno Valley (City) is the lead agency for the project under CEQA and shall administer and implement the MMRP. The City is responsible for review of all monitoring reports, enforcement actions, and document disposition. The City shall rely on information provided by the project site observers/ monitors (e.g., construction manager, project manager, archaeologist, etc.) as accurate and up-to-date and shall provide personnel to field check mitigation measure status, as required.

Project Description: The project is located within the City of Moreno Valley (City), in western Riverside County. The site is bordered by Bay Avenue along the north, Darwin Drive along the east, Alessandro Boulevard on the south, and Lassalle Street on the west. The project site consists of two adjacent properties: the approximately 17.6 acre "Skylar Place" property (APN 487-470-025) on the west and the approximately 17.9-acre "Windsong" property (APN 487-470-028) on the east.

The proposed project intends to develop a residential tract within the two adjacent parcels. Surrounding land uses include single family residential neighborhoods to the north, undeveloped open space to the south, and a combination of undeveloped land and single-family residences to the east and west. Overall, the project consists of the construction of 177 single-family homes divided between the two properties, with 84 lots situated on the Skylar Place property and the remaining 93 lots on the western Windsong property. Residential home sizes range from a minimum 1,378 square feet (SF) to 2,435 SF. Site development would include the grading and construction of single-family residential lots, a water quality basin, an approximately two-acre park, underground utilities, street improvements, and off-site sewer improvements. All off-site storm drain improvements would be conducted within the right-of-way (ROW). The vacant lot in the southwest corner of the Skylar Place property is not part of the project and is designated for future commercial uses. Vehicular access to the project site would be provided by five driveways, including two from Lasselle Street to the west, one from Bay Avenue to the north, and two from Darwin Drive to the east. A series of internal drives would provide access throughout the two properties and to the residences.

On June 15, 2021, the City Council adopted a resolution certifying the 2040 General Plan Update EIR, approving the 2040 General Plan Update and updating the Zoning Atlas. With the General Plan and zoning update, the project site has a General Plan land use designation of Downtown Center and is also zoned as Downtown Center. This designation allows for residential uses, including single-family homes.

Topographically, site elevations range from approximately 1,626 feet above mean sea level (amsl) located in the north-northeast edge of the site and lowest ground elevation of 1,585 feet amsl towards the southwestern corner. Surface drainage is to the south-southwest. Both properties are currently vacant but have been graded and/or previously disturbed by past activities and are currently regularly disked and/or mowed for fire prevention.

Project construction is assumed to occur over an approximately 3-year, 2-month period starting in May 2022. Construction activities include grading (possibly with blasting), installation of underground utilities and infrastructure, paving, construction of residences, and architectural coating (e.g., painting). The project would not require demolition, as the site is currently vacant and undeveloped. Site preparation (e.g., grubbing) would be included in the grading. During grading, approximately 180 truckloads per day of material would be exported over 15 days, generating approximately 5,400 one-way truck trips. Blasting may be required during grading if conventional equipment is unable to efficiently remove areas of rock. Blasting is assumed to occur up to one day per week during grading. All other construction activities on the project site would be halted while explosives are prepared and detonated.

Table 1
MITIGATION MONITORING AND REPORTING PROGRAM CHECKLIST FOR THE TENTATIVE TRACT MAP 38123 RESIDENTIAL PROJECT

	Mitigation Measure	Monitoring/ Mitigation Timing	Responsible for Monitoring	Verification of Compliance	
				Initials	Date
AIR QUALITY					
AQ-1	**Tier 4 Off-Road Construction Equipment:** All off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction of the project shall be USEPA Tier 4 certified or have California Air Resource Board (CARB) approved engine/exhaust retrofit kits to result in equivalent emissions. Prior to issuing permits, the City shall verify that construction contracts specify the off-road equipment certification or retrofit requirements. The applicant shall compile and maintain an inventory, including documentation of engine certification or emissions retrofits, of all off-road diesel-powered equipment rated at 50 horsepower or greater used on the project site during construction. The inventory shall be available for review and verification by the City on demand.	Throughout construction This mitigation measure shall be included in construction documents for implementation during construction	City / Construction contractor		
BIOLOGICAL RESOURCES					
BIO-1	**Burrowing Owl:** In compliance with the MSHCP, a pre-construction survey shall be conducted on the study area within 30 days prior to ground disturbance to determine presence of BUOW. If the pre-construction survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required. If BUOW is observed during the pre-construction survey, active burrows shall be avoided by the project in accordance with the California Department of Fish and Wildlife's (CDFW) Staff Report on Burrowing Owl Mitigation (2012) or CDFW's most recent guidelines. The project proponent shall immediately inform the Western Riverside County Regional Conservation Authority (RCA) of BUOW observations. A BUOW Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by RCA prior to initiating ground disturbance. The RCA will coordinate directly with CDFW as needed to ensure that the plan is consistent with the MSHCP and CDFW guidelines. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31). The RCA may require translocation sites to be created within the MSHCP Conservation Area for the establishment of new colonies. If required, the translocation sites must take into	Prior to and throughout grading and construction activities	City / Construction contractor		

	consideration unoccupied habitat areas, presence of burrowing mammals, existing colonies, and effects to other MSHCP Covered Species in order to successfully create suitable habitat for BUOW. The translocation sites must be developed in consultation with RCA. If required, translocation sites would also be described in the agency-approved plan.				
BIO-2	**Nesting Birds:** To the extent feasible, (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds. The general nesting season is March 15 through August 31 for songbirds and January 15 through August 31 for raptors. If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory songbirds (March 15 through August 31) and raptors (January 15 through August 31), a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. If construction is inactive for more than seven days, an additional survey shall be conducted. The results of the pre-construction survey shall be documented by the qualified biologist. If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.	Prior to ground disturbing activities	City/ Construction contractor		
BIO-3	**Fairy Shrimp:** Prior to commencement of ground-disturbing activities (i.e., earthwork, clearing, and/or grubbing), wet season focused surveys for federally listed fairy shrimp species shall be completed. The wet season surveys shall be conducted by a permitted biologist and follow the current USFWS survey protocol for large brachiopods (USFWS 2017). Survey results shall be submitted to USFWS following completion of the surveys. If listed fairy shrimp species are not detected during the wet season surveys, then ground-disturbing activities shall be allowed to commence on the study area and no further mitigation is required.	Prior to ground disturbing activities	City/ Construction contractor		

	If federally listed fairy shrimp are identified during the wet season surveys and the project cannot avoid occupied habitat, a DBESP assessment shall be completed to ensure that the proposed alternative provides for replacement of any lost functions and values of habitat. Project impacts to occupied listed fairy shrimp habitat shall be accomplished through purchase of off-site mitigation credits at an agency-approved mitigation bank or in-lieu fee program, or through purchase of off-site land that supports occupied habitat at a ratio of no less than 2:1. If off-site land is purchased, the mitigation site shall be preserved in perpetuity through a conservation easement, deed restriction, or similar legal protection mechanism.				
BIO-4	**MSHCP Landscaping Restrictions:** In accordance with MSHCP, no invasive species shall be used in the project landscape plans (including hydroseed mix used for interim erosion control).	Prior to issuance of grading permits This mitigation measure shall be included in construction documents for implementation during construction	City/ Construction contractor		
BIO-5	**Habitat Conservation Plan Fees:** The project applicant is subject to the MSHCP Local Development Mitigation Fee and the Stephens' Kangaroo Rat Habitat Conservation Plan Fee, which shall be paid prior to issuance of any grading permit.	Prior to issuance of grading permits	City		
CULTURAL RESOURCES					
CUL-1	**Archaeological Monitoring.** Prior to the issuance of a grading permit, the Developer shall retain a professional archaeologist to conduct monitoring of all mass grading and trenching activities. The Project Archaeologist shall have the authority to temporarily redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project Archaeologist, in consultation with the Consulting Tribe(s), the contractor, and the City, shall develop a CRMP as defined in Mitigation Measure CUL-3. The Project archeologist shall attend the pre-grading meeting with the City, the construction manager and any contractors and will conduct a mandatory Cultural Resources Worker Sensitivity Training to those in attendance. The archaeological monitor shall have the authority to temporarily halt and redirect earth moving activities in the affected area in the event that suspected archaeological resources are unearthed.	Prior to issuance of grading permits This mitigation measure shall be included in construction documents for implementation during construction	City/ Project Archaeologist		

CUL-2	**Native American Monitoring.** Prior to the issuance of a grading permit, the Developer shall secure agreements with the Consulting Tribe(s) for tribal monitoring. The City is also required to provide a minimum of 30 days advance notice to the tribes of all ground disturbing activities. The Native American Tribal Representatives shall have the authority to temporarily halt and redirect earth moving activities in the affected area in the event that suspected archaeological resources are unearthed. The Native American Monitor(s) shall attend the pre-grading meeting with the Project Archaeologist, City, the construction manager and any contractors and will conduct the Tribal Perspective of the mandatory Cultural Resources Worker Sensitivity Training to those in attendance.	Prior to issuance of grading permits This mitigation measure shall be included in construction documents for implementation during construction	City/ Native American Monitor(s)		
CUL-3	**Cultural Resource Monitoring Plan (CRMP).** The Project Archaeologist, in consultation with the Consulting Tribe(s), the contractor, and the City, shall develop a CRMP in consultation pursuant to the definition in AB 52 to address the details, timing and responsibility of all archaeological and cultural activities that will occur on the project site. A consulting Tribe is defined as a Tribe that initiated the AB 52 tribal consultation process for the Project, has not opted out of the AB 52 consultation process, and has completed AB 52 consultation with the City as provided for in California Public Resources Code Section 21080.3.2(b)(1) of AB 52. Details in the Plan shall include: a. Project description and location b. Project grading and development scheduling; c. Roles and responsibilities of individuals on the Project; d. The pre-grading meeting and Cultural Resources Worker Sensitivity Training details; e. The protocols and stipulations that the contractor, City, Consulting Tribe (s) and Project archaeologist will follow in the event of inadvertent cultural resources discoveries, including any newly discovered cultural resource deposits that shall be subject to a cultural resources evaluation. f. The type of recordation needed for inadvertent finds and the stipulations of recordation of sacred items. g. Contact information of relevant individuals for the Project.	Prior to issuance of grading permits This mitigation measure shall be included in construction documents for implementation during construction	City/ Project Archaeologist		

CUL-4	**Cultural Resource Disposition.** In the event that Native American cultural resources are discovered during the course of ground disturbing activities (inadvertent discoveries), the following procedures shall be carried out for final disposition of the discoveries: a. One or more of the following treatments, in order of preference, shall be employed with the tribes. Evidence of such shall be provided to the City of Moreno Valley Planning Department: i. Preservation-In-Place of the cultural resources, if feasible. Preservation in place means avoiding the resources, leaving them in the place they were found with no development affecting the integrity of the resources. ii. Onsite reburial of the discovered items as detailed in the treatment plan required pursuant to Mitigation Measure CUL-1. This shall include measures and provisions to protect the future reburial area from any future impacts in perpetuity. Reburial shall not occur until all legally required cataloging and basic recordation have been completed. No recordation of sacred items is permitted without the written consent of all Consulting Native American Tribal Governments as defined in Mitigation Measure CUL-3 The location for the future reburial area shall be identified on a confidential exhibit on file with the City, and concurred to by the Consulting Native American Tribal Governments prior to certification of the environmental document. The City shall verify that the following note is included on the Grading Plan: *"If any suspected archaeological resources are discovered during ground – disturbing activities and the Project Archaeologist or Native American Tribal Representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the Project Archaeologist and the Tribal Representatives to the site to assess the significance of the find."*	Throughout grading activities This mitigation measure shall be included in construction documents for implementation during construction	City/ Native American Monitor(s)		
CUL-5	**Inadvertent Finds.** If potential historic or cultural resources are uncovered during excavation or construction activities at the project site that were not assessed by the archaeological report(s) and/or environmental assessment conducted prior to Project approval, all ground disturbing activities in the affected area within 100 feet of the uncovered resource must cease immediately and a qualified person meeting the Secretary of the Interior's standards (36 CFR 61), Tribal Representatives, and all site monitors per the Mitigation Measures, shall be consulted by the City to evaluate the find, and as appropriate recommend	Throughout grading activities This mitigation measure shall be included in construction documents for implementation during construction	City/ Native American Monitor(s)		

	alternative measures to avoid, minimize or mitigate negative effects on the historic, or prehistoric resource. Further ground disturbance shall not resume within the area of the discovery until an agreement has been reached by all parties as to the appropriate mitigation. Work shall be allowed to continue outside of the buffer area and will be monitored by additional archeologist and Tribal Monitors, if needed. Determinations and recommendations by the consultant shall be immediately submitted to the Planning Division for consideration, and implemented as deemed appropriate by the Community Development Director, in consultation with the State Historic Preservation Officer (SHPO) and any and all Consulting Native American Tribes as defined in Mitigation Measure CUL-2 before any further work commences in the affected area. If the find is determined to be significant and avoidance of the site has not been achieved, a Phase III data recovery plan shall be prepared by the Project Archeologist, in consultation with the Tribe, and shall be submitted to the City for their review and approval prior to implementation of the said plan.				
CUL-6	**Archeology Report - Phase III and IV.** Prior to final inspection, the developer/permit holder shall prompt the Project Archeologist to submit two (2) copies of the Phase III Data Recovery report (if required for the Project) and the Phase IV Cultural Resources Monitoring Report that complies with the Community Development Department's requirements for such reports. The Phase IV report shall include evidence of the required cultural/historical sensitivity training for the construction staff held during the pre-grade meeting. The Community Development Department shall review the reports to determine adequate mitigation compliance. Provided the reports are adequate, the Community Development Department shall clear this condition. Once the report(s) are determined to be adequate, two (2) copies shall be submitted to the Eastern Information Center (EIC) at the University of California Riverside (UCR) and one (1) copy shall be submitted to the Consulting Tribe(s) Cultural Resources Department(s).	Prior to Grading Permit Final Inspection This mitigation measure shall be included in construction documents for implementation during construction	City/ Project Archaeologist		
CUL-7	**Human Remains.** If human remains are discovered, no further disturbance shall occur in the affected area until the County Coroner has made necessary findings as to origin. If the County Coroner determines that the remains are potentially Native American, the California Native American Heritage Commission shall be notified within 24 hours of the published finding to be given a reasonable opportunity to identify the "most likely descendant". The "most likely descendant" shall then make recommendations, and engage in consultations concerning the	Throughout grading and construction activities	City/ Native American Monitor(s)		

	treatment of the remains (California Public Resources Code 5097.98). (GP Objective 23.3, CEQA).				
CUL-8	**Non-Disclosure of Reburial Locations.** It is understood by all parties that unless otherwise required by law, the site of any reburial of Native American human remains or associated grave goods shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, pursuant to the specific exemption set forth in California Government Code 6254 (r)., parties, and Lead Agencies, will be asked to withhold public disclosure information related to such reburial, pursuant to the specific exemption set forth in California Government Code 6254 (r).	Throughout grading and construction activities	City/ County Coroner		
PALEONTOLOGICAL RESOURCES					
PAL-1	Prior to construction, a paleontological mitigation plan (PMP) shall be prepared, which shall provide detailed recommended monitoring locations; a description of a worker training program; detailed procedures for monitoring, fossil recovery, laboratory analysis, and museum curation; and notification procedures in the event of a fossil discovery by a paleontological monitor or other project personnel. A curation agreement with WSC or another accredited repository shall also be obtained. Construction excavations that disturb geologic units with moderate paleontological potential (PFYC 3) shall be monitored by a professional paleontologist in order to reduce potential adverse impacts on scientifically important paleontological resources to a less than significant level. If it is determined that only Cretaceous-age tonalite (Kt) (PFYC 1) is impacted, the monitoring program shall be halted in those areas. Any subsurface bones or potential fossils that are unearthed during construction shall be evaluated by a professional paleontologist as described in the PMP.	Prior to grading and construction activities This mitigation measure shall be included in construction documents for implementation during construction	City/ Construction contractor		
GREENHOUSE GAS EMISSIONS					
GHG-1	**Smart Meters:** Real-time energy smart meters shall be installed on all project residences. Prior to issuing building permits, the City shall verify that project plans include the requirement for smart meters. Prior to finalizing each project residence building permit, the City shall verify that a smart meter has been installed on the residence.	Prior to issuance of building permits	City		
NOISE					
NOI-1	**Construction Noise Management Plan.** Noise levels from project-related construction activities shall not exceed the 60 dBA noise limit specified in the Noise Ordinance, when measured at the boundary line of the property where the noise is located or any occupied property where noise is being received. A	Prior to grading and construction activities This mitigation measure shall be included in	City/ Construction contractor		

Construction Management Plan that describes the measures included on the construction plans to ensure compliance with the noise limit shall be prepared by the project applicant and submitted to the City for approval prior to issuance of the grading permit. The following measures may be included to reduce construction noise: • Construction equipment to be properly outfitted and maintained with manufacturer-recommended noise-reduction devices. • Diesel equipment to be operated with closed engine doors and equipped with factory-recommended mufflers. • Mobile or fixed “package” equipment (e.g., arc-welders and air compressors) to be equipped with shrouds and noise control features that are readily available for that type of equipment. • Electrically powered equipment to be used instead of pneumatic or internal-combustion powered equipment, where feasible. • Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) to be prohibited. • Material stockpiles and mobile equipment staging, parking, and maintenance areas to be located as far as practicable from noise sensitive receptors. • The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only. • Temporary sound barriers or sound blankets may be installed between construction operations and adjacent noise-sensitive receptors. Due to equipment exhaust pipes being approximately 7 to 8 feet above ground, a sound wall at least 10 feet in height above grade, located along the eastern property line between the project and neighboring three residences would mitigate noise levels to within acceptable levels. To effectively reduce noise levels, the sound barrier should be constructed of a material with a minimum weight of two pounds per square foot with no gaps or perforations and remain in place until the conclusion of demolition, grading, and construction activities. • The project applicant shall notify residences within 100 feet of the project’s property line in writing within one week of any construction activity such as blasting or heavy grading operations. The notification shall describe the	construction documents for implementation during construction			

	activities anticipated, provide dates and hours, and provide contact information with a description of a complaint and response procedure. - The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process for the affected resident shall be established prior to construction commencement to allow for resolution of noise problems that cannot be immediately solved by the site supervisor.				
NOI-2	**Blasting Management Plan.** Should blasting be required on the project site, the project applicant shall prepare a Blasting Management Plan that minimizes potential blasting effects, including from noise, vibration, airblast and flyrock, to adjacent residences within 100 feet. All blast planning must be done by a City of Moreno Valley approved blasting contractor, and submitted to the City with the appropriate blasting permits, and all other applicable local, state, and federal permits, licenses, and bonding. The blasting contractor or owner must conduct all notifications, inspections, monitoring, and major or minor blasting requirements planning with seismograph reports, as necessary.	Prior to blasting activities This mitigation measure shall be included in construction documents for implementation during construction	City/ Blasting contractor		
NOI-3	**Compliance with Interior Noise Standards.** The project shall incorporate building materials that reduce interior noise levels to 45 CNEL. Standard measures such as glazing with appropriate Sound Transmission Class (STC) ratings, as well as walls with appropriate STC ratings, should be considered. Once specific building plan information is available, an exterior-to-interior analysis shall be performed for residences in locations exceeding 60 CNEL to demonstrate compliance. The information in the analysis shall include wall heights and lengths, room volumes, window and door tables typical for a building plan, as well as information on any other openings in the building shell. With this specific building plan information, the analysis shall determine the predicted interior noise levels for the planned residential spaces. If predicted noise levels are found to exceed 45 CNEL, the analysis shall identify architectural materials or techniques that could be included to reduce noise levels to 45 CNEL. Final plans shall demonstrate that interior noise levels do not exceed 45 CNEL for proposed habitable areas.	Prior to issuance of building permits This mitigation measure shall be included in building plans/ specifications	City		
TRIBAL CULTURAL RESOURCES					
Please refer to Mitigation Measures CUL-1 through CUL-8 above.					

RESOLUTION NUMBER 2022-07

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, APPROVING CONDITIONAL USE PERMIT FOR A PLANNED UNIT DEVELOPMENT (PEN21-0136) ASSOCIATED WITH APPROVAL OF TENTATIVE TRACT MAP 28123 (PEN21-0311) LOCATED AT THE NORTHEAST CORNER OF LASSELLE STREET AND ALESSANDRO BOULEVARD (APN(s) 487-470-025, 487-470-028, 487-574-001, AND 487-574-002)

WHEREAS, the City of Moreno Valley ("City") is a general law city and a municipal corporation of the State of California; and

WHEREAS, D. R. Horton, ("Developer") has applied for the approval of Conditional Use Permit PEN21-0311 ("Application") for a Planned Unit Development associated with Tentative Tract Map 38123, PEN21-0311 ("Project") located at the northeast corner of Lasselle Street and Alessandro Boulevard ("Site"); and

WHEREAS, Section 9.02.060 (Conditional Use Permits) of the Moreno Valley Municipal Code acknowledges that the purpose of conditional use permits is to allow the establishment of uses that may have special impacts or uniqueness such that their effect on the surrounding environment cannot be determined in advance of the use being proposed for a particular location and that the conditional use permit application process involves the review of the location, design, and configuration of improvements related to the Project, and the potential impact of the Project on the surrounding area based on fixed and established standards; and

WHEREAS, the Project is located within the Downtown Center (DC) District (Section 9.07.010, Mixed-Use Zones/Corridors) whereby a Planned Unit Development is required by the designation of the DC District to establish development standards for detached residential housing with the approval of a Conditional Use Permit; and

WHEREAS, the Application has been evaluated in accordance with Section 9.02.060 ("Conditional Use Permits") of the Municipal Code with consideration given to the City's General Plan, Zoning Ordinance, and other applicable laws and regulations; and

WHEREAS, Section 9.02.060 of the Municipal Code imposes conditions of approval upon projects for which a CUP is required, which conditions may be imposed by the Planning Commission to address on-site improvements, off-site improvements, the manner in which the Site is used, and any other conditions as may be deemed necessary to protect the public health, safety, and welfare and ensure that the proposed Project will be developed in accordance with the purpose and intent of Title 9 ("Planning and Zoning") of the Municipal Code; and

WHEREAS, Staff has presented for the Planning Commission's consideration Conditions of Approval to be imposed upon Conditional Use Permit PEN21-0311 ("CUP"), which conditions have been deemed necessary to protect the public health, safety, and welfare and ensure that the proposed Project will be developed in accordance with the purpose and intent of Title 9 (“Planning and Zoning”) of the Municipal Code; and

WHEREAS, pursuant to the provisions of Section 9.02.200 (Public Hearing and Notification Procedures) of the Municipal Code and Government Code section 65905, a public hearing was scheduled for January 27, 2022, and notice thereof was duly published, posted, and mailed to all property owners of record within 600 feet of the Site; and

WHEREAS, on January 27, 2022, the public hearing to consider the Application was duly conducted by the Planning Commission, at which time all interested persons were provided with an opportunity to testify and to present evidence; and

WHEREAS, consistent with the requirements of Section 9.02.060 (Conditional Use Permits) of the Municipal Code and Section 9.07.010 (Mixed Use Zones/Corridors), at the public hearing, the Planning Commission considered Conditions of Approval to be imposed upon Conditional Use Permit PEN21-0311 (CUP), which conditions were prepared by Planning Division staff who deemed said conditions to be necessary to protect the public health, safety, and welfare and to ensure the proposed Project will be developed in accordance with the purpose and intent of Title 9 (“Planning and Zoning”) of the Municipal Code; and

WHEREAS, at the public hearing, the Planning Commission considered whether each of the requisite findings specified in Section 9.02.060 of the Municipal Code and set forth herein could be made concerning the proposed Project as conditioned by Conditions of Approval; and

WHEREAS, on January 27, 2022, in accordance with the provisions of the California Environmental Quality Act (CEQA[1]) and CEQA Guidelines,[2] the Planning Commission approved Resolution 2022-06.

NOW, THEREFORE, THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, DOES HEREBY RESOLVE AS FOLLOWS:

<u>Section 1.</u> Recitals and Exhibits

That the foregoing Recitals and attached Exhibits are true and correct and are hereby incorporated by this reference.

<u>Section 2.</u> Notice

That pursuant to Government Code section 66020(d)(1), notice is hereby given that the proposed Project is subject to certain fees, dedications, reservations, and other exactions as provided herein.

---

[1] Public Resources Code §§ 21000-21177

[2] 14 California Code of Regulations §§15000-15387

Section 3. Evidence

That the Planning Commission has considered all evidence submitted into the administrative record for the proposed CUP, including, but not limited to, the following:

(a) Moreno Valley General Plan and all other relevant provisions contained therein;
(b) Title 9 (Planning and Zoning) of the Moreno Valley Municipal Code and all other relevant provisions referenced therein;
(c) Application for the approval of Conditional Use Permit (CUP) PEN21-0311 and all documents, records, and references contained therein;
(d) Conditions of Approval for CUP PEN21-0311 attached hereto as Exhibit A;
(e) Staff Report prepared for the Planning Commission's consideration and all documents, records, and references related thereto, and Staff's presentation at the public hearing;
(f) Testimony and/or comments from Applicant and its representatives during the public hearing; and
(g) Testimony and/or comments from all persons provided in written format or correspondence, at, or prior to, the public hearing.

Section 4. Findings

That based on the foregoing Recitals and the Evidence contained in the Administrative Record as set forth above, the Planning Commission makes the following findings in approving CUP PEN21-0311.

(a) The proposed Project is consistent with the goals, objectives, policies, and programs of the General Plan;
(b) The proposed Project complies with all applicable zoning and other regulations;
(c) The proposed Project will not be detrimental to the public health, safety, or welfare or materially injurious to properties or improvements in the vicinity; and
(d) The location, design, and operation of the proposed Project will be compatible with existing and planned land uses in the vicinity.

Section 5. Approval

That based on the foregoing Recitals, Evidence contained in the Administrative Record, and Findings set forth above, the Planning Commission hereby approves CUP PEN21-0311 subject to the Conditions of Approval for CUP PEN21-0311 attached hereto as Exhibit A.

Section 6. Repeal of Conflicting Provisions

That all the provisions as heretofore adopted by the Planning Commission that conflicts with the provisions of this Resolution are hereby repealed.

Section 7. Severability

That the Planning Commission declares that, should any provision, section, paragraph, sentence or word of this Resolution be rendered or declared invalid by any final court action in a court of competent jurisdiction or by reason of any preemptive legislation, the remaining provisions, sections, paragraphs, sentences or words of this Resolution as hereby adopted shall remain in full force and effect.

Section 8. Effective Date

That this Resolution shall take effect immediately upon the date of adoption.

Section 9. Certification

That the Secretary of the Planning Commission shall certify to the passage of this Resolution.

PASSED AND ADOPTED THIS 27th day of January, 2022.

CITY OF MORENO VALLEY
PLANNING COMMISSION

____
Patricia Korzec, Chairperson

ATTEST:

____
Sean P. Kelleher,
Planning Official

APPROVED AS TO FORM:

____
Steven B. Quintanilla,
Interim City Attorney

Exhibits:
Exhibit A: Conditions of Approval

Exhibit A

CONDITIONS OF APPROVAL

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
Conditional Use Permit (PEN21-0311)
Tentative Tract Map (PEN21-0136)

EFFECTIVE DATE:
EXPIRATION DATE:

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

1. This approval is for a Tentative Tract Map (TTM38123) to subdivide 33.57 gross acres into 177 single-family lots, and six lettered lots with associated amenities and public improvements, and a Conditional Use Permit for a Planned Unit Development to address development standards for the tract map.

   A change or modification to the land use or the approved site plans may require a separate approval. Prior to any change or modification, the property owner shall contact the City of Moreno Valley Community Development Department to determine if a separate approval is required.

2. Any expansion to this use or exterior alterations will require the submittal of a separate application(s) and shall be reviewed and approved under separate permit(s). (MC 9.02.080)

3. Applicant/Developer shall defend, indemnify and hold harmless City, city council, commissions, boards, subcommittees and City's elected and appointed officials, commissioners, board members, officers, agents, consultants and employees ("City Parties") from and against any and all liabilities, demands, claims, actions or proceedings and costs and expenses incidental thereto (including costs of defense, settlement and reasonable attorneys' fees), which any or all of them may suffer, incur, be responsible for or pay out as a result of or in connection with any challenge to the legality, validity or adequacy of any of the following items: (i) any agreements by and among City and Developer including without limitation any Development Agreement, (ii) any and all permits, licenses and entitlements approved by City; (iii) any environmental determination made by City in connection with the Project Site or Project; and (iv) any proceedings or other actions undertaken by City in connection with the adoption or approval of any of the above.

4. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

5. The site shall be developed in accordance with the approved plans on file in the Community Development Department - Planning Division, the Municipal Code

regulations, General Plan, and the conditions contained herein. Prior to any use of the project site or business activity being commenced thereon, all Conditions of Approval shall be completed to the satisfaction of the Planning Official. (MC 9.14.020)

Special Conditions

6. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

7. The project shall comply with all applicable mitigation measures related to cultural resources and Native American requirements.

8. Prior to grading plan approval, Basin fencing shall include wrought iron fencing with pilasters.

9. Prior to building final, a basin maintained by an HOA or other private entity, landscape (trees, shrubs and groundcover) and irrigation shall be installed, and maintained by the HOA or other private entity with documentation provided to the Planning Division.

10. Prior to issuance of building permits, final front and street side yard landscape and irrigation plans, and slope landscape plans and basin landscape plans, shall be approved.

11. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

12. The site shall be developed in accordance with the approved tentative map and the Planned Unit Development (Conditional Use Permit) on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the conditions contained herein. (MC 9.14.020)

13. A drought tolerant landscape palette shall be utilized throughout the tract in compliance with the City's Landscape Requirements. (9.17)

14. Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to and approved by the Planning Division. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

15. Prior to the issuance of grading permits, grading plans shall be submitted to and approved by the Planning Division to ascertain that development and grading of all lots have been designed to reduce the extent of cut and fill and loss of coastal scrub vegetation. Grading plans shall incorporate multiple level foundations, custom foundations and/or split level pads in accordance with the City's Municipal Code. (MC 9.03.030)

16. All landscaped areas in perpetuity shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

17. Prior to grading plan approval, wall and fence plans shall be submitted to and approved by the Planning Division to include a six (6) foot high solid decorative (e.g. split face, color variation, pattern variation, or as approved by the Planning Official) block wall along the all tract perimeters.

18. Prior to final map recordation, or building permit issuance, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to a separate Phasing Plan submittal for Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

19. Prior to building final, all required and proposed fences and walls shall be constructed/installed per the approved plans on file in the Planning Division. (MC 9.080.070)

20. Prior to the issuance of grading permits, a temporary project identification sign shall be erected on the site in a secure and visible manner. The sign shall be conspicuously posted at the site and remain in place until occupancy of the project. The sign shall include the following: The name and address of the development and the developer's name and address to include a 24-hour emergency phone number.

21. Prior to issuance of any grading permits, the applicant shall have a qualified hazardous materials specialist examine the site to determine if there are any toxic or hazardous materials on-site which might pose a threat to human health. The examination shall include soil tests if deemed necessary by the consultant. A copy of the report, including recommended remediation or other clean-up measures shall be provided to the Planning Division and the Public Works Department - Land Development Division by the consultant. (Ord, CEQA)

22. Prior to issuance of grading permits, the developer shall pay the applicable Stephen’s’ Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee.

23. Prior to building final, slope landscape and irrigation shall be installed, certified by

the Landscape Architect with documentation provided to the Planning Division with an inspection performed and approved by the Planning Division. Vegetation on lots not yet having dwelling units shall be maintained by the developer weed and disease free. (MC 9.03.040)

24. Prior to grading plan approval, wall and fence plans shall be submitted to and approved by the Planning Division subject to the City's Municipal Code including the following:

    a. Side and rear yard fences/walls (not adjacent to a right of way) shall be constructed of decorative block, poly-vinyl or wood.
    b. A solid decorative (e.g. split face, color variation, pattern variation, or as approved by the Planning Official) block wall with pilasters and a cap is required along the perimeter of the tract adjacent to any right of way or reverse frontage location and along any right of way within the interior of the tract (all corner lots).
    c. A six (6) foot high combination wall with pilasters is required at top of slope along an open space area or adjacent to a park.
    d. Decorative open iron or steel fencing with pilasters is required adjacent to open space areas and view lots. (View lots are defined as lots where there is more than 15 foot difference in pad elevation.)
    e. Non-combustible fencing is required for all lots adjacent to all fuel modification zones, subject to the approval of the Fire Prevention Bureau.

25. Prior to Building final, all required and proposed fences and walls shall be constructed/installed per the project Planned Unit Development on file in the Planning Department.

26. Separate Administrative Plot Plans, including, Design Review (product approval), model home complex are required for approval of the design of the future single-family homes for Tentative Tract Map No. 38123 and shall comply with the Design Guidelines and Development Standards per the project Planned Unit Development on file in the Planning Department.

Prior to Grading Permit

27. Prior to issuance of any grading permit, all Conditions of Approval, and Mitigation Measures shall be printed on the grading plans.

28. Prior to issuance of any grading permits, mitigation measures contained in the Mitigation Monitoring Program approved with this project shall be implemented as provided therein. A mitigation monitoring fee, as provided by City ordinance, shall be paid by the applicant within 30 days of project approval. No City permit or approval shall be issued until such fee is paid. (CEQA)

29. Prior to issuance of any grading permits, rock outcroppings or aesthetic features shall be identified on the grading plans as preserved in place, relocated, transplanted or otherwise protected where feasible. Features to be protected shall be identified and designated on the grading plan.

30. Prior to issuance of a building permit, the developer/property owner or developer's successor-in-interest shall pay all applicable impact fees due at permit issuance, including but not limited to Multi-species Habitat Conservation Plan (MSHCP) mitigation fees. (Ord)

31. Prior to building final, the developer/owner or developer's/owner’s successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), and the City’s adopted Development Impact Fees. (Ord)

32. Prior to issuance of building permits, for projects that will be phased, a phasing plan shall be submitted to and approved by the Planning Division if occupancy is proposed to be phased.

33. Prior to issuance of any grading permit, all Conditions of Approval, and Mitigation Measures shall be printed on the building plans.

34. Prior to the issuance of building permits, landscape and irrigation plans for areas maintained by the Homeowner’s Association shall be submitted to the Planning Division. All landscape plans shall be approved by the Planning Division prior to the release of any building permits for the site. The plans shall be prepared in accordance with the City's Landscape Development Guidelines. Landscaping is required for the sides and or slopes of all water quality basin and drainage areas, while a hydroseed mix with irrigation is acceptable for the bottom of the basin areas. All detention basins shall include trees, shrubs and groundcover up to the concreted portion of the basin. A solid decorative wall with pilasters, tubular steel fence with pilasters or other fence or wall approved by the Planning Official is required to secure all water quality and detention basins.

35. Prior to issuance of any building permits, final landscaping and irrigation plans shall be submitted for review and approved by the Planning Division. After the third plan check review for landscape plans, an additional plan check fee shall apply. The plans shall be prepared in accordance with the City's Landscape Requirements and shall include:

    a. Drought tolerant landscape shall be used. Sod shall be limited to gathering areas. (or No sod shall be installed)

    b. Street trees shall be provided every 40 feet on center in the right of way.

c. Enhanced landscaping shall be provided at all driveway entries and street corner locations The review of all utility boxes, transformers etc. shall be coordinated to provide adequate screening from public view.

Building Division

36. Building plans submitted shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

37. The proposed project will be subject to approval by the Eastern Municipal Water District and all applicable fees and charges shall be paid prior to permit issuance. Domestic water supply system to be designed and installed under the auspices of EMWD. Contact the water district at 951.928.3777 for specific details.

38. Prior to submittal, all new development, including residential second units, are required to obtain a valid property address prior to permit application. Addresses can be obtained by contacting the Building Safety Division at 951.413.3350.

39. Any construction within the city shall only be as follows: Monday through Friday seven a.m. to seven p.m (except for holidays which occur on weekdays), eight a.m. to four p.m.; weekends and holidays (as observed by the city and described in the Moreno Valley Municipal Code Chapter 2.55), unless written approval is first obtained from the Building Official or City Engineer.

40. The proposed development shall be subject to the payment of required development fees as required by the City's current Fee Ordinance at the time a building application is submitted or prior to the issuance of permits as determined by the City.

41. All new structures shall be designed in conformance to the latest design standards adopted by the State of California in the California Building Code, (CBC) Part 2, Title 24, California Code of Regulations including requirements for allowable area, occupancy separations, fire suppression systems, accessibility, etc.

42. The proposed project's occupancy shall be classified by the Building Official and must comply with exiting, occupancy separation(s) and minimum plumbing fixture requirements. Minimum plumbing fixtures shall be provided per the California Plumbing Code, Table 422.1. The occupant load and occupancy classification shall be determined in accordance with the California Building Code.

43. The proposed residential project shall comply with the California Green Building Standards Code, Section 4.106.4, mandatory requirements for Electric Vehicle Charging Station (EVCS).

44. Prior to permit issuance, every applicant shall submit a properly completed Waste Management Plan (WMP), as a portion of the building or demolition permit process. (MC 8.80.030)

FINANCIAL & MANAGEMENT SERVICES DEPARTMENT

Moreno Valley Utility

45. This project requires the installation of electric distribution facilities. A non-exclusive easement shall be provided to Moreno Valley Utility and shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

46. This project requires the installation of electric distribution facilities. The developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer shall execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

    The Developer shall coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City all utility infrastructure including but not limited to, conduit, equipment, vaults, ducts, wires (including fiber optic cable), switches, conductors, transformers, and “bring-up” facilities including electrical capacity to serve the identified development and other adjoining, abutting, or benefiting projects as determined by Moreno Valley Utility – collectively referred to as “utility system” (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and/or delivery of any and all “utility services” to and within the project. For purposes of this condition, “utility services” shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. “Utility services” shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

    The City, or the City’s designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

47. Existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer's expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

48. This project is subject to a Reimbursement Agreement. The Developer is responsible for a proportionate share of costs associated with electrical distribution infrastructure previously installed that directly benefits the project.

PUBLIC WORKS DEPARTMENT

Land Development

49. Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans and once landscaping and irrigation has been installed, it and its maintenance shall be turned over to an established Homeowner's Association (HOA). The Homeowner's Association shall enter into an agreement with the City for basin maintenance.

50. Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, shall be required prior to 90% security reduction or the end of the one-year warranty period of the public streets as approved by the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred (100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

51. The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

52. The final approved conditions of approval (COAs) issued and any applicable Mitigation Measures by the Planning Division shall be photographically or electronically placed on mylar sheets and included in the Grading and Street Improvement plans.

53. The developer shall monitor, supervise and control all construction related activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:
(a) Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.
(b) Observance of working hours as stipulated on permits issued by the Land Development Division.
(c) The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.
(d) All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.
Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

54. Drainage facilities (e.g., catch basins, water quality basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

55. In the event right-of-way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right-of-way in accordance with the Land Development Division’s administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right-of-way or offsite easements and complete the improvements at such time the City acquires the right-of-way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right-of-way or easement acquisition. [GC 66462.5]

56. If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit. [MC

9.14.210(B)(C)]

57. The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

58. Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: "Drainage Easement – no structures, obstructions, or encroachments by land fills are allowed." In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

59. The maintenance responsibility of the proposed storm drain line shall be clearly identified. Storm drain lines within private property will be privately maintained and those within public streets will be publicly maintained.

60. A storm drain manhole shall be placed at the right-of-way line to mark the beginning of the publicly maintained portion of this storm drain.

61. For single family residential subdivisions, all lots shall drain to the street at a minimum surface grade of 2.0% and on-site drainage shall be conveyed onto the street with subsurface drains at a minimum grade of 0.5% per current City Standards MVSI-152 and MVSI-153A. No cross-lot or over the sidewalk drainage shall be allowed.

62. This project shall submit civil engineering design plans, reports and/or documents (prepared by a registered/licensed civil engineer) for review and approval by the City Engineer per the current submittal requirements, prior to the indicated threshold or as required by the City Engineer. The submittal consists of, but is not limited to, the following:
    a. Final (Tract) Map (recordation prior to building permit issuance);
    b. Rough grading w/ erosion control plan (prior to grading permit issuance);
    c. Precise grading w/ erosion control plan (prior to grading permit issuance);
    d. Public Improvement Plan (e.g., street/storm drain w/ striping, RCFC storm drain, sewer/water, etc.) (prior to encroachment permit issuance);
    e. Final drainage study (prior to grading plan approval);
    f. Final WQMP (prior to grading plan approval);
    g. Legal Documents (e.g., easement(s), dedications(s), lot line adjustment, vacation, etc.) (prior to building permit issuance);
    h. As-Built revision for all plans (prior to Occupancy release);

Prior to Grading Plan Approval

63. The final project-specific Water Quality Management Plan (WQMP) shall be consistent with the approved P-WQMP, as well as in full conformance with the document: "Water Quality Management Plan - A Guidance Document for the Santa Ana Region of Riverside County" dated October 22, 2012. The F-WQMP shall be submitted and approved prior to application for and issuance of grading permits. At a minimum, the F-WQMP shall include the following: Site Design BMPs; Source Control BMPs, Treatment Control BMPs, Operation and Maintenance requirements for BMPs and sources of funding for BMP implementation.

    a. The Applicant has proposed to incorporate the use of bioretention and biotreatment BMPs. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The Applicant acknowledges that more area than currently shown on the plans may be required to treat site runoff as required by the WQMP guidance document.

    b. The Applicant shall substantiate the applicable Hydrologic Condition of Concerns (HCOC) in Section F of the F-WQMP. <The HCOC designates that the project will be exempt from mitigation requirements based on Exemption 3>.

    c. All proposed LID BMP's shall be designed in accordance with the RCFC&WCD's Design Handbook for Low Impact Development Best Management Practices, dated September 2011.

    d. The proposed LID BMP's as identified in the project-specific P-WQMP shall be incorporated into the Final WQMP.

    e. The NPDES notes per City Standard Drawing No. MVFE-350-0 shall be included in the grading plans.

    f. Post-construction treatment control BMPs, once placed into operation for post-construction water quality control, shall not be used to treat runoff from construction sites or unstabilized areas of the site.

64. Resolution of all drainage issues shall be as approved by the City Engineer.

65. A final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include, but not be limited to: existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. The study shall analyze 1, 3, 6 and 24-hour duration events for the 2, 5, 10 and 100-year storm events [MC 9.14.110(A.1)]. A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

66. Emergency overflow areas shall be shown at all applicable drainage improvement locations in the event that the drainage improvement fails or exceeds full capacity.

67. A final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

68. The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

69. Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

70. The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

71. The developer shall submit recorded slope easements from adjacent property owners in all areas where grading resulting in slopes is proposed to take place outside of the project boundaries. For all other offsite grading, written permission from adjacent property owners shall be submitted.

72. The developer shall pay all remaining plan check fees.

73. A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

74. For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

Prior to Grading Permit

75. A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

76. If the developer chooses to construct the project in phases, a Construction Phasing Plan for the construction of on-site public or private improvements shall be submitted for review and approved by the City Engineer.

77. Prior to the payment of the Development Impact Fee (DIF), the developer may enter into a DIF Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement prior to the timing specified above, credits may not be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

78. A digital (pdf) copy of all approved grading plans shall be submitted to the Land Development Division.

79. Security, in the form of a cash deposit (preferable), bond or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

80. Security, in the form of a cash deposit (preferable), bond or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

81. The developer shall pay all applicable inspection fees.

82. Prior to the payment of the Transportation Uniform Mitigation Fee (TUMF), the developer may enter into a TUMF Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement by the timing specified above, credits may not be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

Prior to Map Approval

83. All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

84. A copy of the Covenants, Conditions and Restrictions (CC&R's) shall be submitted for review and approved by the City Engineer. The CC&R's shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project. In addition, for single-family residential development, bylaws and articles of incorporation shall also be included as part of the maintenance agreement for any water quality BMPs.

85. The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project.

86. After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

87. Resolution of all drainage issues shall be as approved by the City Engineer.

88. If the project involves the subdivision of land, maps may be developed in phases with the approval of the City Engineer. Financial security shall be provided for all public improvements associated with each phase of the map. The boundaries of any multiple map increment shall be subject to the approval of the City Engineer. If the project does not involve the subdivision of land and it is necessary to dedicate right-of-way/easements, the developer shall make the appropriate offer of dedication by separate instrument. In either case, the City Engineer may require the dedication and construction of necessary utility, street or other improvements beyond the project boundary, if the improvements are needed for circulation, parking, access, or for the welfare or safety of the public. This approval must be obtained prior to the Developer submitting a Phasing Plan to the California Bureau of Real Estate. [MC 9.14.080(B)(C), GC 66412 & 66462.5]

89. Maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal

requirements.

90. Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

    a. Establish a Home Owners Association (HOA) to finance the maintenance of the "Water Quality BMPs". Any lots which are identified as "Water Quality BMPs" shall be owned in fee by the HOA.

    b. Dedicate a maintenance easement to the City of Moreno Valley.

    c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

    d. Provide a certificate of insurance per the terms of the maintenance agreement.

    e. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

        i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

        ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

    f. Notify the Special Districts Division of the intent to record the final map 90 days prior to City Council action authorizing recordation of the final map and the financial option selected. The final option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

91. The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

92. All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

93. The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

94. All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

Prior to Improvement Plan Approval

95. The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless otherwise approved by the City Engineer.

96. The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

97. The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

98. Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

99. The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

100. All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

101. Any missing or deficient existing improvements along the project frontage within shall be constructed or secured for construction. The City Engineer may require the ultimate structural section for pavement to half-street width plus 18 feet or provide core test results confirming that existing pavement section is per current City Standards; additional signing & striping to accommodate increased traffic imposed by the development, etc.

102. The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts may be allowed for emergency repairs or as specifically approved in writing by the City Engineer. Special requirements shall be imposed for repaving, limits to be determined by the City Engineer.

103. All dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

Prior to Encroachment Permit

104. A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

105. All applicable inspection fees shall be paid.

106. The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City’s moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts may be allowed for emergency repairs or as specifically approved in writing by the City Engineer. Special requirements shall be imposed for repaving, limits to be determined by the City Engineer.

107. Any work performed within public right-of-way requires an encroachment permit.

Prior to Building Permit

108. An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of “blue-top” markers installed by a registered land surveyor or licensed civil engineer.

109. For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

110. A walk through with a Land Development Inspector shall be scheduled to inspect existing improvements within public right of way along project frontage. Any missing, damaged or substandard improvements including ADA access ramps that do not meet current City standards shall be required to be installed, replaced and/or repaired. The applicant shall post security to cover the cost of the repairs and complete the repairs within the time allowed in the public improvement agreement used to secure the improvements.

111. Certification to the line, grade, flow test and system invert elevations for the water quality control BMPs shall be submitted for review and approved by the City Engineer (excluding models homes).

Prior to Occupancy

112. All outstanding fees shall be paid.

113. All required as-built plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

114. The final/precise grade certification shall be submitted for review and approved by the City Engineer.

115. The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:
    a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, pavement tapers/transitions and traffic control devices as appropriate.
    b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.
    c. City-owned utilities.
    d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.
    e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]
    f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

116. For residential subdivisions, punch list work for improvements and capping of streets in that phase shall be completed and approved for acceptance by the City Engineer prior to the last 20% or last 5% (whichever is greater, unless as otherwise determined by the City Engineer).

117. The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:
    a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).
    b. Certification of best management practices (BMPs) from a state licensed civil

engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

118. The Developer shall comply with the following water quality related items:

a. Notify the Land Development Division prior to construction and installation of all structural BMPs so that an inspection can be performed.

b. Demonstrate that all structural BMPs described in the approved final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications;

c. Demonstrate that Developer is prepared to implement all non-structural BMPs described in the approved final project-specific WQMP; and

d. Demonstrate that an adequate number of copies of the approved final project-specific WQMP are available for future owners/occupants.

e. Clean and repair the water quality BMP's, including re-grading to approved civil drawing if necessary.

f. Obtain approval and complete installation of the irrigation and landscaping.

Special Conditions

119. Alessandro Boulevard is classified as a Divided Major Arterial (134' RW/110' CC) per City Standard Plan No. MVSI-101A-0. A raised median is required along the project frontage. 7' of right-of-way shall be dedicated. Any improvements undertaken by this project shall be consistent with the City's standards.

120. Lasselle Street is classified as an Arterial (100' RW/76' CC) per City Standard Plan No. MVSI-104A-0. 6' of right-of-way shall be dedicated. Any improvements undertaken by this project shall be consistent with the City's standards.

121. Bay Avenue is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. 7' of right-of-way shall be vacated. Any improvements undertaken by this project shall be consistent with the City's standards.

122. Darwin Drive is classified as a Collector (88' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

123. Interior Streets are designated as Local Streets (56' RW/36'CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

Special Districts Division

124. Street Light Coordination/Advanced Energy Fees. Prior to the issuance of the 1st

Building Permit for this project, the Developer shall pay New Street Light Installation Fees for all street lights required to be installed for this development. Payment will be collected by the Land Development Division. Fees are based on the street light administration/coordination and advanced energy fees as set forth in the City Fees, Charges, and Rates as adopted by City Council and effective at the time of payment. Any change in the project which increases the number of street lights to be installed requires payment of the fees at the then current fee. Questions may be directed to the Special Districts Administration at 951.413.3470 or SDAdmin@moval.org.

125. Landscape Construction. Parkway, open space, traffic circle and/or median landscaping specified in the project's Conditions of Approval shall be constructed consistent with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of Certificate of Occupancy for 25% (or 44) of the dwelling units for this tract or 12 months from the issuance of the first Certificate of Occupancy, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of Certificate of Occupancies issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

126. Approved Landscape Plans. For those areas to be maintained by the City and prior to the issuance of the 1st Building Permit, Planning, Landscape Services and Transportation Engineering staff, at a minimum, shall review and approve the final median, parkway, slope, traffic circle and/or open space landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval.

127. Major Infrastructure SFD Major Infrastructure Financing District. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for the construction and maintenance of major infrastructure improvements, which may include but is not limited to thoroughfares, bridges, and certain flood control improvements. This condition will be applicable provided said district is under development at the time this project applies for the 1st Building Permit. This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the

improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings. An alternative to satisfying this condition will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

128. Maintenance Services Funding. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for the operation and maintenance of public improvements and/or services associated with impacts of the development. This condition will only be applicable provided said district is under development at the time this project applies for the 1st Building Permit.

This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

An alternative to satisfying this funding source will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

129. Public Safety Funding. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for Public Safety services, which may include but is not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. This condition will only be applicable provided said district

is under development at the time this project applies for the 1st Building Permit.

This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

An alternative to satisfying this condition will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

130. Bioretention Basin Maintenance. The ongoing maintenance of any bioretention basin, or other like water quality BMP constructed in the public right of way, shall be the responsibility of a property owner association or the property owner.

131. Maintenance Period. The Developer, or the Developer's successors or assignees shall be responsible for all parkway, traffic circle, open space and/or median landscape maintenance and utility costs, etc. for a period no less than one (1) year commencing from the time all items of work have been completed to the satisfaction of Landscape Services staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the City accepts maintenance responsibilities.

132. Independent Utilities. Parkway, median, slope, traffic circle and/or open space landscape areas included within a special financing district are required to have independent utility systems, including but not limited to water, electric, and telephone services. An independent irrigation controller and pedestal will also be required. Combining utility systems with existing or future landscape areas that are not within the same CFD 2014-01 tax rate layers or funding program (e.g. NPDES) will not be permitted.

133. Landscape Inspection Fees. Inspection fees for the monitoring of landscape

installation associated with the City of Moreno Valley maintained landscaping are due prior to the required pre-construction meeting. (MC 3.32.040)

134. Landscape Guidelines. Plans for parkway, median, slope, traffic circle, and/or open space landscape areas designated in the project's Conditions of Approval for incorporation into a City Coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org or from Landscape Services (951.413.3480 or SDLandscape@moval.org).

135. Maintenance Responsibility. The ongoing maintenance of any landscaping required to be installed behind the curb shall be the responsibility of the property owner.

136. Easement Termination. In the event the City of Moreno Valley determines that funds authorized by any Proposition 218 mail ballot proceeding, Landowner Petition, etc. are insufficient to meet the costs for parkway, slope, and/or open space maintenance and utility charges, the City shall have the right, at its option, to terminate the grant of any or all parkway, slope, and/or open space maintenance easements. This power of termination, should it be exercised, shall be exercised in the manner provided by law to quit claim and abandon the property so conveyed to the City, and to revert to the Developer or the Developer’s successors in interest, all rights, title, and interest in said parkway, slope, and/or open space areas, including but not limited to responsibility for perpetual maintenance of said areas.

137. Landscape Plan Check Fees. Plan check fees for review of parkway/median, open space, and/or traffic circle landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

138. Zone A Per Dwelling Unit. The Moreno Valley Community Services District Zone A (Parks & Community Services) tax is levied on the property tax bill on a per parcel or dwelling unit basis. Upon the issuance of building permits, the Zone A tax will be assessed based on 177 dwelling units.

139. Landscape Easements. Prior to the recordation of the final map, the Developer shall provide all necessary documents to convey to the City the required easements for parkway and/or slope maintenance as specified on the tentative map or in these Conditions of Approval.

140. Easement Area. Easements for reverse frontage parkway and slope landscape areas abutting Alessandro shall be 10 ft. and Lasselle St and Bay Ave. shall be 6 ft. or to top of parkway facing slope or to face of perimeter tract wall, whichever is greater. Easements shall be dedicated to the City of Moreno Valley for landscape maintenance purposes, and shall be depicted on the final map, and an offer of their

dedication made thereon.

141. NPDES Funding. Prior to City Council action authorizing recordation of the final map for the development and if the Land Development Division requires this project to provide a funding source for the City's National Pollutant Discharge Elimination System (NPDES) program, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the balloting/annexation fee or fund an endowment) to provide an ongoing funding source for the NPDES program. This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful special election process into the NPDES program, or other special financing district, and payment of all costs associated with the special election process. Participation in the NPDES program requires an annual payment of the annual special tax, assessment, rate or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the City Council action to consider the ballot/annexation into or formation of the district, the qualified elector(s) will not protest the ballot/annexation or formation, but will retain the right to object to any eventual tax/assessment/rate/fee that is not equitable should the financial burden of the tax/assessment/rate/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings. (City of Moreno Valley Municipal Code Title 3, Section 3.50.050). Alternatively, the condition can be satisfied by the Developer funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

142. Park Maintenance Funding. Prior to City Council action authorizing the recordation of the map, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or fund an endowment) to provide an ongoing funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trails systems.

This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

Alternatively, the condition can be satisfied by the Developer funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

143. Mylars of the landscape and irrigation plans shall be submitted on hanging tab to Landscape Services.

144. CFD 2014-01. Prior to City Council action authorizing the recordation of the map, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee, form an association to fund the services or fund an endowment) to provide an ongoing funding source for a) Street Lighting Services for capital improvements, energy charges, and maintenance and/or b) Landscape Maintenance Services for public parkway, traffic circle, open space, and/or median landscaping on Lasselle St., Bay Ave., Darwin Dr., and/or Alessandro Blvd. and/or c) street and storm drain maintenance.

This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

Alternatively, the condition can be satisfied by the Developer forming a property owner association that will be responsible for the improvements and any and all operation and maintenance costs for the improvements or by funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

145. Zones A and C. The parcel(s) associated with this project is included in Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). Zone A is levied on the property tax bill on a per parcel or dwelling unit basis. Zone C is levied on the property tax bill on a per parcel basis. Zone A and Zone C are levied against all assessable parcels, and any subdivision thereof.

Transportation Engineering Division

146. Conditions of approval may be modified or added if a phasing plan is submitted for this development.

147. All driveways within the project shall conform to City of Moreno Valley Standard Plans No. MVSI-111A-0 for residential driveway approaches.

148. Driveways for the future commercial site shall conform to Section 9.11.080, and Table 9.11.080-14 of the City’s Development Code – Design Guidelines and City of Moreno Valley Standard Plans No. MVSI-112C-0 for commercial driveway approaches. The driveways shall be restricted to right-in and right-out only.

149. Alessandro Boulevard is classified as a Divided Major Arterial (134' RW/110' CC) per City Standard Plan No. MVSI-101A-0. A raised median is required along the project frontage. Any improvements undertaken by this project shall be consistent with the City's standards.

150. Lasselle Street is classified as an Arterial (100' RW/76' CC) per City Standard Plan No. MVSI-104A-0. Any improvements undertaken by this project shall be consistent with the City's standards.

151. Bay Avenue is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

152. Darwin Drive is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

153. Interior Streets are designated as Local Streets (56' RW/36'CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be

consistent with the City's standards for this facility.

154. Prior to final approval of any landscaping or monument sign plans, the project plans shall demonstrate that sight distance at the project intersections conforms to City Standard Plan No. MVSI-164A, B, C-0.

155. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per City of Moreno Valley Standard Plans - Section 4 for Alessandro Boulevard, Lasselle Avenue, Darwin Drive, Bay Avenue, and all interior streets. Signing and striping plans shall include, but limited to, Alessandro Boulevard from Chervil Court to Morrison Street and Lasselle Street from Lancia Street to Cottonwood Avenue. A right/left (west to east) chicane shall be striped approximately 475' from the Lasselle Street and Bay Avenue intersection.

156. Prior to the final approval of the street improvement plans, traffic signal modification plans shall be prepared for the existing traffic signal located at Alessandro Boulevard and Lasselle Street intersection. Traffic signal modification plans shall be prepared per the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD) and current City of Moreno Valley Standard Plans by a qualified registered civil engineer. Improvements may include, but not limited to new signal poles, new pull boxes, video detection system, relocation of signal controller cabinet, ADA curb ramps on the northeast and northwest corner, additional widening on the west side of Lasselle Street, striping transitions, etc. It is the responsibility of the developer to obtain any necessary right-of-way to complete the intersection improvements. NOTE: Additional right-of-way will be required on the northwest corner of the intersection. The Developer is responsible for acquiring right-of-way.

157. Prior to the final approval of the street improvement plans, the Alessandro Boulevard and Lasselle Street intersection shall be designed to provide the following (at a minimum):

- Northbound: One left turn lane, one future left turn lane, two through lanes, one right turn lane;
- Southbound: One left turn lane, one future left lane, one shared through/right turn lane;
- Eastbound: Two left turn lanes; one through lane, one right turn lane;
- Westbound: Two left turn lanes; one through lane, one right turn lane.

158. Prior to the final approval of the street improvement plans, a median construction plan shall be prepared for a raised median on Alessandro Boulevard along the project frontage. The plans shall provide a left turn pocket for eastbound traffic at the Alessandro Boulevard and Darwin Drive intersection.

159. Prior to issuance of Certificate of Occupancy, all street improvements shall be

installed to the satisfaction of the City Engineer.

160. Prior to issuance of Certificate of Occupancy, all signing and striping shall be installed per current City Standards and the approved plans.

161. Prior to issuance of Certificate of Occupancy, modification work for the existing traffic signal at the Alessandro Boulevard and Lasselle Street intersection shall be completed and fully operational per current City Standards and the approved plans.

162. Prior to issuance of Certificate of Occupancy, the raised median on Alessandro Boulevard along the project frontage shall be completed and fully operational per current City Standards and the approved plans.

163. Prior to issuance of an encroachment permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic engineer may be required for plan approval or as required by the City Traffic Engineer.

164. Prior to the final approval of the street improvement plans, construction plans shall be prepared for the traffic circle at Darwin Drive and Barbados Lane. Intersection geometry shall be determined during the plan check process.

165. Prior to the final approval of the street improvement plans, Lasselle Street shall be widened to provide one northbound through lane, one southbound through lane, and a two-way left turn lane from Lancia Street to Cottonwood Avenue. No additional right-of-way is required.

166. Communication conduit shall be required on Alessandro Boulevard and Lasselle Street per City Standard Plan No. MVSI-186-0.

167. On-street parking shall be restricted on Darwin Drive from Pissaro Way to the first driveway on the west side of Darwin Drive, north of Pissaro Way.

168. Prior to issuance of Certificate of Occupancy, the traffic circle at the Darwin Drive and Barbados Lane intersection shall be completed and fully operational per current City Standards and the approved plans.

169. Prior to issuance of Certificate of Occupancy, the pavement widening and striping on Lasselle Street from Lancia Street to Cottonwood Avenue shall completed per current City Standards and the approved plans.

PARKS & COMMUNITY SERVICES DEPARTMENT

170. This project is subject to current Development Impact Fees.

171. This project is subject to current Quimby Fees.

172. SPECIFIC CONDITIONS OF APPROVAL
PCS-1 Parks and Community Services Department
Standard Park and Community Services Project Conditions:

a. Parks and Community Services project construction shall adhere to: The City's Standard Plans, 'The Greenbook Standard Specifications for Public Works Construction', 'California Code of Regulations Title 24', and the Park and Community Services Specification Guide.

b. The General Contractor shall be properly licensed with the State of California for which the work is being performed. Licenses must be current and in good standing, for the duration of the project.

c. A map of all easements and the corresponding easement rights shall be presented to Parks and Community Services prior to scheduling the Tentative Map for approval.

d. (R) A restriction shall be placed on lots that are adjacent to the Parks and Community Services project, preventing openings or gates accessing the site. This shall be done through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this/her restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee prior to the recordation of the Final Map.

e. The following plans require Parks and Community Services written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to parks; park improvement plans.

f. (GP) A detailed rough grading plan with profile of all walkways in the parks project shall be submitted and approved by the Director of Parks and Community Services or his/her designee prior to the issuance of grading permits.

g. Grading certification and compaction tests are required, prior to any improvements being installed.

h. A minimum two-foot graded bench is required where turf, walkways, or other flat work adjoin landscaped or open space areas.

i. (R) Prior to the approval of the Final Map, a detailed map of the park or community services site and areas adjacent to the site shall be submitted to the Director of Parks and Community Services or his/her designee prior for review and written approval.

j. (R) All necessary documents to convey to the City and/or the Community Services District any required dedications for parks or open space, as specified on the tentative map or in these Conditions of Approval shall be submitted by the developer to Parks and Community Services, prior to the recordation of the final map.

k. (R) Prior to recordation of the Final Map, the developer shall post security (bonds) to guarantee construction of the park to the City's standards. Copies of the bonds shall be provided to Parks and Community Services, prior to the approval of the Final Map.

l. (BP) Prior to the issuance of the first Building Permit, final park improvement plans (mylars and AutoCAD & PDF file on a CD-ROM) shall be reviewed and approved by the Community Development Department – Planning Division; the Public Works Department – Land Development and Transportation Division; Fire Prevention; and Parks and Community Services Department. Landscaped areas adjacent to the park shall be designed to prevent water on the park.

m. Eight sets of complete park and community services site improvement plans shall be submitted to Parks and Community Services for routing. Adjacent landscaping and walls shall be shown on the plans. Final construction plans and details require wet stamped and signed Mylars, eight sets of bond copies and one Mylar copy from the City signed mylars, the AutoCAD file on CD, and a PDF file on CD. As-builts for the parks have the same requirements as final plan submittals.

n. CSD Zone ‘A’ plan check fees shall be paid prior to the second plan check.

o. CSD Zone ‘A’ inspection fees shall be paid prior to signing of Mylars.

173. SPECIFIC CONDITIONS OF APPROVAL

PCS-2 Parks and Community Services Department
Standard Park and Community Services Project Conditions

p. Drive approaches shall adhere to City Std. Plan #118C.

q. In order to prevent the delay of building permit issuance, any deviation from materials shall be submitted to Director of Parks and Community Services or his/her designee and approved in writing 60-days prior to the commencement of park construction.

r. Any unauthorized deviation from the approved plan, specifications, City Standard Plans, or Conditions of Approval may result in the delay of building permit issuance and/or building Finals/Certificate of Occupancy of the project conditioned for improvements.

s. Where required, decorative solid-grouted block wall (no precision block, stucco, veneer finishes, PVC, or wood fencing) with a minimum height of 72” on the park side shall be installed along lots that adjoin the park. Block walls shall be located solely on private property. If landscaping is to be utilized between the block wall and the park, a PVC fence shall be installed along the park separating the landscaping from the park (where required). All block walls that have public view shall have an anti-graffiti coating per Parks and Community Services specifications. Combination block/tubular steel fences shall only be utilized where approved by Parks and Community Services. Tubular steel shall comply with Parks and Community Services standards. Coating for tubular steel shall be anti-graffiti coating for metal per Parks and Community Services specifications. If alternate products are requested, the requested material(s) shall be presented to the Director of Parks and Community Services or his/her designee for review and approval. Under no circumstances can alternate products be utilized without prior written authorization from the Director of Parks and Community Services or his/her designee.

t. All inspections shall be requested two (2) working days in advance from the Parks and Community Services Department at the time of grading and installation of any improvements.

u. Any damage to existing landscape or trail areas due to project construction shall be repaired/replaced by the developer, or developer's successors in interest, at no cost to the City or Community Services District.

v. (BP)Parks and Community Services project construction in single family developments shall commence prior to 30% of total building permit issuance. Trail completion and acceptance (single family developments) for maintenance shall be completed prior to 70% of total building permit issuance.

w. (CO) Parks and Community Services project construction in multi-family or commercial developments shall commence with the rough grading. All Parks and Community Services projects shall be completed and accepted for maintenance prior to the issuance of 50% of the total certificates-of-occupancy (for multi-family and/or commercial developments).

PCS-3 (R) If Special Districts, a Division of the Public Works Department, requires this project to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems, the Developer must notify Special Districts of intent to record the final map 70 days prior to recordation of the final map and the financial option selected to fund the continued maintenance. (California Government Code, GP Chapter 2.7)

PCS-3b (BP) If Special Districts, a Division of the Public Works Department, requires this project to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems, the Developer must notify Special Districts of intent to request building permits 70 days prior to their issuance and the financial option selected to fund the continued maintenance. (California Government Code, GP Chapter 2.7)

174. SPECIFIC CONDITIONS OF APPROVAL

PCS-4 Parks and Community Services Department
Standard Park and Community Services Project Conditions:
PCS-5 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services Districts Zones A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone A charge for operations and capital improvements.

PCS-6 (R) Prior to recordation of the final map, the developer, or the developer's successors or assignees, shall supply a copy of the recorded Declaration of Covenant and Acknowledgement of Assessments to the Parks and

Community Services Department.

PCS-7 (BP) Prior to release of building permit, the developer, or the developer's successors or assignees shall supply a copy of the recorded Declaration of Covenant and Acknowledgement of Assessments to the Parks and Community Services Department.

PCS-8 (BP)This project is subject to current Development Impact Fees at time of building permit issuance.

PCS-9 Any modified or newly created agreements shall be reviewed and approved by the Board of the Moreno Valley Community Services District.

Standard Conditions

175. Within the improvements for PCS, the applicant shall show all existing and planned easements on all maps and plans. Easements on City/CSD owned or maintained parks, trails, bikeways, and landscape shall be identified on each of these plans with the instrument number of the recorded easement.

176. Prior to recordation of the Final Map, the applicant shall post security to guarantee construction or modification of parks, trails and/or bikeways for the City/CSD. Copies of said documentation shall be provided to PCS, prior to the approval of the Final Map.

177. Applicable plan check and inspection fees shall be paid, per the approved City fee schedule.

178. A restriction shall be placed on lots that back up to City/CSD owned or maintained parks, trails, bikeways, and landscaped areas, preventing openings or gates accessing the City/CSD owned or maintained property. This shall be documented through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee, prior to the recordation of the Final Map.

179. The following plans require PCS written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to bikeways; trail improvement plans. PCS will not approve any permits without review and approval of the above items.

RESOLUTION NUMBER 2022-08

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, APPROVING TENTATIVE TRACT MAP 38123 (PEN21-0136) LOCATED AT THE NORTHEAST CORNER OF LASSELLE STREET AND ALESSANDRO BOULEVARD (APN(s) 487-470-025, 487-470-028, 487-574-001, AND 487-574-002)

WHEREAS, the City of Moreno Valley ("City") is a general law city and a municipal corporation of the State of California; and

WHEREAS, D.R. Horton ("Applicant") is seeking approval of a Tentative Tract Map for 177 single-family lots with associated public improvements and related Conditional Use Permit for a Planned Unit Development, located on the northeast corner of Lasselle Street and Alessandro Boulevard; the tract map excludes two acres at the northeast corner of Lasselle Street and Alessandro Boulevard, which is reserved for future development under the Downtown Center designation; and

WHEREAS, the Applicant has filed an application for the approval of Tentative Tract Map 38123, PEN21-0136 ("Application") for a Planned Unit Development associated therewith ("Project") located at the northeast corner of Lasselle Street and Alessandro Boulevard (APN(s) 487-470-025, 487-470-028, 487-574-001, and 487-574-002) ("Site"); and

WHEREAS, the Application has been evaluated in accordance with Chapter 9.14 (Land Divisions) of the Municipal Code with consideration given to the City's General Plan, Zoning Ordinance, and other applicable laws and regulations; and

WHEREAS, Chapter 9.14 of the Municipal Code imposes conditions of approval upon projects for which a Tentative Tract Map is required, which conditions may be imposed by the Planning Commission to address on-site improvements, off-site improvements, the manner in which the Site is used, and any other conditions as may be deemed necessary to protect the public health, safety, and welfare and ensure that the proposed Project will be developed in accordance with the purpose and intent of Title 9 ("Planning and Zoning") of the Municipal Code; and

WHEREAS, Staff has presented for the Planning Commission's consideration Conditions of Approval to be imposed upon Tentative Tract Map 38123, PEN21-0136 (TTM), which conditions have been deemed necessary to protect the public health, safety, and welfare and ensure that the proposed Project will be developed in accordance with the purpose and intent of Title 9 ("Planning and Zoning") of the Municipal Code; and

WHEREAS, pursuant to the provisions of Section 9.02.200 (Public Hearing and Notification Procedures) of the Municipal Code and Government Code section 65905, a public hearing was scheduled for January 27, 2022, and notice thereof was duly published, posted, and mailed to all property owners of record within 600 feet of the Site; and

Attachment: Resolution No. 2022-08 - Tentative Tract Map [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

WHEREAS, consistent with the requirements of Chapter 9.14 (Land Divisions) of the Municipal Code, at the public hearing, the Planning Commission considered Conditions of Approval to be imposed upon Tentative Tract Map 38123, PEN21-0136 (TTM), which conditions were prepared by Planning Division staff who deemed said conditions to be necessary to protect the public health, safety, and welfare and to ensure the proposed Project will be developed in accordance with the purpose and intent of Title 9 ("Planning and Zoning") of the Municipal Code; and

WHEREAS, on January 27, 2022, a public hearing to consider the Application was duly conducted by the Planning Commission, at which time all interested persons were provided with an opportunity to testify and to present evidence; and

WHEREAS, at the public hearing, the Planning Commission considered whether each of the requisite findings specified in 9.14.070 of the Municipal Code and set forth herein could be made concerning the proposed Project as conditioned by the Conditions of Approval; and

WHEREAS, on January 27, 2022, in accordance with the provisions of the California Environmental Quality Act (CEQA[1]) and CEQA Guidelines,[2] the Planning Commission considered and approved Resolution 2022-06 certifying a Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program for the proposed Project.

NOW, THEREFORE, THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY, CALIFORNIA, DOES HEREBY RESOLVE AS FOLLOWS:

__Section 1.__ Recitals and Exhibits

That the foregoing Recitals and attached Exhibits are true and correct and are hereby incorporated by this reference.

__Section 2.__ Notice

That pursuant to Government Code section 66020(d)(1), notice is hereby given that the proposed Project is subject to certain fees, dedications, reservations, and other exactions as provided herein.

__Section 3.__ Evidence

That the Planning Commission has considered all of the evidence submitted into the administrative record for the proposed Tentative Tract Map 38123 (PEN21-0136), including, but not limited to, the following:

(a) Moreno Valley General Plan and all other relevant provisions contained therein;

(b) Title 9 (Planning and Zoning) of the Moreno Valley Municipal Code and all other applicable provisions referenced therein;

---

[1] Public Resources Code §§ 21000-21177

[2] 14 California Code of Regulations §§15000-15387

(c) Application for the approval of Tentative Tract Map 38123 (TTM) PEN21-0136 including Resolution No. 2022-08, and Planned Unit Development (PUD) PEN21-0311 including Resolution No. 2022-07, and all documents, records, and references contained therein;
(d) Conditions of Approval for Tentative Tract Map (PEN21-0136), attached as Exhibit A;
(e) Staff Report prepared for the Planning Commission's consideration and all documents, records, and references related thereto, and Staff's presentation at the public hearing;
(f) Testimony and/or comments from Applicant and its representatives during the public hearing; and
(g) Testimony and/or comments from all persons that were provided in written format or correspondence, at, or prior to, the public hearing.

<u>Section 4.</u> Findings

That based on the foregoing Recitals and the Evidence contained in the Administrative Record as set forth above, the Planning Commission makes the following findings in approving Tentative Tract Map PEN21-0136.

(a) That the proposed map is consistent with applicable general and specific plans and the zoning ordinance;
(b) That the design or improvement of the proposed subdivision is consistent with applicable general and specific plans;
(c) That the Site is physically suitable for the type of development;
(d) That the Site of the proposed land division is physically suitable for the proposed density of the development;
(e) That the design of the subdivision or the proposed improvements are not likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat;
(f) That the design of the subdivision or type of improvements is not likely to cause serious public health problems;
(g) That the design of the subdivision or the type of improvements will not conflict with easements, acquired by the public at large, for access through or use of, property within the proposed subdivision;
(h) That the requirements of CEQA have been satisfied;
(i) That the proposed land division is not subject to the Williamson Act pursuant to the California Land Conservation Act of 1965;
(j) That the proposed land division and the associated design and improvements are not consistent with applicable ordinances of the city;
(k) That the design of the land division provides, to the extent feasible, for future passive or natural heating and cooling opportunities in the subdivision; and
(l) That the effect of the proposed land division on the housing needs of the region was considered and balanced against the public service needs of the residents of Moreno Valley and available fiscal and environmental resources.

<u>Section 5.</u> Approval

That based on the foregoing Recitals, Evidence contained in the Administrative Record, and Findings set forth above, the Planning Commission hereby approves Tentative Tract Map (PEN21-0136) subject to the Conditions of Approval for Tentative Tract Map (PEN21-0136) attached hereto as Exhibit A.

Section 6. Repeal of Conflicting Provisions

That all the provisions as heretofore adopted by the Planning Commission that conflicts with the provisions of this Resolution are hereby repealed.

Section 7. Severability

That the Planning Commission declares that, should any provision, section, paragraph, sentence or word of this Resolution be rendered or declared invalid by any final court action in a court of competent jurisdiction or by reason of any preemptive legislation, the remaining provisions, sections, paragraphs, sentences or words of this Resolution as hereby adopted shall remain in full force and effect.

Section 8. Effective Date

That this Resolution shall take effect immediately upon the date of adoption.

Section 9. Certification

That the Secretary of the Planning Commission shall certify to the passage of this Resolution.

PASSED AND ADOPTED THIS 27th day of January 2022.

CITY OF MORENO VALLEY
PLANNING COMMISSION

____
Patricia Korzec, Chairperson

ATTEST:

____
Sean P. Kelleher,
Planning Official

APPROVED AS TO FORM:

____
Steven B. Quintanilla,
Interim City Attorney

Exhibits:
Exhibit A: Conditions of Approval

Attachment: Resolution No. 2022-08 - Tentative Tract Map [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Exhibit A

CONDITIONS OF APPROVAL

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
Conditional Use Permit (PEN21-0311)
Tentative Tract Map (PEN21-0136)

EFFECTIVE DATE:
EXPIRATION DATE:

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

1. This approval is for a Tentative Tract Map (TTM38123) to subdivide 33.57 gross acres into 177 single-family lots, and six lettered lots with associated amenities and public improvements, and a Conditional Use Permit for a Planned Unit Development to address development standards for the tract map.

   A change or modification to the land use or the approved site plans may require a separate approval. Prior to any change or modification, the property owner shall contact the City of Moreno Valley Community Development Department to determine if a separate approval is required.

2. Any expansion to this use or exterior alterations will require the submittal of a separate application(s) and shall be reviewed and approved under separate permit(s). (MC 9.02.080)

3. Applicant/Developer shall defend, indemnify and hold harmless City, city council, commissions, boards, subcommittees and City's elected and appointed officials, commissioners, board members, officers, agents, consultants and employees ("City Parties") from and against any and all liabilities, demands, claims, actions or proceedings and costs and expenses incidental thereto (including costs of defense, settlement and reasonable attorneys' fees), which any or all of them may suffer, incur, be responsible for or pay out as a result of or in connection with any challenge to the legality, validity or adequacy of any of the following items: (i) any agreements by and among City and Developer including without limitation any Development Agreement, (ii) any and all permits, licenses and entitlements approved by City; (iii) any environmental determination made by City in connection with the Project Site or Project; and (iv) any proceedings or other actions undertaken by City in connection with the adoption or approval of any of the above.

4. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

5. The site shall be developed in accordance with the approved plans on file in the Community Development Department - Planning Division, the Municipal Code

regulations, General Plan, and the conditions contained herein. Prior to any use of the project site or business activity being commenced thereon, all Conditions of Approval shall be completed to the satisfaction of the Planning Official. (MC 9.14.020)

Special Conditions

6. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

7. The project shall comply with all applicable mitigation measures related to cultural resources and Native American requirements.

8. Prior to grading plan approval, Basin fencing shall include wrought iron fencing with pilasters.

9. Prior to building final, a basin maintained by an HOA or other private entity, landscape (trees, shrubs and groundcover) and irrigation shall be installed, and maintained by the HOA or other private entity with documentation provided to the Planning Division.

10. Prior to issuance of building permits, final front and street side yard landscape and irrigation plans, and slope landscape plans and basin landscape plans, shall be approved.

11. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

12. The site shall be developed in accordance with the approved tentative map and the Planned Unit Development (Conditional Use Permit) on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the conditions contained herein. (MC 9.14.020)

13. A drought tolerant landscape palette shall be utilized throughout the tract in compliance with the City's Landscape Requirements. (9.17)

14. Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to and approved by the Planning Division. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

15. Prior to the issuance of grading permits, grading plans shall be submitted to and approved by the Planning Division to ascertain that development and grading of all lots have been designed to reduce the extent of cut and fill and loss of coastal scrub vegetation. Grading plans shall incorporate multiple level foundations, custom foundations and/or split level pads in accordance with the City's Municipal Code. (MC 9.03.030)

16. All landscaped areas in perpetuity shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

17. Prior to grading plan approval, wall and fence plans shall be submitted to and approved by the Planning Division to include a six (6) foot high solid decorative (e.g. split face, color variation, pattern variation, or as approved by the Planning Official) block wall along the all tract perimeters.

18. Prior to final map recordation, or building permit issuance, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to a separate Phasing Plan submittal for Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

19. Prior to building final, all required and proposed fences and walls shall be constructed/installed per the approved plans on file in the Planning Division. (MC 9.080.070)

20. Prior to the issuance of grading permits, a temporary project identification sign shall be erected on the site in a secure and visible manner. The sign shall be conspicuously posted at the site and remain in place until occupancy of the project. The sign shall include the following: The name and address of the development and the developer's name and address to include a 24-hour emergency phone number.

21. Prior to issuance of any grading permits, the applicant shall have a qualified hazardous materials specialist examine the site to determine if there are any toxic or hazardous materials on-site which might pose a threat to human health. The examination shall include soil tests if deemed necessary by the consultant. A copy of the report, including recommended remediation or other clean-up measures shall be provided to the Planning Division and the Public Works Department - Land Development Division by the consultant. (Ord, CEQA)

22. Prior to issuance of grading permits, the developer shall pay the applicable Stephen’s’ Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee.

23. Prior to building final, slope landscape and irrigation shall be installed, certified by

the Landscape Architect with documentation provided to the Planning Division with an inspection performed and approved by the Planning Division. Vegetation on lots not yet having dwelling units shall be maintained by the developer weed and disease free. (MC 9.03.040)

24. Prior to grading plan approval, wall and fence plans shall be submitted to and approved by the Planning Division subject to the City's Municipal Code including the following:

    a. Side and rear yard fences/walls (not adjacent to a right of way) shall be constructed of decorative block, poly-vinyl or wood.
    b. A solid decorative (e.g. split face, color variation, pattern variation, or as approved by the Planning Official) block wall with pilasters and a cap is required along the perimeter of the tract adjacent to any right of way or reverse frontage location and along any right of way within the interior of the tract (all corner lots).
    c. A six (6) foot high combination wall with pilasters is required at top of slope along an open space area or adjacent to a park.
    d. Decorative open iron or steel fencing with pilasters is required adjacent to open space areas and view lots. (View lots are defined as lots where there is more than 15 foot difference in pad elevation.)
    e. Non-combustible fencing is required for all lots adjacent to all fuel modification zones, subject to the approval of the Fire Prevention Bureau.

25. Prior to Building final, all required and proposed fences and walls shall be constructed/installed per the project Planned Unit Development on file in the Planning Department.

26. Separate Administrative Plot Plans, including, Design Review (product approval), model home complex are required for approval of the design of the future single-family homes for Tentative Tract Map No. 38123 and shall comply with the Design Guidelines and Development Standards per the project Planned Unit Development on file in the Planning Department.

<u>Prior to Grading Permit</u>

27. Prior to issuance of any grading permit, all Conditions of Approval, and Mitigation Measures shall be printed on the grading plans.

28. Prior to issuance of any grading permits, mitigation measures contained in the Mitigation Monitoring Program approved with this project shall be implemented as provided therein. A mitigation monitoring fee, as provided by City ordinance, shall be paid by the applicant within 30 days of project approval. No City permit or approval shall be issued until such fee is paid. (CEQA)

29. Prior to issuance of any grading permits, rock outcroppings or aesthetic features shall be identified on the grading plans as preserved in place, relocated, transplanted or otherwise protected where feasible. Features to be protected shall be identified and designated on the grading plan.

30. Prior to issuance of a building permit, the developer/property owner or developer's successor-in-interest shall pay all applicable impact fees due at permit issuance, including but not limited to Multi-species Habitat Conservation Plan (MSHCP) mitigation fees. (Ord)

31. Prior to building final, the developer/owner or developer's/owner's successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), and the City's adopted Development Impact Fees. (Ord)

32. Prior to issuance of building permits, for projects that will be phased, a phasing plan shall be submitted to and approved by the Planning Division if occupancy is proposed to be phased.

33. Prior to issuance of any grading permit, all Conditions of Approval, and Mitigation Measures shall be printed on the building plans.

34. Prior to the issuance of building permits, landscape and irrigation plans for areas maintained by the Homeowner's Association shall be submitted to the Planning Division. All landscape plans shall be approved by the Planning Division prior to the release of any building permits for the site. The plans shall be prepared in accordance with the City's Landscape Development Guidelines. Landscaping is required for the sides and or slopes of all water quality basin and drainage areas, while a hydroseed mix with irrigation is acceptable for the bottom of the basin areas. All detention basins shall include trees, shrubs and groundcover up to the concreted portion of the basin. A solid decorative wall with pilasters, tubular steel fence with pilasters or other fence or wall approved by the Planning Official is required to secure all water quality and detention basins.

35. Prior to issuance of any building permits, final landscaping and irrigation plans shall be submitted for review and approved by the Planning Division. After the third plan check review for landscape plans, an additional plan check fee shall apply. The plans shall be prepared in accordance with the City's Landscape Requirements and shall include:

    a. Drought tolerant landscape shall be used. Sod shall be limited to gathering areas. (or No sod shall be installed)

    b. Street trees shall be provided every 40 feet on center in the right of way.

c. Enhanced landscaping shall be provided at all driveway entries and street corner locations The review of all utility boxes, transformers etc. shall be coordinated to provide adequate screening from public view.

Building Division

36. Building plans submitted shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

37. The proposed project will be subject to approval by the Eastern Municipal Water District and all applicable fees and charges shall be paid prior to permit issuance. Domestic water supply system to be designed and installed under the auspices of EMWD. Contact the water district at 951.928.3777 for specific details.

38. Prior to submittal, all new development, including residential second units, are required to obtain a valid property address prior to permit application. Addresses can be obtained by contacting the Building Safety Division at 951.413.3350.

39. Any construction within the city shall only be as follows: Monday through Friday seven a.m. to seven p.m (except for holidays which occur on weekdays), eight a.m. to four p.m.; weekends and holidays (as observed by the city and described in the Moreno Valley Municipal Code Chapter 2.55), unless written approval is first obtained from the Building Official or City Engineer.

40. The proposed development shall be subject to the payment of required development fees as required by the City's current Fee Ordinance at the time a building application is submitted or prior to the issuance of permits as determined by the City.

41. All new structures shall be designed in conformance to the latest design standards adopted by the State of California in the California Building Code, (CBC) Part 2, Title 24, California Code of Regulations including requirements for allowable area, occupancy separations, fire suppression systems, accessibility, etc.

42. The proposed project's occupancy shall be classified by the Building Official and must comply with exiting, occupancy separation(s) and minimum plumbing fixture requirements. Minimum plumbing fixtures shall be provided per the California Plumbing Code, Table 422.1. The occupant load and occupancy classification shall be determined in accordance with the California Building Code.

43. The proposed residential project shall comply with the California Green Building Standards Code, Section 4.106.4, mandatory requirements for Electric Vehicle Charging Station (EVCS).

44. Prior to permit issuance, every applicant shall submit a properly completed Waste Management Plan (WMP), as a portion of the building or demolition permit process. (MC 8.80.030)

FINANCIAL & MANAGEMENT SERVICES DEPARTMENT

Moreno Valley Utility

45. This project requires the installation of electric distribution facilities. A non-exclusive easement shall be provided to Moreno Valley Utility and shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

46. This project requires the installation of electric distribution facilities. The developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer shall execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

    The Developer shall coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City all utility infrastructure including but not limited to, conduit, equipment, vaults, ducts, wires (including fiber optic cable), switches, conductors, transformers, and “bring-up” facilities including electrical capacity to serve the identified development and other adjoining, abutting, or benefiting projects as determined by Moreno Valley Utility – collectively referred to as “utility system” (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and/or delivery of any and all “utility services” to and within the project. For purposes of this condition, “utility services” shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. “Utility services” shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

    The City, or the City’s designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

47. Existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer's expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

48. This project is subject to a Reimbursement Agreement. The Developer is responsible for a proportionate share of costs associated with electrical distribution infrastructure previously installed that directly benefits the project.

PUBLIC WORKS DEPARTMENT

Land Development

49. Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans and once landscaping and irrigation has been installed, it and its maintenance shall be turned over to an established Homeowner's Association (HOA). The Homeowner's Association shall enter into an agreement with the City for basin maintenance.

50. Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, shall be required prior to 90% security reduction or the end of the one-year warranty period of the public streets as approved by the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred (100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

51. The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

52. The final approved conditions of approval (COAs) issued and any applicable Mitigation Measures by the Planning Division shall be photographically or electronically placed on mylar sheets and included in the Grading and Street Improvement plans.

53. The developer shall monitor, supervise and control all construction related activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:
(a) Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.
(b) Observance of working hours as stipulated on permits issued by the Land Development Division.
(c) The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.
(d) All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.
Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

54. Drainage facilities (e.g., catch basins, water quality basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

55. In the event right-of-way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right-of-way in accordance with the Land Development Division’s administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right-of-way or offsite easements and complete the improvements at such time the City acquires the right-of-way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right-of-way or easement acquisition. [GC 66462.5]

56. If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit. [MC

9.14.210(B)(C)]

57. The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

58. Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: "Drainage Easement – no structures, obstructions, or encroachments by land fills are allowed." In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

59. The maintenance responsibility of the proposed storm drain line shall be clearly identified. Storm drain lines within private property will be privately maintained and those within public streets will be publicly maintained.

60. A storm drain manhole shall be placed at the right-of-way line to mark the beginning of the publicly maintained portion of this storm drain.

61. For single family residential subdivisions, all lots shall drain to the street at a minimum surface grade of 2.0% and on-site drainage shall be conveyed onto the street with subsurface drains at a minimum grade of 0.5% per current City Standards MVSI-152 and MVSI-153A. No cross-lot or over the sidewalk drainage shall be allowed.

62. This project shall submit civil engineering design plans, reports and/or documents (prepared by a registered/licensed civil engineer) for review and approval by the City Engineer per the current submittal requirements, prior to the indicated threshold or as required by the City Engineer. The submittal consists of, but is not limited to, the following:
    a. Final (Tract) Map (recordation prior to building permit issuance);
    b. Rough grading w/ erosion control plan (prior to grading permit issuance);
    c. Precise grading w/ erosion control plan (prior to grading permit issuance);
    d. Public Improvement Plan (e.g., street/storm drain w/ striping, RCFC storm drain, sewer/water, etc.) (prior to encroachment permit issuance);
    e. Final drainage study (prior to grading plan approval);
    f. Final WQMP (prior to grading plan approval);
    g. Legal Documents (e.g., easement(s), dedications(s), lot line adjustment, vacation, etc.) (prior to building permit issuance);
    h. As-Built revision for all plans (prior to Occupancy release);

Prior to Grading Plan Approval

63. The final project-specific Water Quality Management Plan (WQMP) shall be consistent with the approved P-WQMP, as well as in full conformance with the document: “Water Quality Management Plan - A Guidance Document for the Santa Ana Region of Riverside County” dated October 22, 2012. The F-WQMP shall be submitted and approved prior to application for and issuance of grading permits. At a minimum, the F-WQMP shall include the following: Site Design BMPs; Source Control BMPs, Treatment Control BMPs, Operation and Maintenance requirements for BMPs and sources of funding for BMP implementation.

    a. The Applicant has proposed to incorporate the use of bioretention and biotreatment BMPs. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The Applicant acknowledges that more area than currently shown on the plans may be required to treat site runoff as required by the WQMP guidance document.

    b. The Applicant shall substantiate the applicable Hydrologic Condition of Concerns (HCOC) in Section F of the F-WQMP. <The HCOC designates that the project will be exempt from mitigation requirements based on Exemption 3>.

    c. All proposed LID BMP’s shall be designed in accordance with the RCFC&WCD’s Design Handbook for Low Impact Development Best Management Practices, dated September 2011.

    d. The proposed LID BMP’s as identified in the project-specific P-WQMP shall be incorporated into the Final WQMP.

    e. The NPDES notes per City Standard Drawing No. MVFE-350-0 shall be included in the grading plans.

    f. Post-construction treatment control BMPs, once placed into operation for post-construction water quality control, shall not be used to treat runoff from construction sites or unstabilized areas of the site.

64. Resolution of all drainage issues shall be as approved by the City Engineer.

65. A final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include, but not be limited to: existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. The study shall analyze 1, 3, 6 and 24-hour duration events for the 2, 5, 10 and 100-year storm events [MC 9.14.110(A.1)]. A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

66. Emergency overflow areas shall be shown at all applicable drainage improvement locations in the event that the drainage improvement fails or exceeds full capacity.

67. A final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

68. The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

69. Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

70. The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

71. The developer shall submit recorded slope easements from adjacent property owners in all areas where grading resulting in slopes is proposed to take place outside of the project boundaries. For all other offsite grading, written permission from adjacent property owners shall be submitted.

72. The developer shall pay all remaining plan check fees.

73. A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

74. For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

Prior to Grading Permit

75. A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

76. If the developer chooses to construct the project in phases, a Construction Phasing Plan for the construction of on-site public or private improvements shall be submitted for review and approved by the City Engineer.

77. Prior to the payment of the Development Impact Fee (DIF), the developer may enter into a DIF Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement prior to the timing specified above, credits may not be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

78. A digital (pdf) copy of all approved grading plans shall be submitted to the Land Development Division.

79. Security, in the form of a cash deposit (preferable), bond or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

80. Security, in the form of a cash deposit (preferable), bond or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

81. The developer shall pay all applicable inspection fees.

82. Prior to the payment of the Transportation Uniform Mitigation Fee (TUMF), the developer may enter into a TUMF Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement by the timing specified above, credits may not be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

Prior to Map Approval

83. All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

84. A copy of the Covenants, Conditions and Restrictions (CC&R's) shall be submitted for review and approved by the City Engineer. The CC&R's shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project. In addition, for single-family residential development, bylaws and articles of incorporation shall also be included as part of the maintenance agreement for any water quality BMPs.

85. The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project.

86. After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

87. Resolution of all drainage issues shall be as approved by the City Engineer.

88. If the project involves the subdivision of land, maps may be developed in phases with the approval of the City Engineer. Financial security shall be provided for all public improvements associated with each phase of the map. The boundaries of any multiple map increment shall be subject to the approval of the City Engineer. If the project does not involve the subdivision of land and it is necessary to dedicate right-of-way/easements, the developer shall make the appropriate offer of dedication by separate instrument. In either case, the City Engineer may require the dedication and construction of necessary utility, street or other improvements beyond the project boundary, if the improvements are needed for circulation, parking, access, or for the welfare or safety of the public. This approval must be obtained prior to the Developer submitting a Phasing Plan to the California Bureau of Real Estate. [MC 9.14.080(B)(C), GC 66412 & 66462.5]

89. Maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal

requirements.

90. Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

    a. Establish a Home Owners Association (HOA) to finance the maintenance of the "Water Quality BMPs". Any lots which are identified as "Water Quality BMPs" shall be owned in fee by the HOA.

    b. Dedicate a maintenance easement to the City of Moreno Valley.

    c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

    d. Provide a certificate of insurance per the terms of the maintenance agreement.

    e. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

        i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

        ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

    f. Notify the Special Districts Division of the intent to record the final map 90 days prior to City Council action authorizing recordation of the final map and the financial option selected. The final option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

91. The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

92. All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

93. The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

94. All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

Prior to Improvement Plan Approval

95. The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless otherwise approved by the City Engineer.

96. The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

97. The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

98. Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

99. The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

100. All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

101. Any missing or deficient existing improvements along the project frontage within shall be constructed or secured for construction. The City Engineer may require the ultimate structural section for pavement to half-street width plus 18 feet or provide core test results confirming that existing pavement section is per current City Standards; additional signing & striping to accommodate increased traffic imposed by the development, etc.

102. The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts may be allowed for emergency repairs or as specifically approved in writing by the City Engineer. Special requirements shall be imposed for repaving, limits to be determined by the City Engineer.

103. All dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

Prior to Encroachment Permit

104. A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

105. All applicable inspection fees shall be paid.

106. The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts may be allowed for emergency repairs or as specifically approved in writing by the City Engineer. Special requirements shall be imposed for repaving, limits to be determined by the City Engineer.

107. Any work performed within public right-of-way requires an encroachment permit.

Prior to Building Permit

108. An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of "blue-top" markers installed by a registered land surveyor or licensed civil engineer.

109. For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

110. A walk through with a Land Development Inspector shall be scheduled to inspect existing improvements within public right of way along project frontage. Any missing, damaged or substandard improvements including ADA access ramps that do not meet current City standards shall be required to be installed, replaced and/or repaired. The applicant shall post security to cover the cost of the repairs and complete the repairs within the time allowed in the public improvement agreement used to secure the improvements.

111. Certification to the line, grade, flow test and system invert elevations for the water quality control BMPs shall be submitted for review and approved by the City Engineer (excluding models homes).

Prior to Occupancy

112. All outstanding fees shall be paid.

113. All required as-built plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

114. The final/precise grade certification shall be submitted for review and approved by the City Engineer.

115. The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:
   a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, pavement tapers/transitions and traffic control devices as appropriate.
   b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.
   c. City-owned utilities.
   d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.
   e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]
   f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

116. For residential subdivisions, punch list work for improvements and capping of streets in that phase shall be completed and approved for acceptance by the City Engineer prior to the last 20% or last 5% (whichever is greater, unless as otherwise determined by the City Engineer).

117. The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:
   a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).
   b. Certification of best management practices (BMPs) from a state licensed civil

engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

118. The Developer shall comply with the following water quality related items:
   a. Notify the Land Development Division prior to construction and installation of all structural BMPs so that an inspection can be performed.
   b. Demonstrate that all structural BMPs described in the approved final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications;
   c. Demonstrate that Developer is prepared to implement all non-structural BMPs described in the approved final project-specific WQMP; and
   d. Demonstrate that an adequate number of copies of the approved final project-specific WQMP are available for future owners/occupants.
   e. Clean and repair the water quality BMP's, including re-grading to approved civil drawing if necessary.
   f. Obtain approval and complete installation of the irrigation and landscaping.

Special Conditions

119. Alessandro Boulevard is classified as a Divided Major Arterial (134' RW/110' CC) per City Standard Plan No. MVSI-101A-0. A raised median is required along the project frontage. 7’ of right-of-way shall be dedicated. Any improvements undertaken by this project shall be consistent with the City's standards.

120. Lasselle Street is classified as an Arterial (100' RW/76' CC) per City Standard Plan No. MVSI-104A-0. 6’ of right-of-way shall be dedicated. Any improvements undertaken by this project shall be consistent with the City's standards.

121. Bay Avenue is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. 7’ of right-of-way shall be vacated. Any improvements undertaken by this project shall be consistent with the City's standards.

122. Darwin Drive is classified as a Collector (88' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

123. Interior Streets are designated as Local Streets (56' RW/36'CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

Special Districts Division

124. Street Light Coordination/Advanced Energy Fees. Prior to the issuance of the 1st

Building Permit for this project, the Developer shall pay New Street Light Installation Fees for all street lights required to be installed for this development. Payment will be collected by the Land Development Division. Fees are based on the street light administration/coordination and advanced energy fees as set forth in the City Fees, Charges, and Rates as adopted by City Council and effective at the time of payment. Any change in the project which increases the number of street lights to be installed requires payment of the fees at the then current fee. Questions may be directed to the Special Districts Administration at 951.413.3470 or SDAdmin@moval.org.

125. Landscape Construction. Parkway, open space, traffic circle and/or median landscaping specified in the project's Conditions of Approval shall be constructed consistent with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of Certificate of Occupancy for 25% (or 44) of the dwelling units for this tract or 12 months from the issuance of the first Certificate of Occupancy, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of Certificate of Occupancies issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

126. Approved Landscape Plans. For those areas to be maintained by the City and prior to the issuance of the 1st Building Permit, Planning, Landscape Services and Transportation Engineering staff, at a minimum, shall review and approve the final median, parkway, slope, traffic circle and/or open space landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval.

127. Major Infrastructure SFD Major Infrastructure Financing District. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for the construction and maintenance of major infrastructure improvements, which may include but is not limited to thoroughfares, bridges, and certain flood control improvements. This condition will be applicable provided said district is under development at the time this project applies for the 1st Building Permit. This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the

improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings. An alternative to satisfying this condition will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

128. Maintenance Services Funding. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for the operation and maintenance of public improvements and/or services associated with impacts of the development. This condition will only be applicable provided said district is under development at the time this project applies for the 1st Building Permit.

This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

An alternative to satisfying this funding source will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

129. Public Safety Funding. Prior to applying for the 1st Building Permit, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or use the alternative identified at the time of the special financing district formation) to provide an ongoing funding source for Public Safety services, which may include but is not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. This condition will only be applicable provided said district

is under development at the time this project applies for the 1st Building Permit.

This condition must be fully satisfied prior to issuance of the 1st Certificate of Occupancy. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

An alternative to satisfying this condition will be identified at such time as a special financing district has been established. At the time of development, the developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to determine if this condition is applicable.

130. Bioretention Basin Maintenance. The ongoing maintenance of any bioretention basin, or other like water quality BMP constructed in the public right of way, shall be the responsibility of a property owner association or the property owner.

131. Maintenance Period. The Developer, or the Developer's successors or assignees shall be responsible for all parkway, traffic circle, open space and/or median landscape maintenance and utility costs, etc. for a period no less than one (1) year commencing from the time all items of work have been completed to the satisfaction of Landscape Services staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the City accepts maintenance responsibilities.

132. Independent Utilities. Parkway, median, slope, traffic circle and/or open space landscape areas included within a special financing district are required to have independent utility systems, including but not limited to water, electric, and telephone services. An independent irrigation controller and pedestal will also be required. Combining utility systems with existing or future landscape areas that are not within the same CFD 2014-01 tax rate layers or funding program (e.g. NPDES) will not be permitted.

133. Landscape Inspection Fees. Inspection fees for the monitoring of landscape

installation associated with the City of Moreno Valley maintained landscaping are due prior to the required pre-construction meeting. (MC 3.32.040)

134. Landscape Guidelines. Plans for parkway, median, slope, traffic circle, and/or open space landscape areas designated in the project's Conditions of Approval for incorporation into a City Coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org or from Landscape Services (951.413.3480 or SDLandscape@moval.org).

135. Maintenance Responsibility. The ongoing maintenance of any landscaping required to be installed behind the curb shall be the responsibility of the property owner.

136. Easement Termination. In the event the City of Moreno Valley determines that funds authorized by any Proposition 218 mail ballot proceeding, Landowner Petition, etc. are insufficient to meet the costs for parkway, slope, and/or open space maintenance and utility charges, the City shall have the right, at its option, to terminate the grant of any or all parkway, slope, and/or open space maintenance easements. This power of termination, should it be exercised, shall be exercised in the manner provided by law to quit claim and abandon the property so conveyed to the City, and to revert to the Developer or the Developer’s successors in interest, all rights, title, and interest in said parkway, slope, and/or open space areas, including but not limited to responsibility for perpetual maintenance of said areas.

137. Landscape Plan Check Fees. Plan check fees for review of parkway/median, open space, and/or traffic circle landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

138. Zone A Per Dwelling Unit. The Moreno Valley Community Services District Zone A (Parks & Community Services) tax is levied on the property tax bill on a per parcel or dwelling unit basis. Upon the issuance of building permits, the Zone A tax will be assessed based on 177 dwelling units.

139. Landscape Easements. Prior to the recordation of the final map, the Developer shall provide all necessary documents to convey to the City the required easements for parkway and/or slope maintenance as specified on the tentative map or in these Conditions of Approval.

140. Easement Area. Easements for reverse frontage parkway and slope landscape areas abutting Alessandro shall be 10 ft. and Lasselle St and Bay Ave. shall be 6 ft. or to top of parkway facing slope or to face of perimeter tract wall, whichever is greater. Easements shall be dedicated to the City of Moreno Valley for landscape maintenance purposes, and shall be depicted on the final map, and an offer of their

dedication made thereon.

141. NPDES Funding. Prior to City Council action authorizing recordation of the final map for the development and if the Land Development Division requires this project to provide a funding source for the City's National Pollutant Discharge Elimination System (NPDES) program, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the balloting/annexation fee or fund an endowment) to provide an ongoing funding source for the NPDES program. This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful special election process into the NPDES program, or other special financing district, and payment of all costs associated with the special election process. Participation in the NPDES program requires an annual payment of the annual special tax, assessment, rate or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the City Council action to consider the ballot/annexation into or formation of the district, the qualified elector(s) will not protest the ballot/annexation or formation, but will retain the right to object to any eventual tax/assessment/rate/fee that is not equitable should the financial burden of the tax/assessment/rate/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings. (City of Moreno Valley Municipal Code Title 3, Section 3.50.050). Alternatively, the condition can be satisfied by the Developer funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

142. Park Maintenance Funding. Prior to City Council action authorizing the recordation of the map, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee or fund an endowment) to provide an ongoing funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trails systems.

This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

Alternatively, the condition can be satisfied by the Developer funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

143. Mylars of the landscape and irrigation plans shall be submitted on hanging tab to Landscape Services.

144. CFD 2014-01. Prior to City Council action authorizing the recordation of the map, the qualified elector (e.g. property owner) must initiate the process (i.e. pay the annexation fee, form an association to fund the services or fund an endowment) to provide an ongoing funding source for a) Street Lighting Services for capital improvements, energy charges, and maintenance and/or b) Landscape Maintenance Services for public parkway, traffic circle, open space, and/or median landscaping on Lasselle St., Bay Ave., Darwin Dr., and/or Alessandro Blvd. and/or c) street and storm drain maintenance.

This condition must be fully satisfied prior to issuance of the 1st Building Permit. This condition will be satisfied with the successful annexation/formation (i.e. special election process) into a special financing district and payment of all costs associated with the special election process. Annexation into a special financing district requires an annual payment of the annual special tax, assessment, or fee levied against the property tax bill, or other lawful means, of the parcels of the project for such district. At the time of the public hearing to consider annexation into or formation of the district, the qualified elector(s) will not protest the annexation or formation, but will retain the right to object to any eventual tax/assessment/fee that is not equitable should the financial burden of the tax/assessment/fee not be reasonably proportionate to the benefit the affected property receives from the improvements to be installed and/or maintained or services provided. The special election requires a minimum 90-day process in compliance with the provisions of Article 13C of the California Constitution, Proposition 218, or other applicable legislation, and consistent with the scheduling for City Council meetings.

Alternatively, the condition can be satisfied by the Developer forming a property owner association that will be responsible for the improvements and any and all operation and maintenance costs for the improvements or by funding an endowment in an amount sufficient to yield an annual revenue stream that meets the annual obligation, as calculated by Special Districts Admin staff. The Developer must contact Special Districts Administration at 951.413.3470 or at SDAdmin@moval.org to satisfy this condition.

145. Zones A and C. The parcel(s) associated with this project is included in Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). Zone A is levied on the property tax bill on a per parcel or dwelling unit basis. Zone C is levied on the property tax bill on a per parcel basis. Zone A and Zone C are levied against all assessable parcels, and any subdivision thereof.

Transportation Engineering Division

146. Conditions of approval may be modified or added if a phasing plan is submitted for this development.

147. All driveways within the project shall conform to City of Moreno Valley Standard Plans No. MVSI-111A-0 for residential driveway approaches.

148. Driveways for the future commercial site shall conform to Section 9.11.080, and Table 9.11.080-14 of the City's Development Code – Design Guidelines and City of Moreno Valley Standard Plans No. MVSI-112C-0 for commercial driveway approaches. The driveways shall be restricted to right-in and right-out only.

149. Alessandro Boulevard is classified as a Divided Major Arterial (134' RW/110' CC) per City Standard Plan No. MVSI-101A-0. A raised median is required along the project frontage. Any improvements undertaken by this project shall be consistent with the City's standards.

150. Lasselle Street is classified as an Arterial (100' RW/76' CC) per City Standard Plan No. MVSI-104A-0. Any improvements undertaken by this project shall be consistent with the City's standards.

151. Bay Avenue is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

152. Darwin Drive is classified as a Collector (66' RW/44' CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards.

153. Interior Streets are designated as Local Streets (56' RW/36'CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be

consistent with the City's standards for this facility.

154. Prior to final approval of any landscaping or monument sign plans, the project plans shall demonstrate that sight distance at the project intersections conforms to City Standard Plan No. MVSI-164A, B, C-0.

155. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per City of Moreno Valley Standard Plans - Section 4 for Alessandro Boulevard, Lasselle Avenue, Darwin Drive, Bay Avenue, and all interior streets. Signing and striping plans shall include, but limited to, Alessandro Boulevard from Chervil Court to Morrison Street and Lasselle Street from Lancia Street to Cottonwood Avenue. A right/left (west to east) chicane shall be striped approximately 475' from the Lasselle Street and Bay Avenue intersection.

156. Prior to the final approval of the street improvement plans, traffic signal modification plans shall be prepared for the existing traffic signal located at Alessandro Boulevard and Lasselle Street intersection. Traffic signal modification plans shall be prepared per the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD) and current City of Moreno Valley Standard Plans by a qualified registered civil engineer. Improvements may include, but not limited to new signal poles, new pull boxes, video detection system, relocation of signal controller cabinet, ADA curb ramps on the northeast and northwest corner, additional widening on the west side of Lasselle Street, striping transitions, etc. It is the responsibility of the developer to obtain any necessary right-of-way to complete the intersection improvements. NOTE: Additional right-of-way will be required on the northwest corner of the intersection. The Developer is responsible for acquiring right-of-way.

157. Prior to the final approval of the street improvement plans, the Alessandro Boulevard and Lasselle Street intersection shall be designed to provide the following (at a minimum):

- Northbound: One left turn lane, one future left turn lane, two through lanes, one right turn lane;
- Southbound: One left turn lane, one future left lane, one shared through/right turn lane;
- Eastbound: Two left turn lanes; one through lane, one right turn lane;
- Westbound: Two left turn lanes; one through lane, one right turn lane.

158. Prior to the final approval of the street improvement plans, a median construction plan shall be prepared for a raised median on Alessandro Boulevard along the project frontage. The plans shall provide a left turn pocket for eastbound traffic at the Alessandro Boulevard and Darwin Drive intersection.

159. Prior to issuance of Certificate of Occupancy, all street improvements shall be

installed to the satisfaction of the City Engineer.

160. Prior to issuance of Certificate of Occupancy, all signing and striping shall be installed per current City Standards and the approved plans.

161. Prior to issuance of Certificate of Occupancy, modification work for the existing traffic signal at the Alessandro Boulevard and Lasselle Street intersection shall be completed and fully operational per current City Standards and the approved plans.

162. Prior to issuance of Certificate of Occupancy, the raised median on Alessandro Boulevard along the project frontage shall be completed and fully operational per current City Standards and the approved plans.

163. Prior to issuance of an encroachment permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic engineer may be required for plan approval or as required by the City Traffic Engineer.

164. Prior to the final approval of the street improvement plans, construction plans shall be prepared for the traffic circle at Darwin Drive and Barbados Lane. Intersection geometry shall be determined during the plan check process.

165. Prior to the final approval of the street improvement plans, Lasselle Street shall be widened to provide one northbound through lane, one southbound through lane, and a two-way left turn lane from Lancia Street to Cottonwood Avenue. No additional right-of-way is required.

166. Communication conduit shall be required on Alessandro Boulevard and Lasselle Street per City Standard Plan No. MVSI-186-0.

167. On-street parking shall be restricted on Darwin Drive from Pissaro Way to the first driveway on the west side of Darwin Drive, north of Pissaro Way.

168. Prior to issuance of Certificate of Occupancy, the traffic circle at the Darwin Drive and Barbados Lane intersection shall be completed and fully operational per current City Standards and the approved plans.

169. Prior to issuance of Certificate of Occupancy, the pavement widening and striping on Lasselle Street from Lancia Street to Cottonwood Avenue shall completed per current City Standards and the approved plans.

PARKS & COMMUNITY SERVICES DEPARTMENT

170. This project is subject to current Development Impact Fees.

171. This project is subject to current Quimby Fees.

172. SPECIFIC CONDITIONS OF APPROVAL
PCS-1 Parks and Community Services Department
Standard Park and Community Services Project Conditions:

a. Parks and Community Services project construction shall adhere to: The City's Standard Plans, 'The Greenbook Standard Specifications for Public Works Construction', 'California Code of Regulations Title 24', and the Park and Community Services Specification Guide.

b. The General Contractor shall be properly licensed with the State of California for which the work is being performed. Licenses must be current and in good standing, for the duration of the project.

c. A map of all easements and the corresponding easement rights shall be presented to Parks and Community Services prior to scheduling the Tentative Map for approval.

d. (R) A restriction shall be placed on lots that are adjacent to the Parks and Community Services project, preventing openings or gates accessing the site. This shall be done through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this/her restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee prior to the recordation of the Final Map.

e. The following plans require Parks and Community Services written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to parks; park improvement plans.

f. (GP) A detailed rough grading plan with profile of all walkways in the parks project shall be submitted and approved by the Director of Parks and Community Services or his/her designee prior to the issuance of grading permits.

g. Grading certification and compaction tests are required, prior to any improvements being installed.

h. A minimum two-foot graded bench is required where turf, walkways, or other flat work adjoin landscaped or open space areas.

i. (R) Prior to the approval of the Final Map, a detailed map of the park or community services site and areas adjacent to the site shall be submitted to the Director of Parks and Community Services or his/her designee prior for review and written approval.

j. (R) All necessary documents to convey to the City and/or the Community Services District any required dedications for parks or open space, as specified on the tentative map or in these Conditions of Approval shall be submitted by the developer to Parks and Community Services, prior to the recordation of the final map.

k. (R) Prior to recordation of the Final Map, the developer shall post security (bonds) to guarantee construction of the park to the City's standards. Copies of the bonds shall be provided to Parks and Community Services, prior to the approval of the Final Map.

l. (BP) Prior to the issuance of the first Building Permit, final park improvement plans (mylars and AutoCAD & PDF file on a CD-ROM) shall be reviewed and approved by the Community Development Department – Planning Division; the Public Works Department – Land Development and Transportation Division; Fire Prevention; and Parks and Community Services Department. Landscaped areas adjacent to the park shall be designed to prevent water on the park.

m. Eight sets of complete park and community services site improvement plans shall be submitted to Parks and Community Services for routing. Adjacent landscaping and walls shall be shown on the plans. Final construction plans and details require wet stamped and signed Mylars, eight sets of bond copies and one Mylar copy from the City signed mylars, the AutoCAD file on CD, and a PDF file on CD. As-builts for the parks have the same requirements as final plan submittals.

n. CSD Zone ‘A’ plan check fees shall be paid prior to the second plan check.

o. CSD Zone ‘A’ inspection fees shall be paid prior to signing of Mylars.

173. SPECIFIC CONDITIONS OF APPROVAL

PCS-2 Parks and Community Services Department
Standard Park and Community Services Project Conditions

p. Drive approaches shall adhere to City Std. Plan #118C.

q. In order to prevent the delay of building permit issuance, any deviation from materials shall be submitted to Director of Parks and Community Services or his/her designee and approved in writing 60-days prior to the commencement of park construction.

r. Any unauthorized deviation from the approved plan, specifications, City Standard Plans, or Conditions of Approval may result in the delay of building permit issuance and/or building Finals/Certificate of Occupancy of the project conditioned for improvements.

s. Where required, decorative solid-grouted block wall (no precision block, stucco, veneer finishes, PVC, or wood fencing) with a minimum height of 72” on the park side shall be installed along lots that adjoin the park. Block walls shall be located solely on private property. If landscaping is to be utilized between the block wall and the park, a PVC fence shall be installed along the park separating the landscaping from the park (where required). All block walls that have public view shall have an anti-graffiti coating per Parks and Community Services specifications. Combination block/tubular steel fences shall only be utilized where approved by Parks and Community Services. Tubular steel shall comply with Parks and Community Services standards. Coating for tubular steel shall be anti-graffiti coating for metal per Parks and Community Services specifications. If alternate products are requested, the requested material(s) shall be presented to the Director of Parks and Community Services or his/her designee for review and approval. Under no circumstances can alternate products be utilized without prior written authorization from the Director of Parks and Community Services or his/her designee.

t. All inspections shall be requested two (2) working days in advance from the Parks and Community Services Department at the time of grading and installation of any improvements.

u. Any damage to existing landscape or trail areas due to project construction shall be repaired/replaced by the developer, or developer's successors in interest, at no cost to the City or Community Services District.

v. (BP)Parks and Community Services project construction in single family developments shall commence prior to 30% of total building permit issuance. Trail completion and acceptance (single family developments) for maintenance shall be completed prior to 70% of total building permit issuance.

w. (CO) Parks and Community Services project construction in multi-family or commercial developments shall commence with the rough grading. All Parks and Community Services projects shall be completed and accepted for maintenance prior to the issuance of 50% of the total certificates-of-occupancy (for multi-family and/or commercial developments).

PCS-3 (R) If Special Districts, a Division of the Public Works Department, requires this project to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems, the Developer must notify Special Districts of intent to record the final map 70 days prior to recordation of the final map and the financial option selected to fund the continued maintenance. (California Government Code, GP Chapter 2.7)

PCS-3b (BP) If Special Districts, a Division of the Public Works Department, requires this project to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems, the Developer must notify Special Districts of intent to request building permits 70 days prior to their issuance and the financial option selected to fund the continued maintenance. (California Government Code, GP Chapter 2.7)

174. SPECIFIC CONDITIONS OF APPROVAL

PCS-4 Parks and Community Services Department
Standard Park and Community Services Project Conditions:

PCS-5 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services Districts Zones A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone A charge for operations and capital improvements.

PCS-6 (R) Prior to recordation of the final map, the developer, or the developer's successors or assignees, shall supply a copy of the recorded Declaration of Covenant and Acknowledgement of Assessments to the Parks and

Community Services Department.

PCS-7 (BP) Prior to release of building permit, the developer, or the developer's successors or assignees shall supply a copy of the recorded Declaration of Covenant and Acknowledgement of Assessments to the Parks and Community Services Department.

PCS-8 (BP)This project is subject to current Development Impact Fees at time of building permit issuance.

PCS-9 Any modified or newly created agreements shall be reviewed and approved by the Board of the Moreno Valley Community Services District.

Standard Conditions

175. Within the improvements for PCS, the applicant shall show all existing and planned easements on all maps and plans. Easements on City/CSD owned or maintained parks, trails, bikeways, and landscape shall be identified on each of these plans with the instrument number of the recorded easement.

176. Prior to recordation of the Final Map, the applicant shall post security to guarantee construction or modification of parks, trails and/or bikeways for the City/CSD. Copies of said documentation shall be provided to PCS, prior to the approval of the Final Map.

177. Applicable plan check and inspection fees shall be paid, per the approved City fee schedule.

178. A restriction shall be placed on lots that back up to City/CSD owned or maintained parks, trails, bikeways, and landscaped areas, preventing openings or gates accessing the City/CSD owned or maintained property. This shall be documented through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee, prior to the recordation of the Final Map.

179. The following plans require PCS written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to bikeways; trail improvement plans. PCS will not approve any permits without review and approval of the above items.

TRACT 38123

SINGLE FAMILY DETACHED HOMES
MORENO VALLEY, CALIFORNIA
PLANNED UNIT DEVELOPMENT

PLAN 1. 1898 | C - CRAFTSMAN PLAN 2.2239 | B - TRADITIONAL PLAN 3.2587 | A - SPANISH PLAN 4.2435 | D - TUSCAN

WINDSONG

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1.1576 | B - TRADITIONAL PLAN 3.1975 | A - SPANISH PLAN 2.1705 | D - TUSCAN

SKYLAR PLACE

D·R·HORTON®
America's Builder

AMERICA'S #1 HOME BUILDER · SINCE 2002 ·

WHA

Table of Content

1.1 Introduction

PROJECT LOCATION

Windsong is located on approximately 18.50 acres in the City of Moreno Valley, Riverside County, California. Specifically, Windsong is located north of Alessandro Blvd west of Darwin Drive.

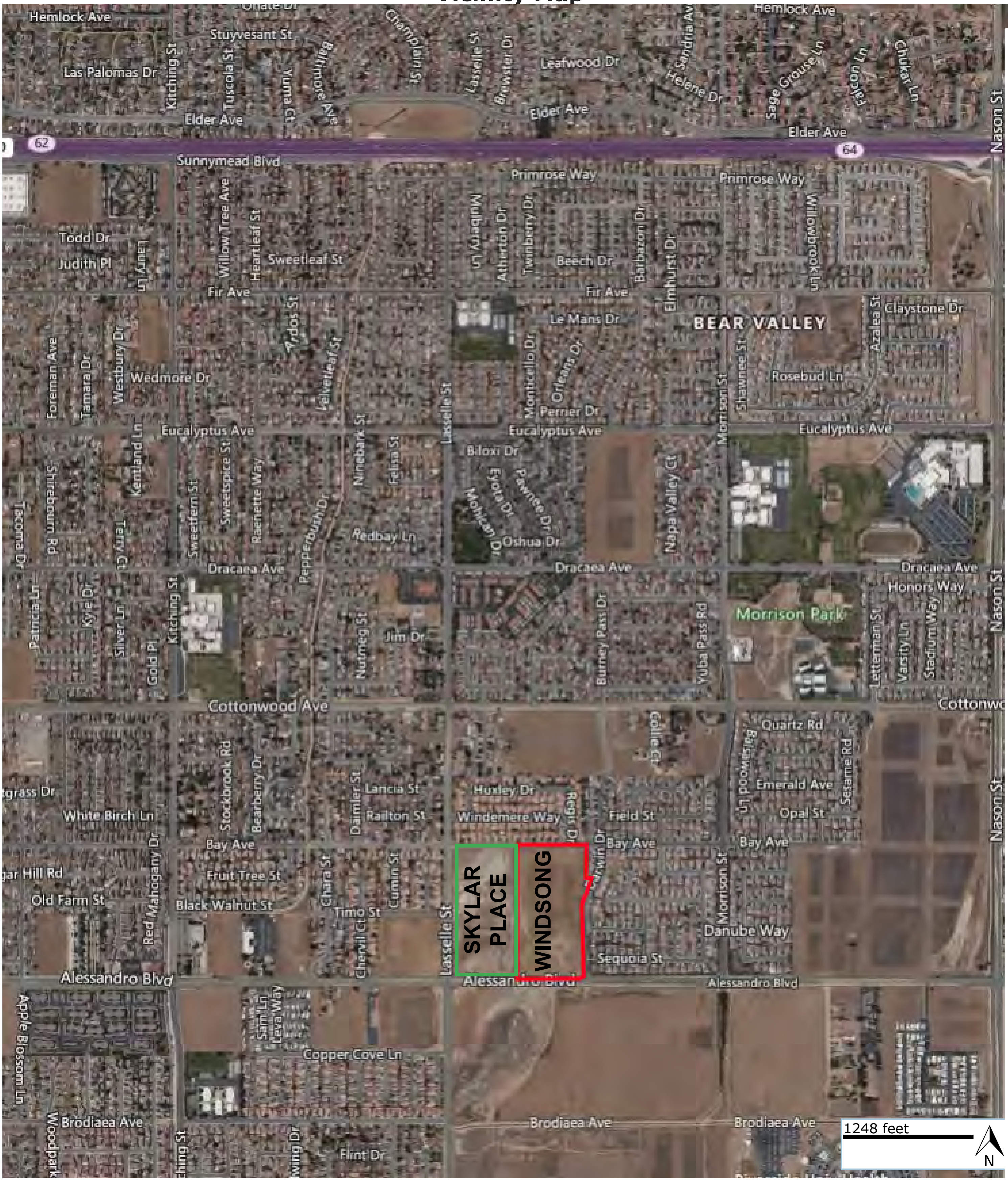
Skylar Place is located on approximately 17.63 acres in the City of Moreno Valley, Riverside County, California. Specifically, Skylar Place is located north of Alessandro Blvd east of Lasselle Road. Skylar Place is adjacent to Windsong.

The location of both Windsong and Skylar Place is depicted on Figure 1-1, *Vicinity Map*

This Planned Unit Development guideline is for the design of homes within the Windsong and Skylar Place Neighborhoods.

The handbook includes both Standards and Guidelines. Standards are meant to provide information that is more definitive while Guidelines provide a vision for the project.

Vicinity Map



D·R·HORTON®
America's Builder

AMERICA'S #1 HOME BUILDER
#1
SINCE 2002

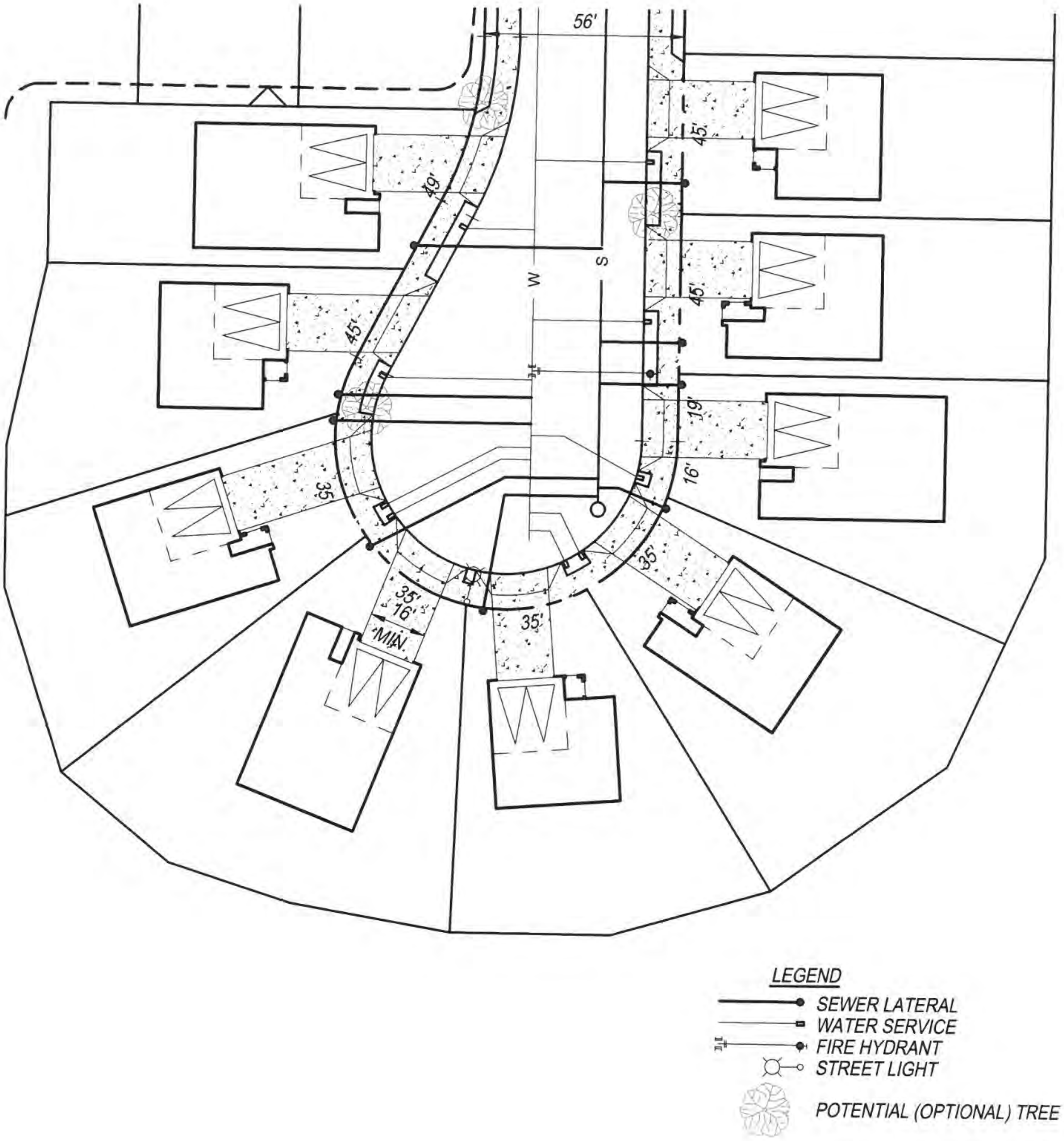
https://apps.spatialstream.com/landvision/production/CurrentBuild/Html/Reporting.html

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

1.2 Residential Design Standards

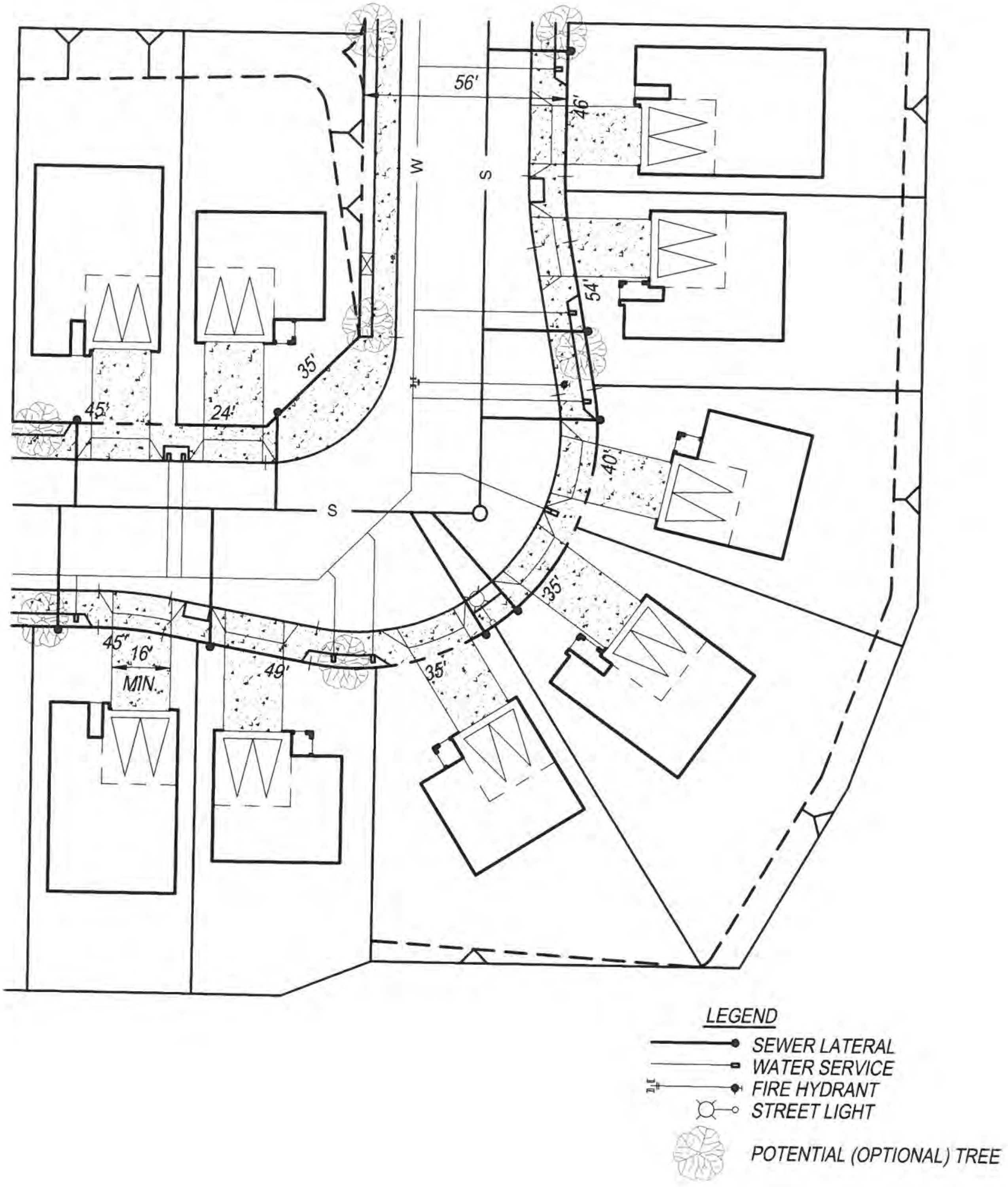
Residential Site Development Standards Single Family Standards	
1. Maximum Density (DU's per net acre)	5.3
2. Minimum Lot Size (sq. ft net area)	4,210
3. Minimum Lot Width, in feet	45'
Cul De Sac Lot Frontage	35'
4. Minimum Lot Depth, in feet	84'
5. Minimum Front Yard Setback	18'
Front Facing Garages	20'
6. Minimum Side Yard Setback, in feet	5'
Interior Side Yard	5'
Street Side Yard	10'
7. Minimum Rear Yard Setback, in Feet	10'
8. Maximum Lot Coverage	42%
9. Maximum building and structure height, in feet	30'-35'
10. Minimum dwelling size (sq. ft.)	1,000
11. Minimum distance between buildings, in feet (including main DUs and accessory structures)	10'
12. Floor Area Ratio	
One-Story home	0.5
Multi-Story home	0.75

SIDEWALKS PER MVSI-115A-0 & MVSI-115B-0
DRIVEWAYS PER MVSI-111A-0



TYPICAL CUL-DE-SAC DETAIL
(35' MINIMUM LOT FRONTAGE)

SIDEWALKS PER MVSI-115A-0 & MVSI-115B-0
DRIVEWAYS PER MVSI-111A-0



TYPICAL KNUCKLE DETAIL
(35' MINIMUM LOT FRONTAGE)

1.3 Residential Design Guidelines

Varied Plot Plans

Streets within the project should vary in their architectural character to create a sense of individual ownership and personality.

Similar plans and elevations will be plotted as far from one another as possible.

Homes with identical:

Floor plan
Elevation Style
Color Palette
Orientation

shall not be plotted within four (4) lots of one another on either side of the street. However, if one of those four (4) elements are changed, floor plans may be moved closer to one another as follows:

Different floor plans plotted next to one another shall provide different elevation styles with different color palettes.

The same floor plan with different elevation styles, color palettes, and garage orientation can be plotted within two (2) lots of one another

The same floor plan with different elevation styles, color palettes, but the same garage orientation can be plotted within three (3) lots of one another

The same floor plan with different elevation styles, but similar color palettes, and the same garage orientation can be plotted within four (4) lots of one another

The same floor plan with the same elevation style, dissimilar color palettes, and different garage orientation can be plotted within four (4) lots of one another.

Elevation and Front Yards

All windows and doors shall be trimmed. Each elevation style shall have a different trim design in keeping with the style of the home. This trim shall be composed in accordance with the style.

Elevations shall be painted in an architecturally authentic way based on the elevation style's historical precedents.

Each elevation style should have a different roofing color

All elevations visible from streets or common open space shall have the same level of detailing as is present on the front elevation.

Varied window grid patterns in each elevation style is recommended. The grid pattern shall be historically accurate.

Front elevation siding/veneer, if different from that on the side elevations, should return a minimum of 3’ down on the side elevations.

Windows in garage doors should be optioned.

A walkway shall join principle entry doors directly to the public sidewalk.

Trash and recycling bins shall be screened fully with walls or fencing in keeping with the architectural style of the home.

Minimum plate heights:

8’ for first and second floor for 4,500s

9’ for first floor and 8’ for second floor for 5,000s

Foundation walls should be painted to match siding where visible from streets or common open space.

Condenser units shall be placed in private side yards to screen them from view.

Massing

Minimum building height when possible and appropriate to the style of the home.

Try to use side to side roofs and hip main spans whenever possible to minimize the impact of the roof on neighboring homes.

Use single story porches against two story masses to help break them down.

Proportion

Individual building elements and masses shall be sized in proportion to one another.

Entry elements can be proportioned so as to make them the dominant feature of an elevation.

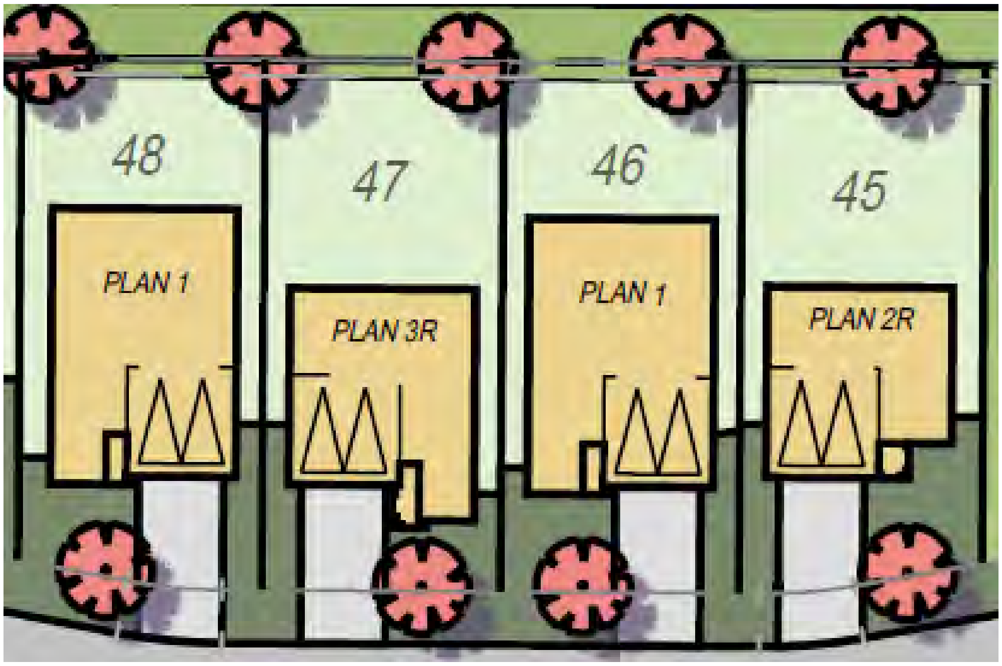
To reduce the proportional dominance of garage doors on any elevation style, they should be more detained in design so as to become an important part of the elevations style for a more appealing appearance.

Scale

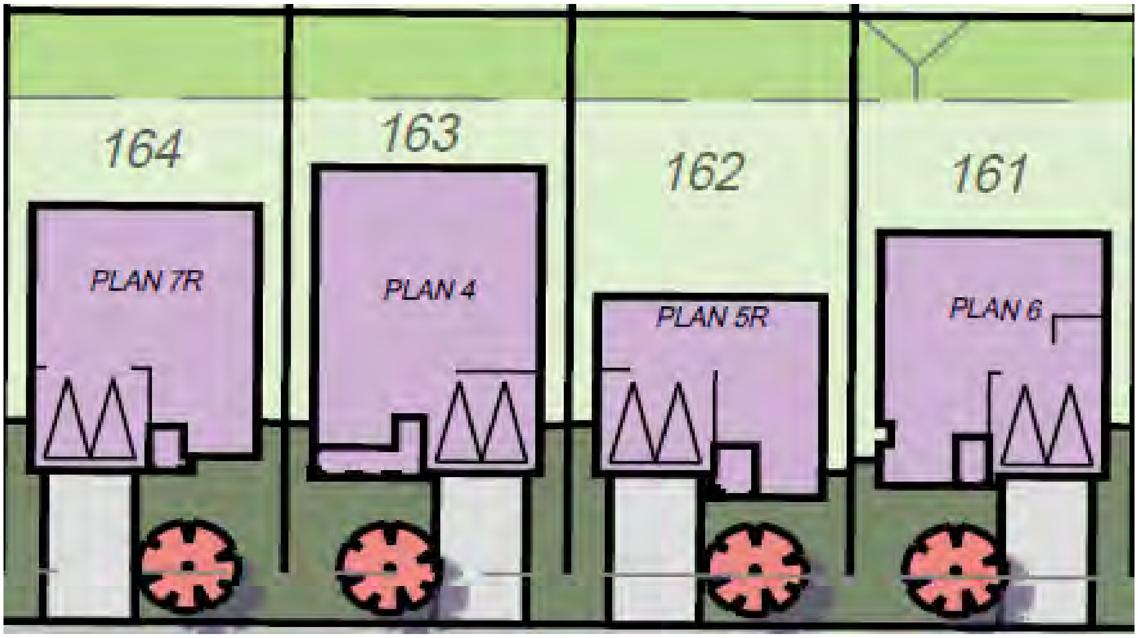
Scale is important in that elements of a building’s composition need to be in balance, as do buildings sited next to one another. That is to say, one element of a building should be so dominant as to out weigh other elements in a building’s makeup. Likewise, a building on one site, should not dominate a building on an adjacent lot.

1.4 Typical Lot Module

This typical lot module demonstrates how the homes are meant to be plotted throughout the project.



Skylar Place - 45’ x 100’



Windsong- 50’ x 100’

1.5 Architectural Style Palettes

This section will focus on the architectural styles envisioned for the housing in Skylar Place and Windsong.

Skylar Place, the 4,500 square foot lots offer three architectural characters including Spanish, Traditional, Tuscan.

Windsong, the 5,000 square foot lots offer four architectural characters including Craftsman, Spanish, Traditional, Tuscan.

The following images and text provide an outline of each styles roof and details for reference.

STYLE DESCRIPTION

Influenced by the earlier Mission aesthetic, the Craftsman style emphasizes natural materials and attention to detail. Shallow roof pitches vary from 3:12 to 4:12 with deep overhangs. Porches supported by square or tapered columns of either stucco or wood with stone veneer bases. Additional elements include stucco walls, gable end treatments of board and battens with wood brackets, and paired windows.

KEY ELEMENTS

Ⓐ Concrete flat tile roof.

Ⓑ Stone veneer accents.

Ⓒ Board and batten gable end detailing.

Ⓓ Deep overhangs at eaves.

Ⓔ Square or tapered columns.

CRAFTSMAN STYLE

Craftsman

The Craftsman style was inspired by the English Arts and Crafts Movement of the late 19th century. Of the utmost importance was that all exterior and interior elements received both tasteful and “artful” attention. The movement influenced numerous California architects such as Greene and Greene, and Bernard Maybeck.

The resulting Craftsman style responded with extensive built-in elements and by treating details such as windows or ceilings as if they were furniture. The style was further characterized by the rustic texture of building materials, broad overhangs with exposed rafter tails at the eaves and trellises over the porches. The overall affect was the creation of a natural, warm and livable home. In Southern California, the Craftsman style spun out of bungalows that were the production home of the time.

ELEMENT	MENU OF COMMON FEATURES
Form	• Simple 2-story boxed massing with vertical and horizontal breaks
Roof	• 4:12 to 6:12 roof pitch • 16” to 24” overhangs • Concrete tile (slate or shake) • Composition shingles (40 year – high profile) • Basic gabled roof - side to side with cross gables
Walls	• Stucco with horizontal siding accents. • Board and Batten accents also permitted. • Stone base accents on walls and/or porch.
Windows	• Vertical window with window grids at front elevation • Windows with grids on side and rear elevations in high visibility public view areas • Use windows individually or in groups
Details	• Porches with heavy square columns or posts on stone or brick piers • Surface mounted fixtures on front elevations must complement architectural style • Garage and front door patterns to complement style • Stone and brick base accents • Open eave overhangs with shaped roof rafter tails • Wood trim at doors and windows • Triangulated knee braces
Colors	**Field**: Light to dark earth tones **Trim**: Light to dark earth tones in harmony or contrasting with field **Accents**: Light to dark earth tones in contrast with field

Where “wood” is referred to, it can also be interpreted as simulated wood. In addition, some styles can be appropriately expressed without the wood elements, in which case stucco-wrapped, high-density foam trim (with style-appropriate stucco finish) is acceptable. Similarly, pre-cast elements can be satisfied by high-density foam or other similar materials in a style-appropriate finish

STYLE DESCRIPTION

Inspired by the architecture of Spain and the Spanish missions, the Spanish style consists of simple one to two story massing with mostly gable end roofs of concrete "S" tile. Shallow roof pitches vary from 3:12 to 5:12 with minimal overhangs. Exterior walls consist of light-colored smooth stucco with sand finish. Other elements include recessed windows, gable end tile detailing and plank shutters.

KEY ELEMENTS

Ⓐ Concrete "S" tile roof

Ⓑ Stucco finish with light colors.

Ⓒ Clay or ceramic tile gable end detail.

Ⓓ Round arches at entrances and/or porches

Ⓔ Plank Shutters

SPANISH STYLE

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Spanish

The Spanish style attained wide-spread popularity after the Panama-California exposition of 1915-1916 in San Diego. The Spanish style's most notable characteristics include the use of "S" or barrel tile roofs, stucco walls, feature entry doors and porticos, highlighted ornamental iron work and carefully proportioned windows appropriate to its wall mass.

Key features of this style were adapted to the California lifestyle. Plans were informally organized around a courtyard with the front elevation very simply articulated and detailed. The charm of this style lies in the directness, adaptability and contrasts of materials and textures.

ELEMENT	MENU OF COMMON FEATURES
Form	• 2 story asymmetrical massing with strong one story element
Roof	• 4:12 to 6:12 roof pitch • 12" to 16" overhang • Simple hip or gable roof with one intersecting gable roof • Barrel or 'S' shape concrete tiles
Walls	• Stucco
Windows	• Vertical window at front elevation with window grids • Windows with window grids on side and rear elevations in high visibility public view areas • Feature recessed arched window • Single or grouped round top windows
Details	• Stucco over foam window and door trim • Feature arched window or door • Surface mounted fixtures on front elevations must complement architectural style • Shaped rafter tails • Garage and front door patterns to complement style • Decorative iron details and railings • Simple Plank shutters • Gable vent tubes
Colors	**Field**: Whites, beige, or warm tints **Trim**: Dark shades to contrast field color **Accents**: Deep tones of green, blue, red (on shutters, door, balcony trim)

Where "wood" is referred to, it can also be interpreted as simulated wood. In addition, some styles can be appropriately expressed without the wood elements, in which case stucco-wrapped, high-density foam trim (with style-appropriate stucco finish) is acceptable. Similarly, pre-cast elements can be satisfied by high-density foam or other similar materials in a style-appropriate finish

STYLE DESCRIPTION

Derived from the Bungalow and Ranch styles, the Traditional style consists of one to two story volumes with gable and hip roofs. Exterior walls comprised of stucco and horizontal siding. The roof pitches vary between 4:12 to 6:12 with average overhangs, and concrete flat tile. Other exterior elements include; porches with square columns or posts, board and batten shutters and pot shelves.

KEY ELEMENTS

Ⓐ Concrete flat tile.

Ⓑ Square columns with stucco over, or wood posts.

Ⓒ Stucco walls with horizontal siding accents.

Ⓓ Board and batten shutters

TRADITIONAL STYLE

Traditional

The American Traditional style as manifested in Southern California was often realized as an East Coast derived expression with Cape Cod influences, and displayed the aspects of practicality and functional elegance. This expression evolved from early Colonial beginnings and truly began to proliferate as an American building style from the 1850s to the early 20th century. In Southern California, the style was employed from the foothill neighborhoods of Pasadena to Los Angeles communities such as Westwood and was occasionally used in combination with the Monterey and Ranch styles to create homes which opened to the exterior gracefully yet retained a sense of formality and reserve.

Features of this style include simple gable roof forms, louvered shutters, and articulated entry surrounds. Dormers and second-floor wood decks are also occasionally used.

ELEMENT	MENU OF COMMON FEATURES
Form	• Asymmetrical massing with a vertical and a horizontal break
Roof	• 4:12 to 12:12 roof pitch • 16" to 24" overhangs • Concrete tile (slate or shake) • Composition shingles (40 year – high profile) • Front to back gable or hip roof with intersecting hip or gable roofs
Walls	• Stucco • Wood siding, brick, or board and batten accents
Windows	• Vertical window at front elevation with window grids • Windows with window grids on side and rear elevations in high visibility public view areas • Round top accent or bay window
Details	• Simplified cornice trim at gable ends • Header window wood accent trim • 2x6 window and door trim - wood on siding, foam on stucco • Surface mounted fixtures on front elevations must complement architectural style • Porches and/or balconies • Garage and front door patterns to complement style • Square wood columns with trim
Colors	**Field**: Whites, off-white, dark or light colors **Trim**: White or contrasting with field color **Accents**: White, light or dark colors in contrast or harmony with field color

Where "wood" is referred to, it can also be interpreted as simulated wood. In addition, some styles can be appropriately expressed without the wood elements, in which case stucco-wrapped, high-density foam trim (with style-appropriate stucco finish) is acceptable. Similarly, pre-cast elements can be satisfied by high-density foam or other similar materials in a style-appropriate finish

STYLE DESCRIPTION

Inspired by the hill towns of Tuscany, the Tuscan style consists of simple, formal massing with a mixture of gable and hip roofs. The roof material consists of concrete “S” tile with a shallow roof pitch of 4:12 to 5:12 with minimal overhangs. The exterior walls are a smooth stucco with earth toned coloring and use of stone veneer. Additional elements include vertically proportioned windows and louvered shutters.

KEY ELEMENTS

Ⓐ Concrete “S” tile roof.

Ⓑ Stone veneer accents.

Ⓒ Louvered shutters.

Ⓓ Earth tone colors.

TUSCAN STYLE

Tuscan

During the 15th and 16th century large numbers of houses were built along roads and hillsides in rural Tuscany, many of which, although altered, are still in use today. As this region was and is primarily agricultural, these homes reflect the character of the farmhouse estate or 'podere'. Built by their owners with the indigenous materials and colors of the surroundings, these buildings blend naturally with the land.

The building form and massing is an example of simplicity; a plan that began as a simple rectangular form that evolved organically over time. Smaller components similar to the original form were typically added as necessary to meet the spatial needs of the owner. The resulting building, with the flexibility and variety apparent in this style, is what makes it so appealing. The informality of these rural farmhouse and settlement building types, including their traditional squared towers, eventually became the inspiration for Tuscan villas.

ELEMENT	MENU OF COMMON FEATURES
Form	• Rectangular plan form massing with some recessed 2nd floor area • Squared tower elements at entry or upper story
Roof	• Main roof hip or gable with intersecting gable roofs • 4:12 to 6:12 roof pitch • 16" overhangs at eaves • Barrel or 'S' shape concrete tiles • Brackets under eaves
Walls	• Stucco with stone veneer accents
Windows	• Vertical window at front elevation with window grids • Windows with window grids on side and rear elevations in high visibility public view areas • Curved or round top accent windows • Single hung windows at front
Details	• Enhanced articulation and detail of entries, windows, doorways and balconies • Entry accents with faux stone • Garage and entry door patterns to complement style • Shutters • Balcony or veranda • Simple 2x4 window and door trim - wood on stone or siding, stucco on stucco • Wrought Iron/Metal or wood balconies and potshelves • Rusticated hardware and details
Colors	**Field:** Medium, saturated earth tones **Trim:** Whites tones or light shades complementary to field color **Accents:** Light or dark shades in contrast with field color

Where "wood" is referred to, it can also be interpreted as simulated wood. In addition, some styles can be appropriately expressed without the wood elements, in which case stucco-wrapped, high-density foam trim (with style-appropriate stucco finish) is acceptable. Similarly, pre-cast elements can be satisfied by high-density foam or other similar materials in a style-appropriate finish

PLAN 1.1335 | B - TRADITIONAL

PLAN 3.1975 | D - TUSCAN

PLAN 2.1705 | A - SPANISH

Express
HOMES
a D.R. Horton Company

Note: Artist's Conception; Colors, Materials And Application May Vary.

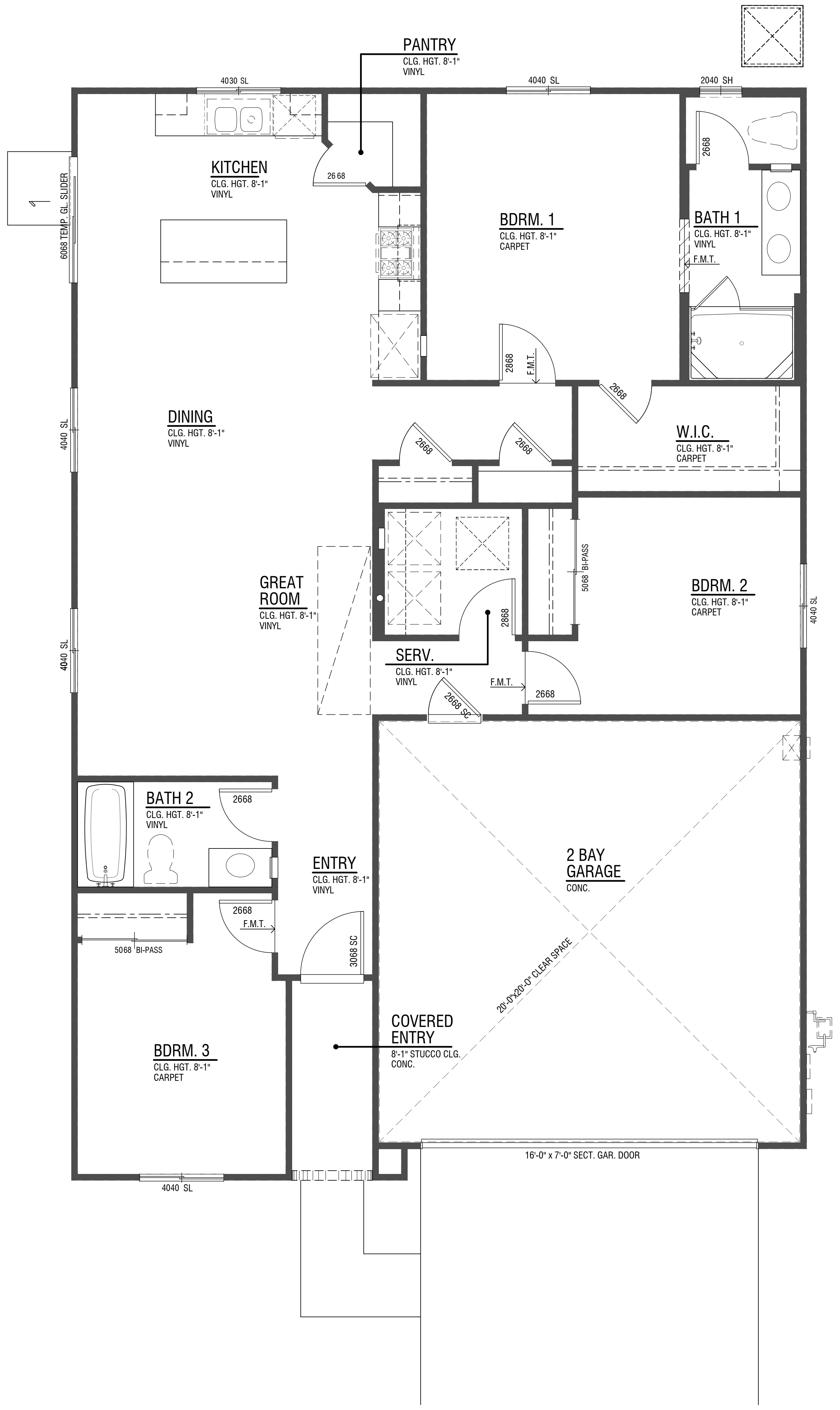
SKYLAR **PLACE**

MORENO VALLEY, CA

DESIGN SUBMITTAL SET

| 2020363 | 08-17-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1.1335

1,335 SF
3 Bdrm | 2 Bath
2 Bay Garage
8' Plates

1A | Spanish

SKYLAR PLACE - 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

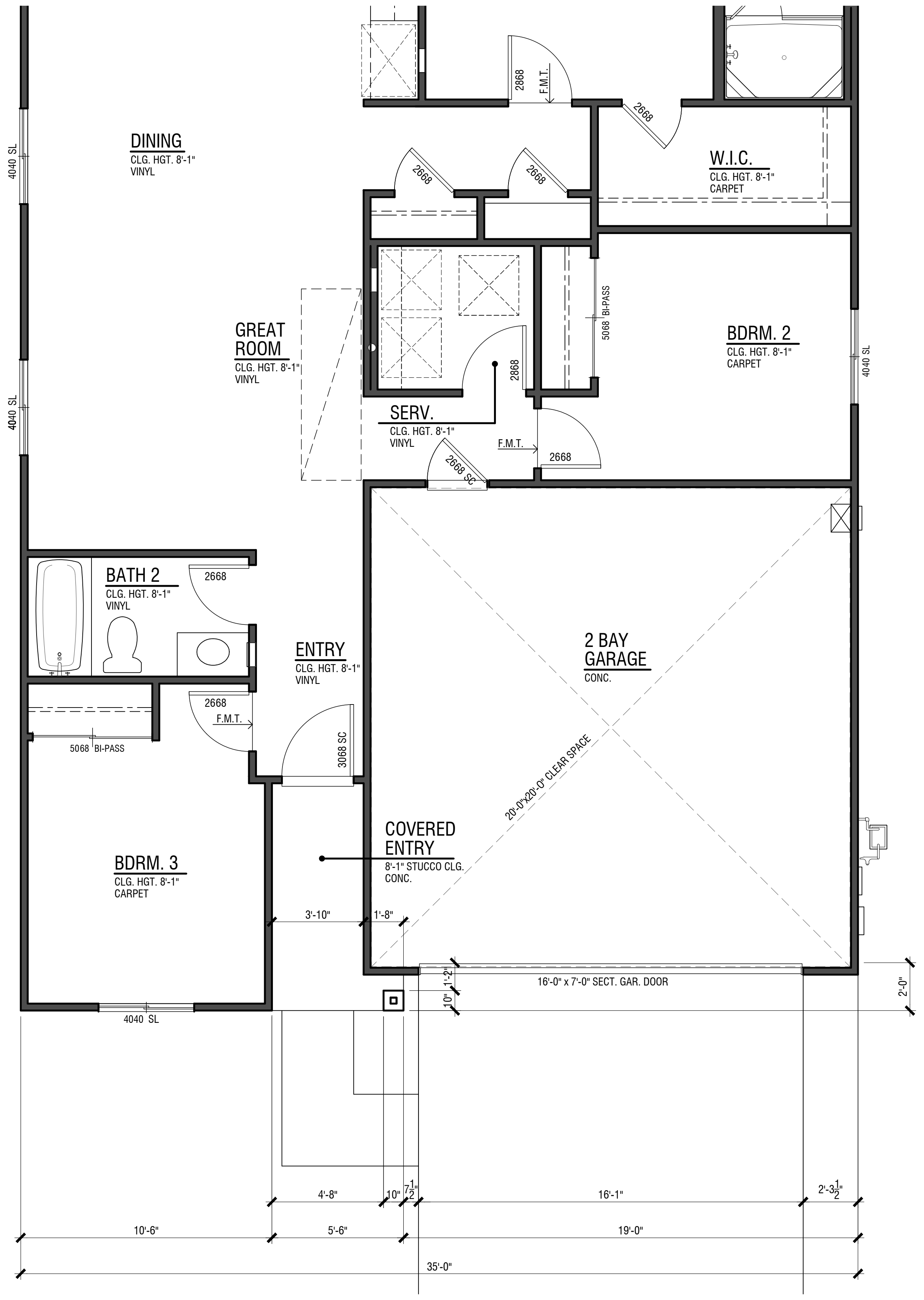
1.0

0 2 4 8

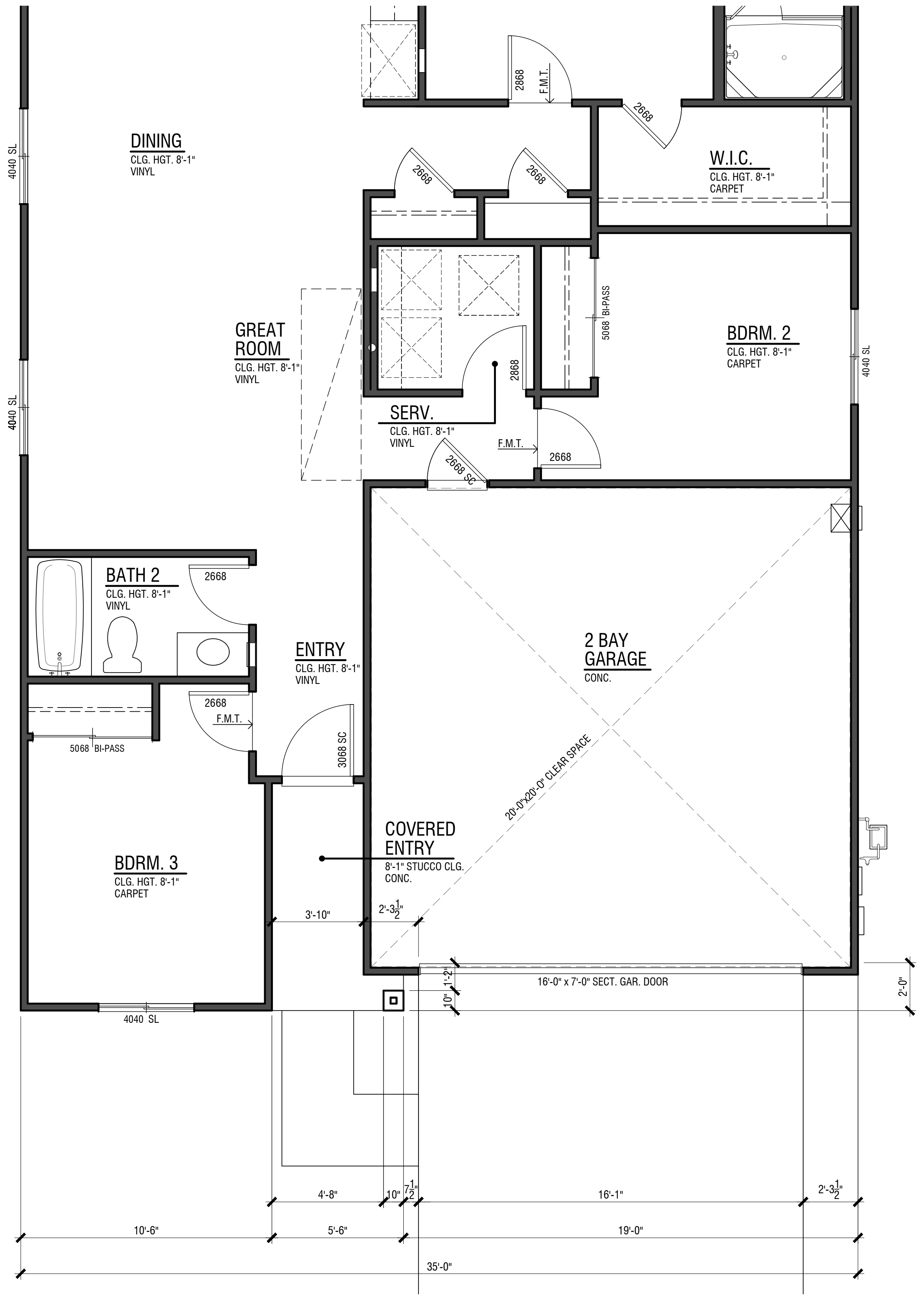
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



1B | Traditional



1D | Tuscan

PLAN 1.1335

1,335 SF
3 Bdrm|2 Bath
2 Bay Garage
8' Plates

Partial Floor Plans

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

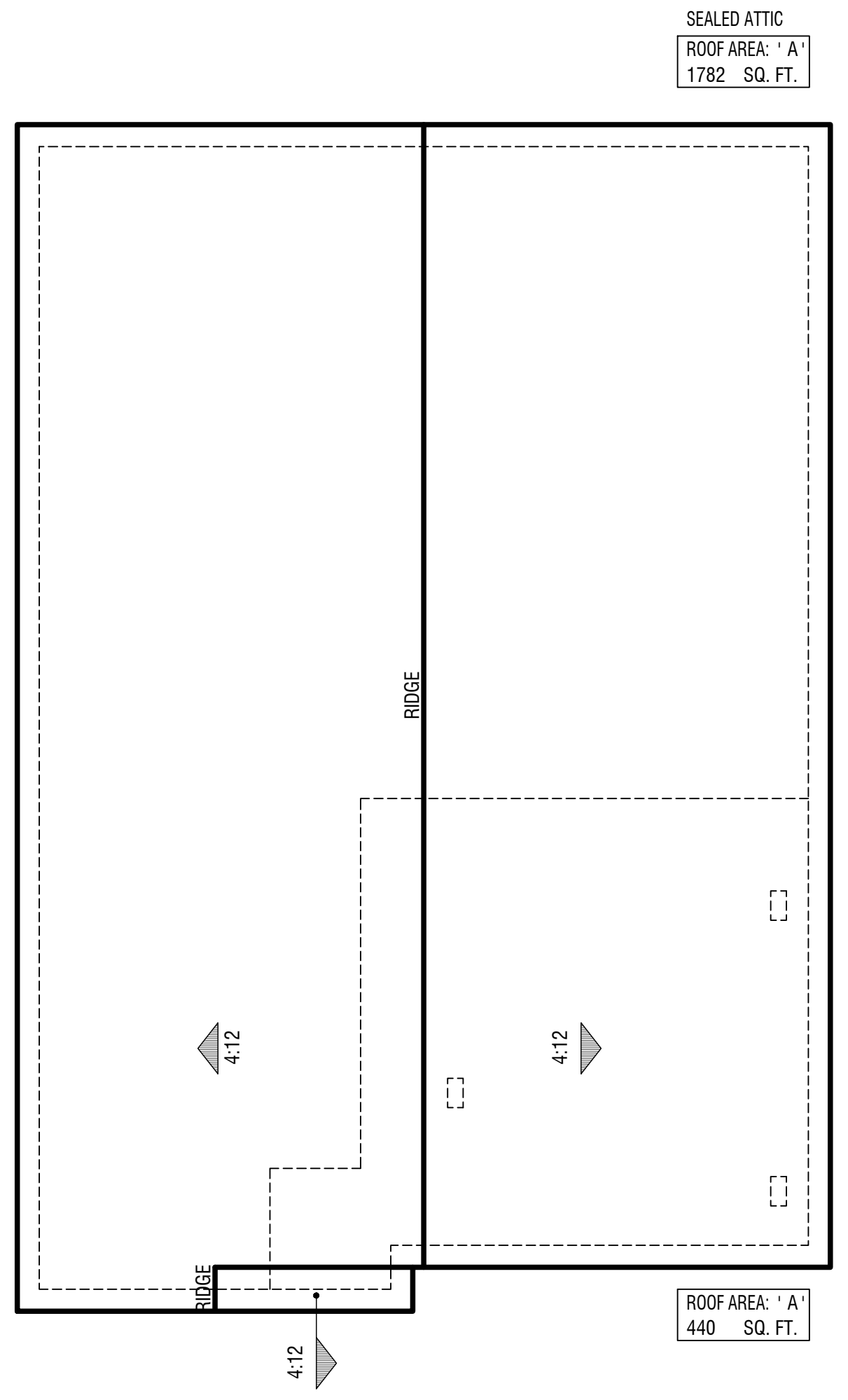
1.1
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

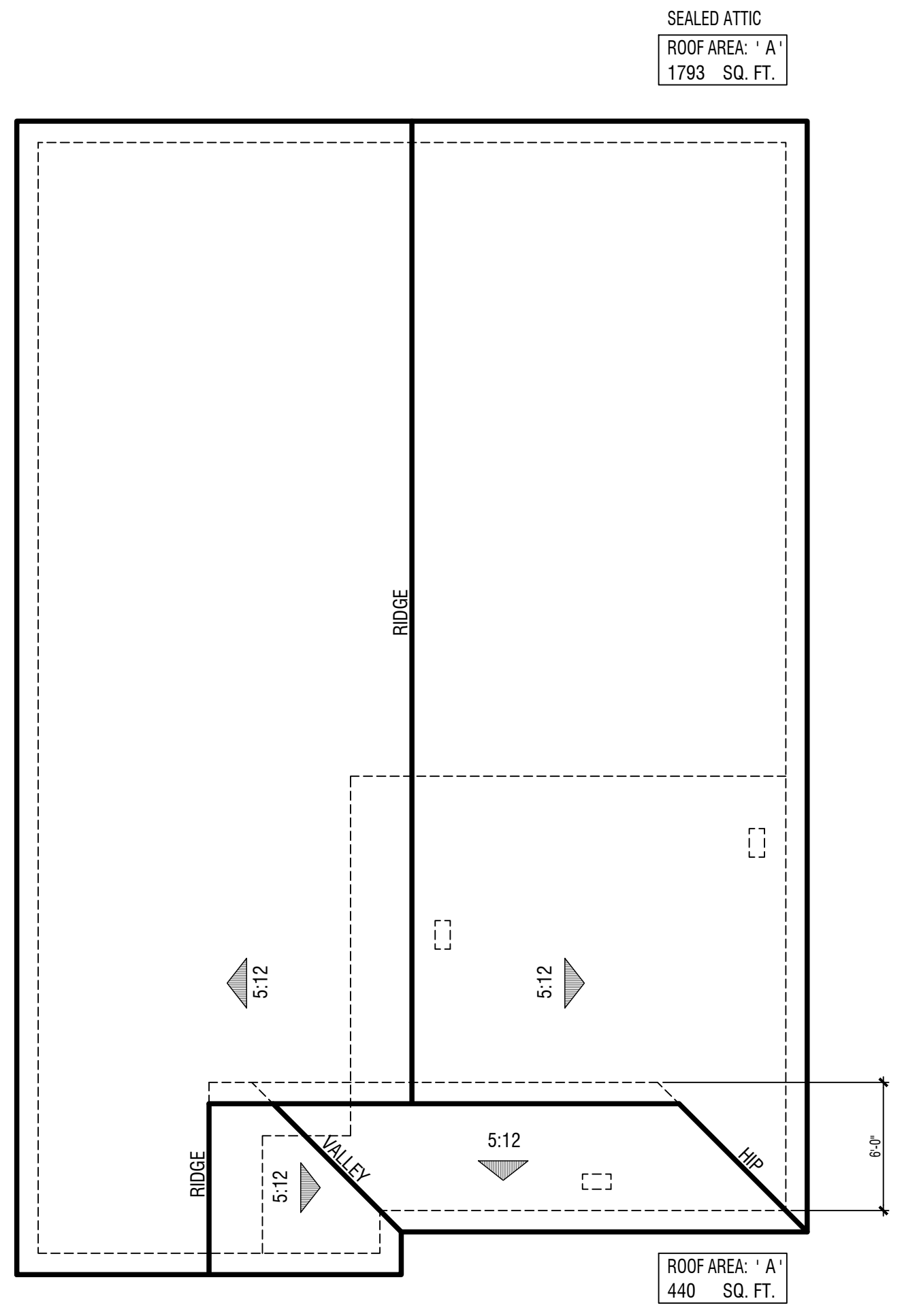
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



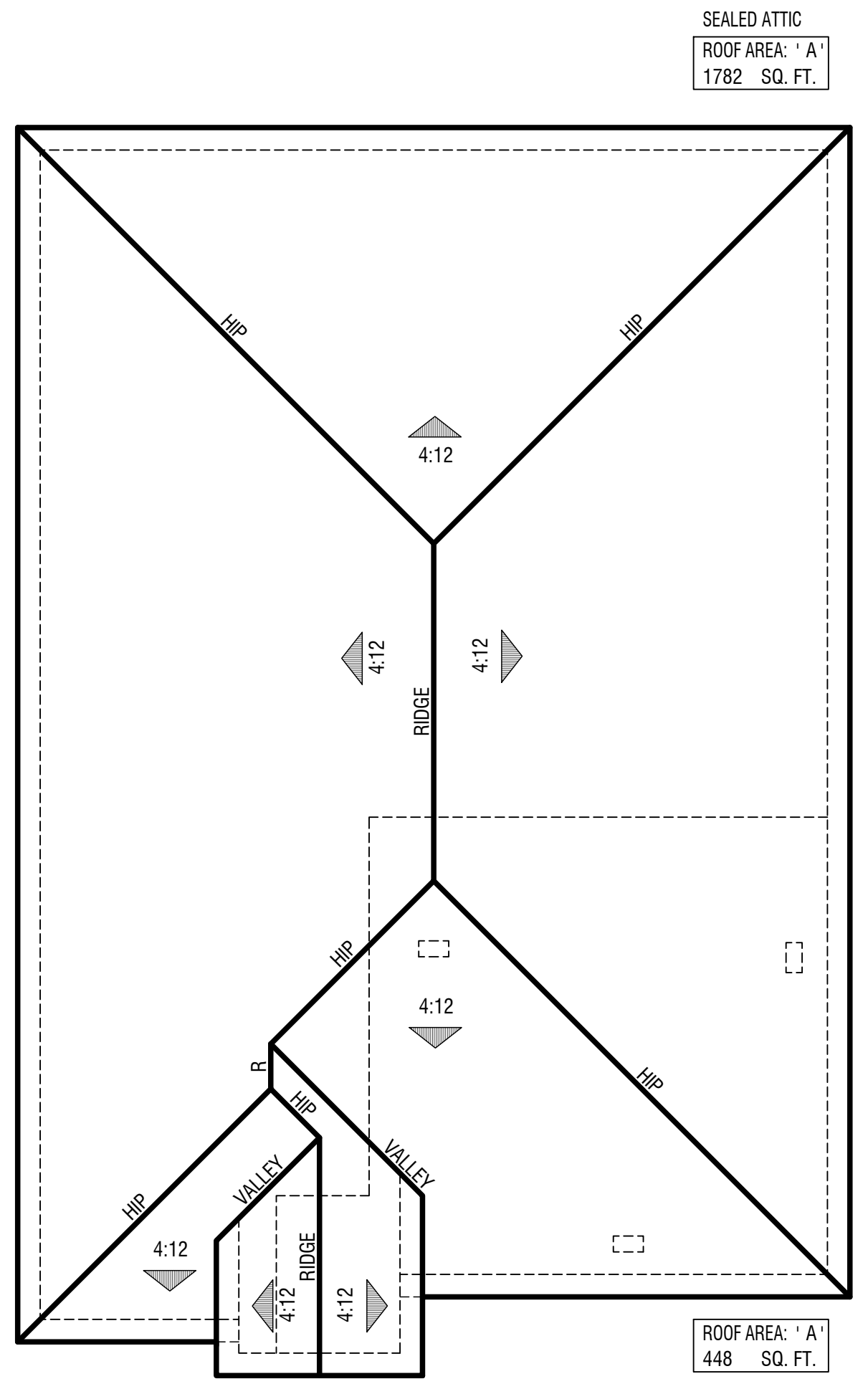
1A | Spanish

Eave 12" / Rake 12"
Concrete Low "S" Tile



1B | Traditional

Eave 12" / Rake 12"
Concrete Flat Tile



1D | Tuscan

Eave 18" / Rake 12"
Concrete Low "S" Tile

PLAN 1.1335

Roof Plans

SKYLAR PLACE - 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

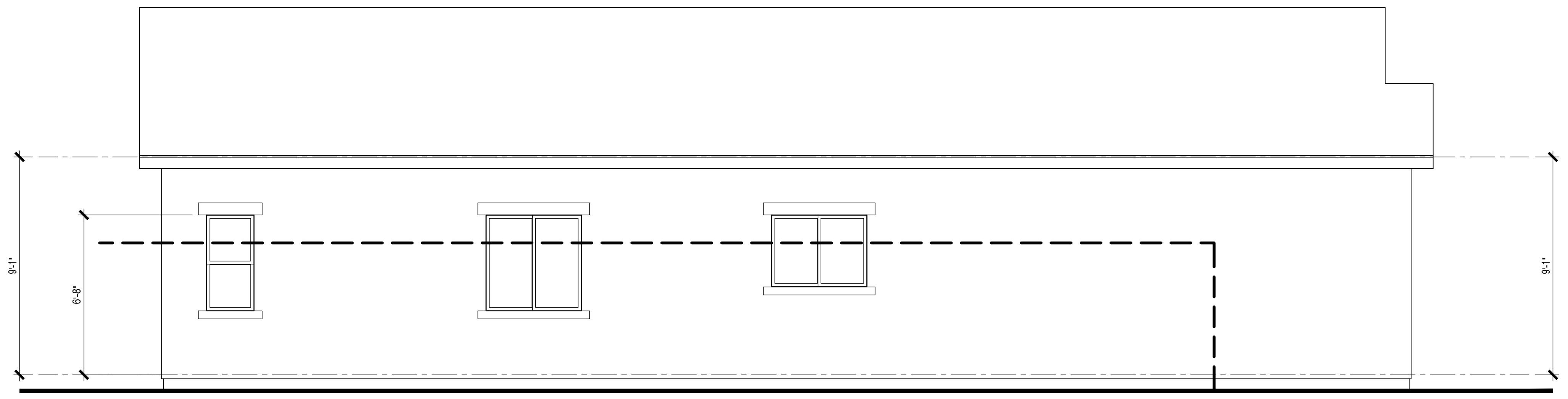
1.2
0 4 8 16

DESIGN REVIEW

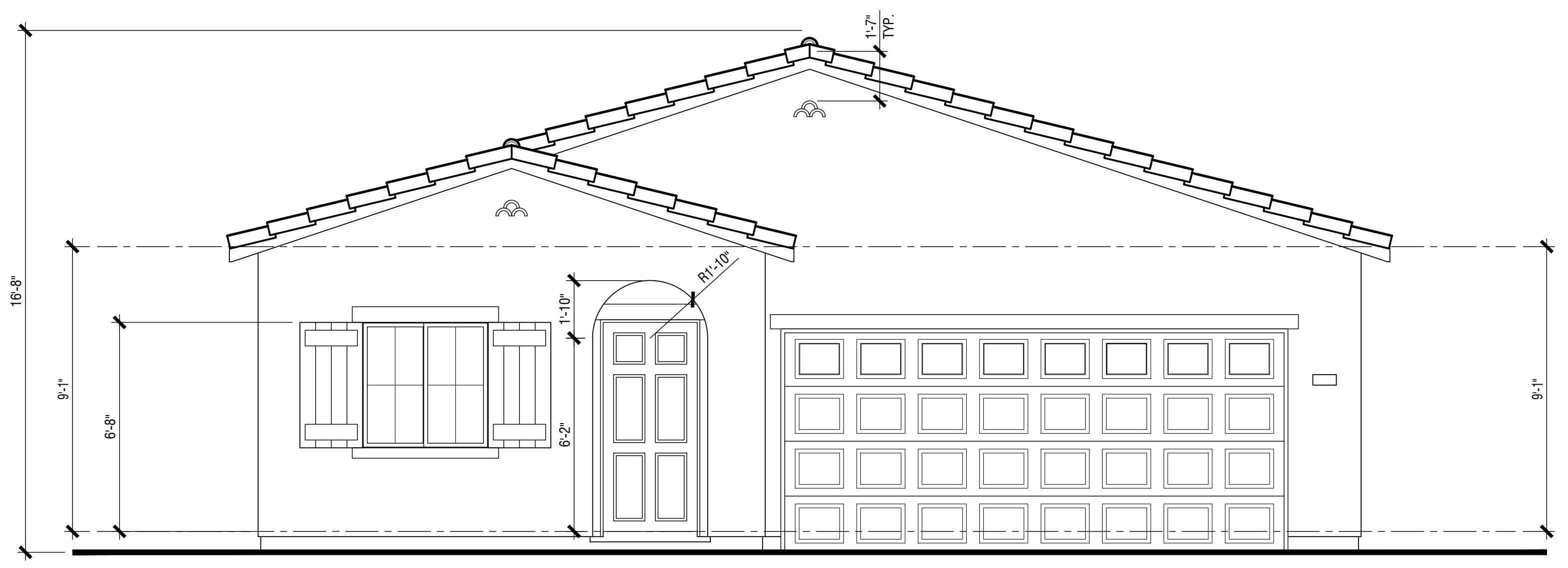
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

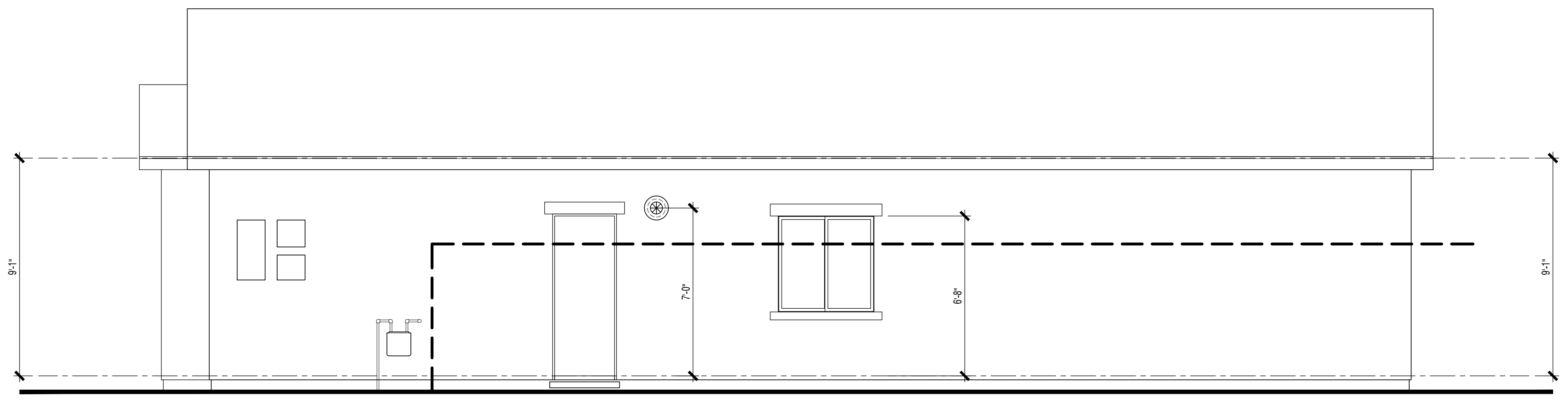
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



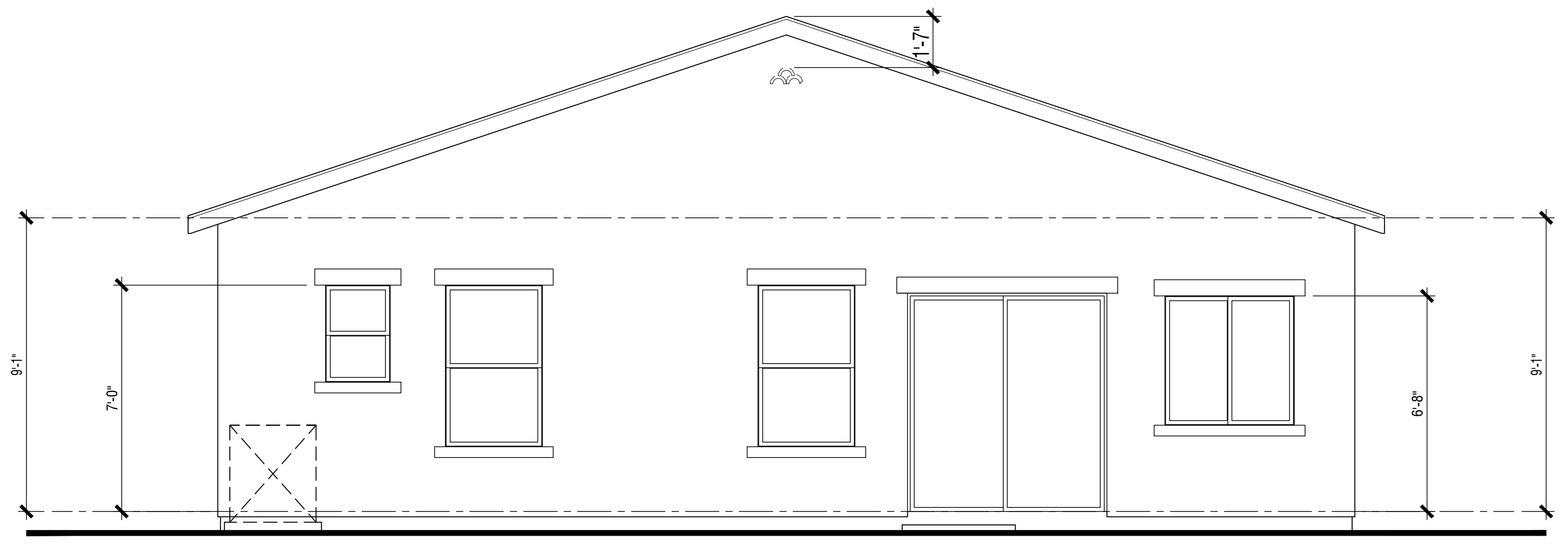
Left



Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1A | SPANISH

Building Elevations

SKYLAR PLACE- 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

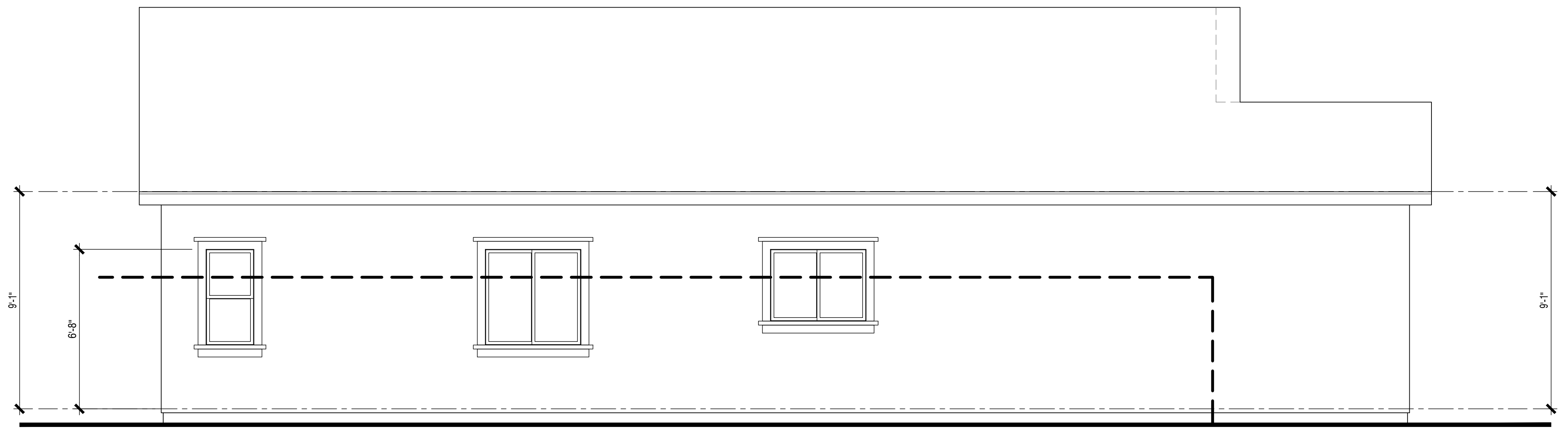
1.4

0 2 4 8

DESIGN REVIEW

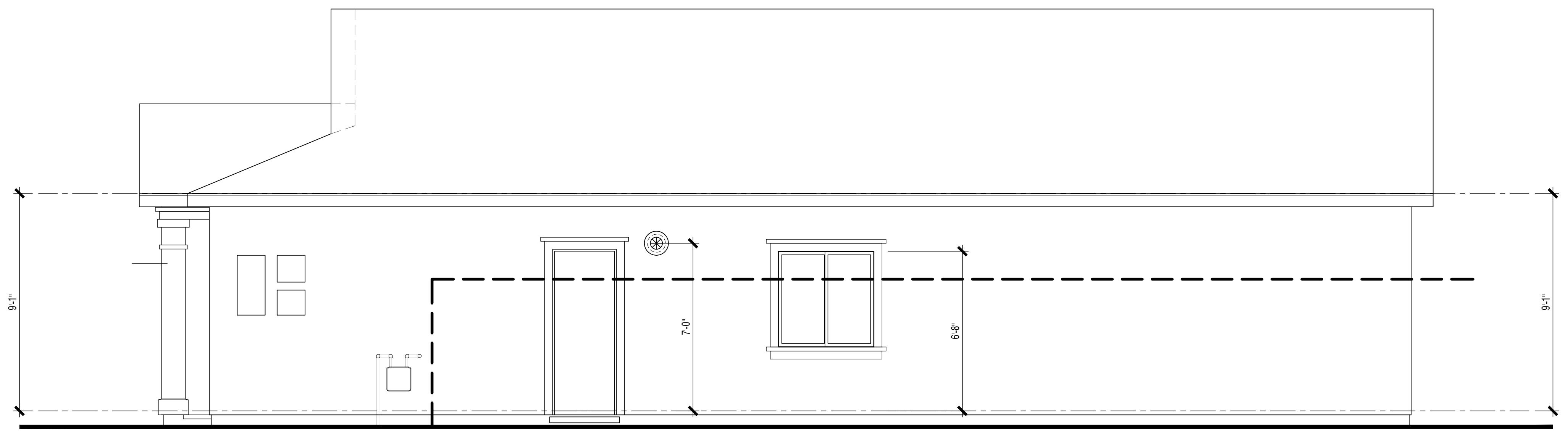
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

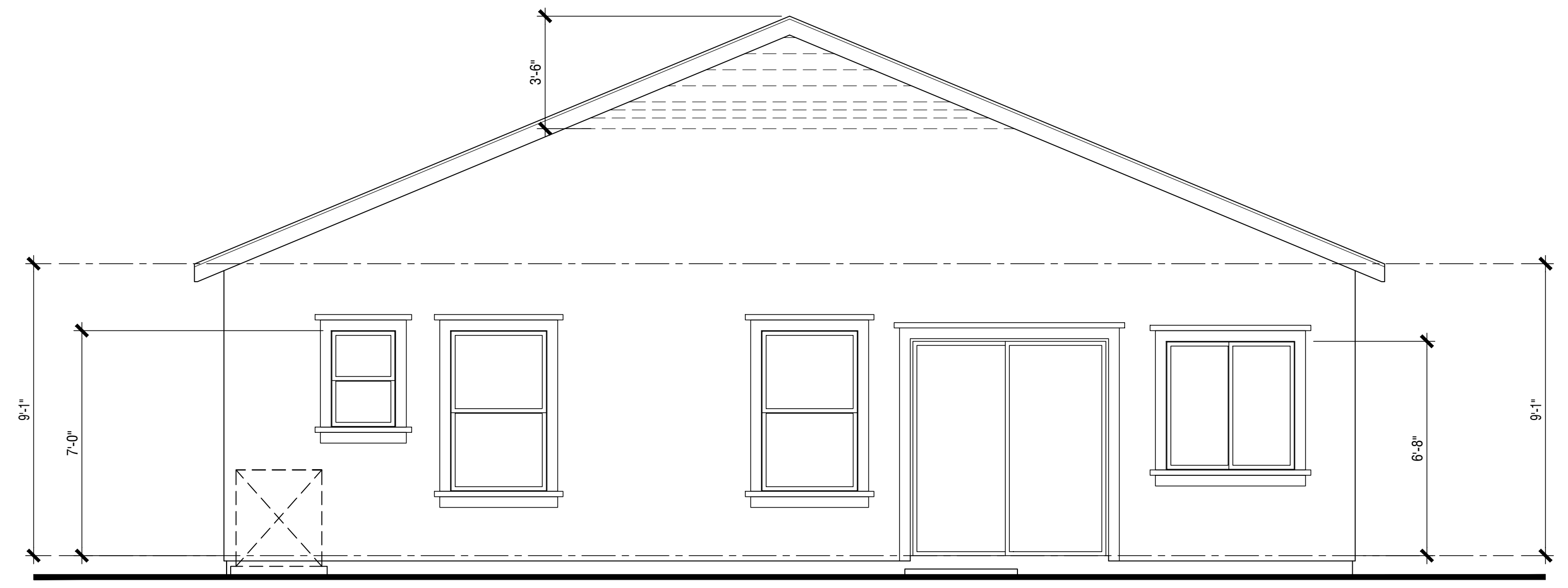


Left

Front



Right



Rear

PLAN 1B | TRADITIONAL

Building Elevations

SKYLAR PLACE - 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

1.5

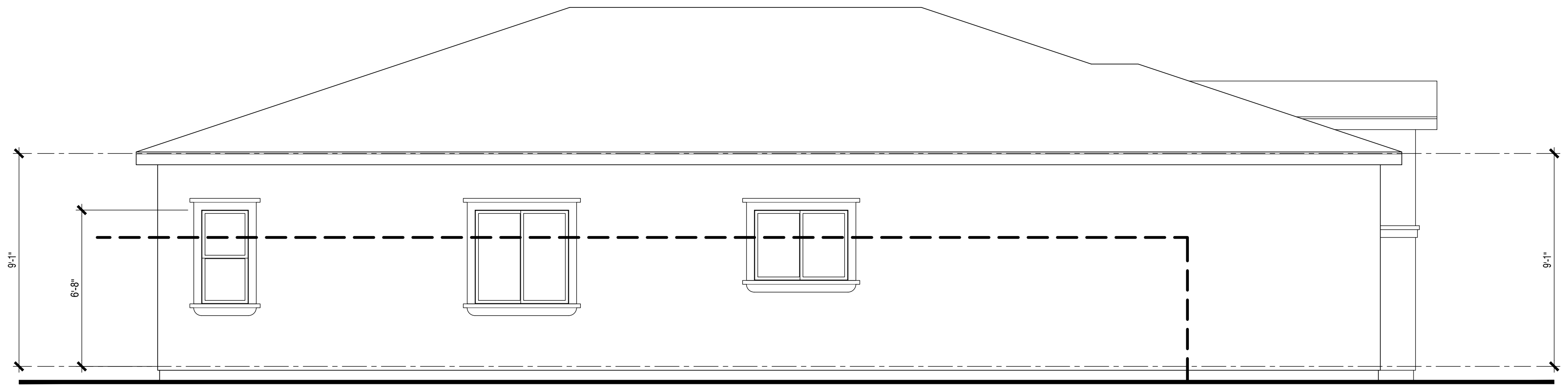
0 2 4 8

DESIGN REVIEW

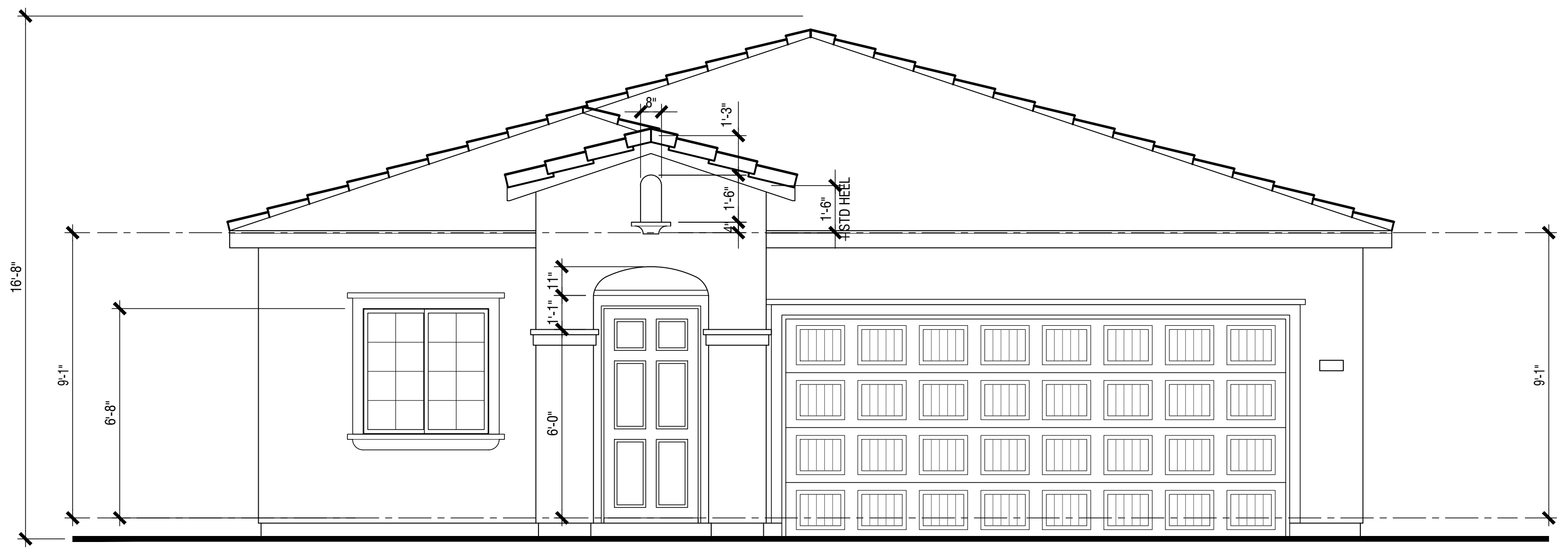
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

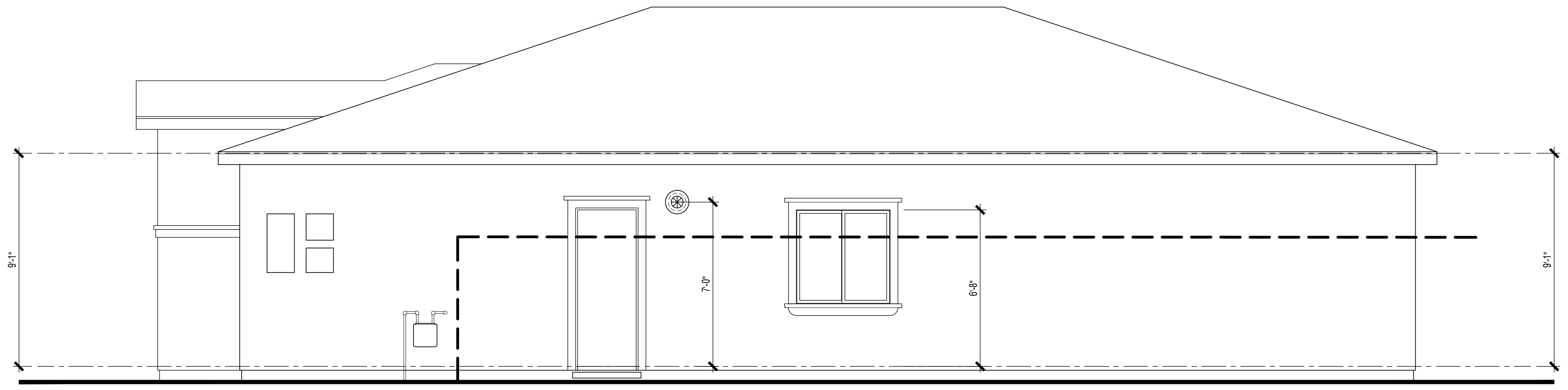
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



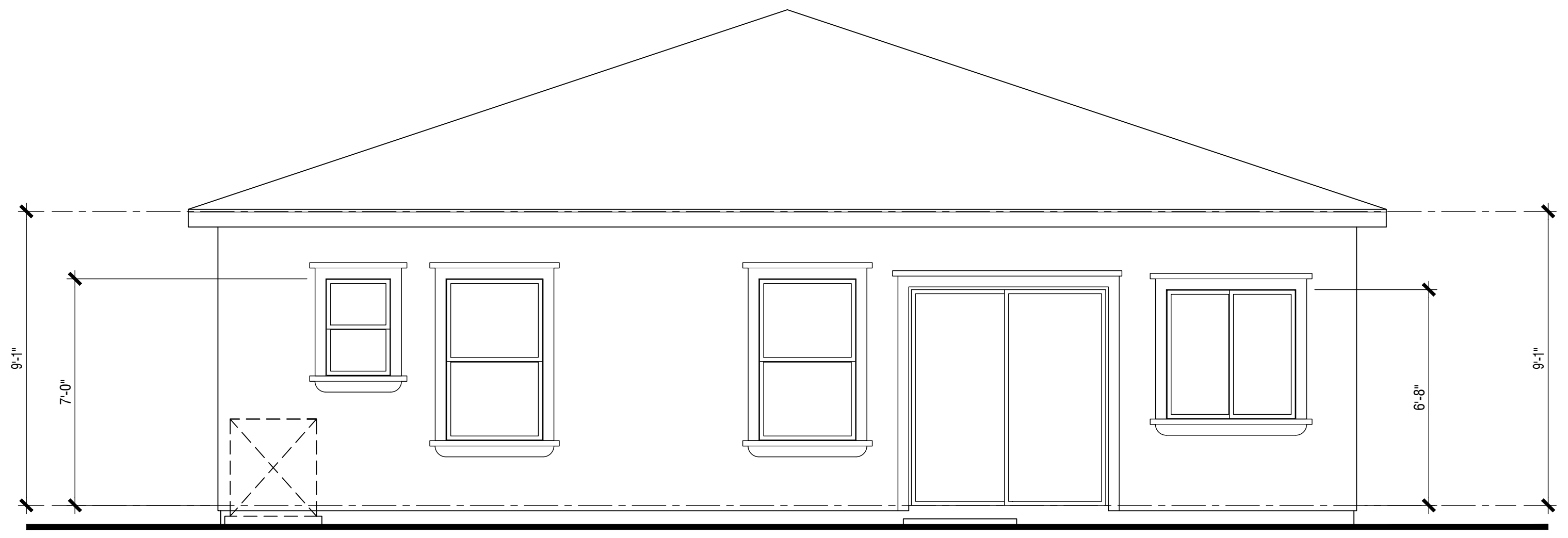
Left



Front



Right



Rear

PLAN 1D | TUSCAN

Building Elevations

SKYLAR PLACE- 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

1.6

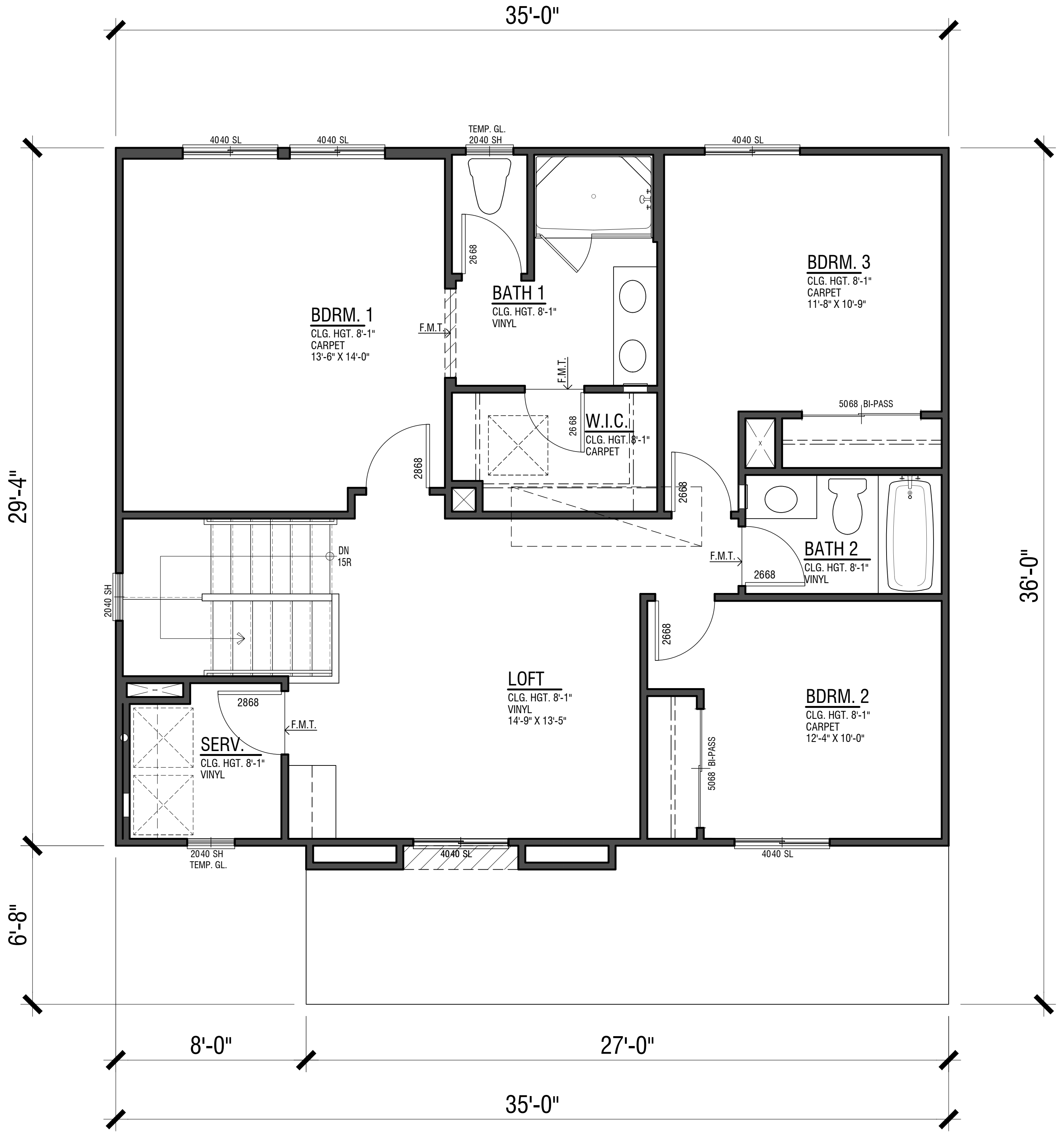
0 2 4 8

DESIGN REVIEW

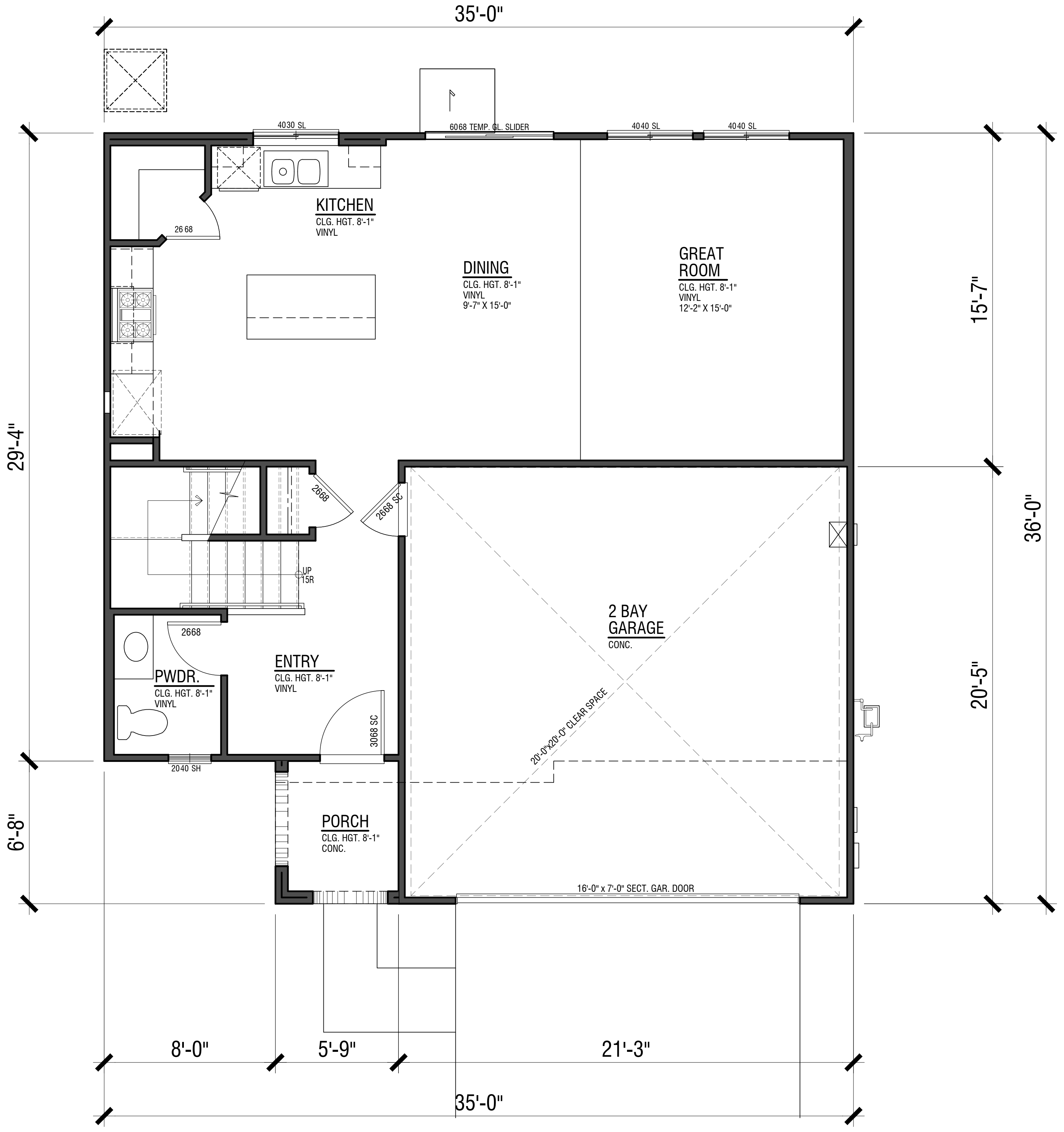
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Upper Floor - 966 SF



Lower Floor - 739 SF

PLAN 2.1705

1,705 SF
3 Bdrm | 2.5 Bath
2 Bay Garage
8' | 8' Plates

2A | Spanish

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

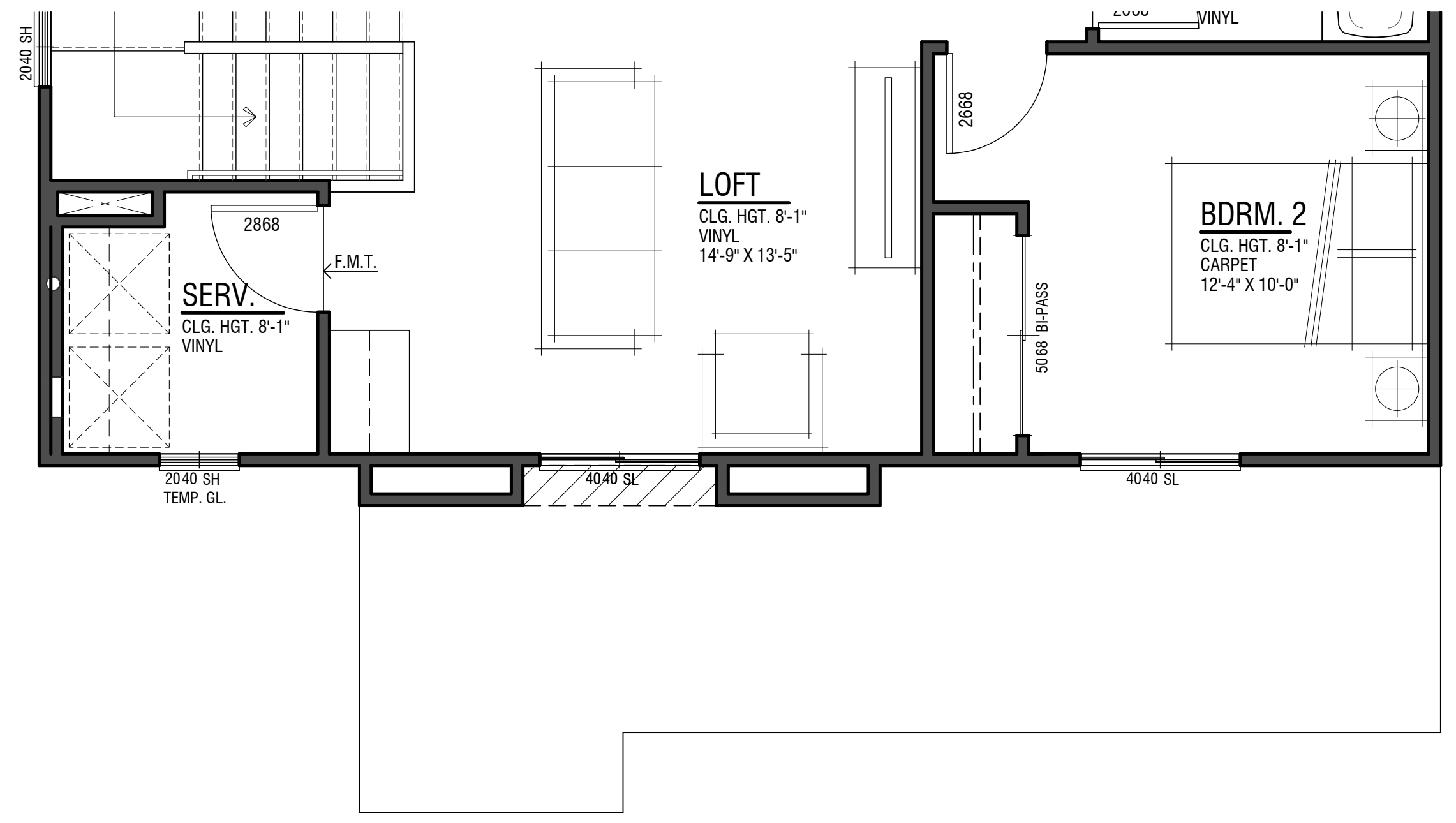
2.0

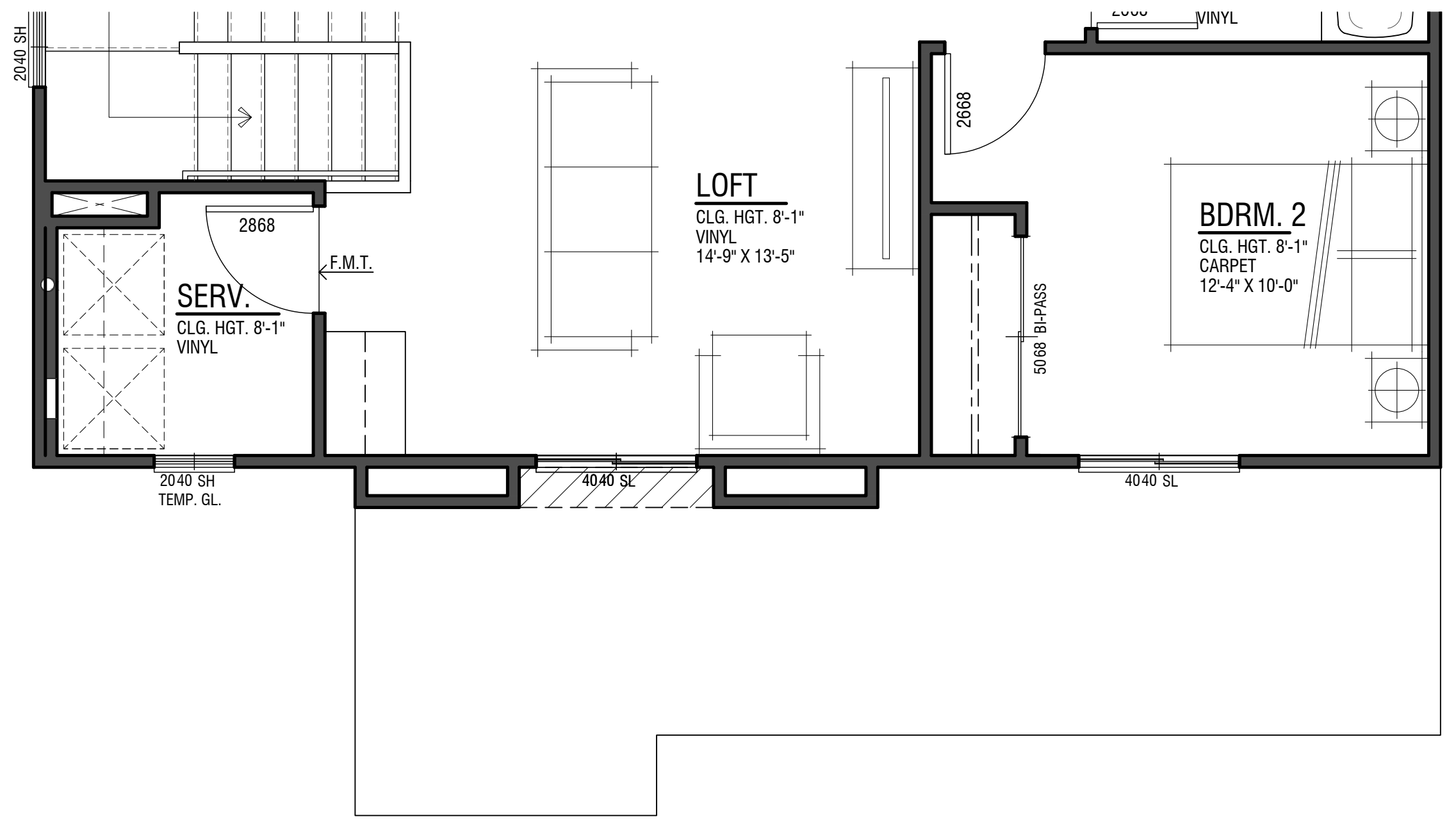
0 2 4 8

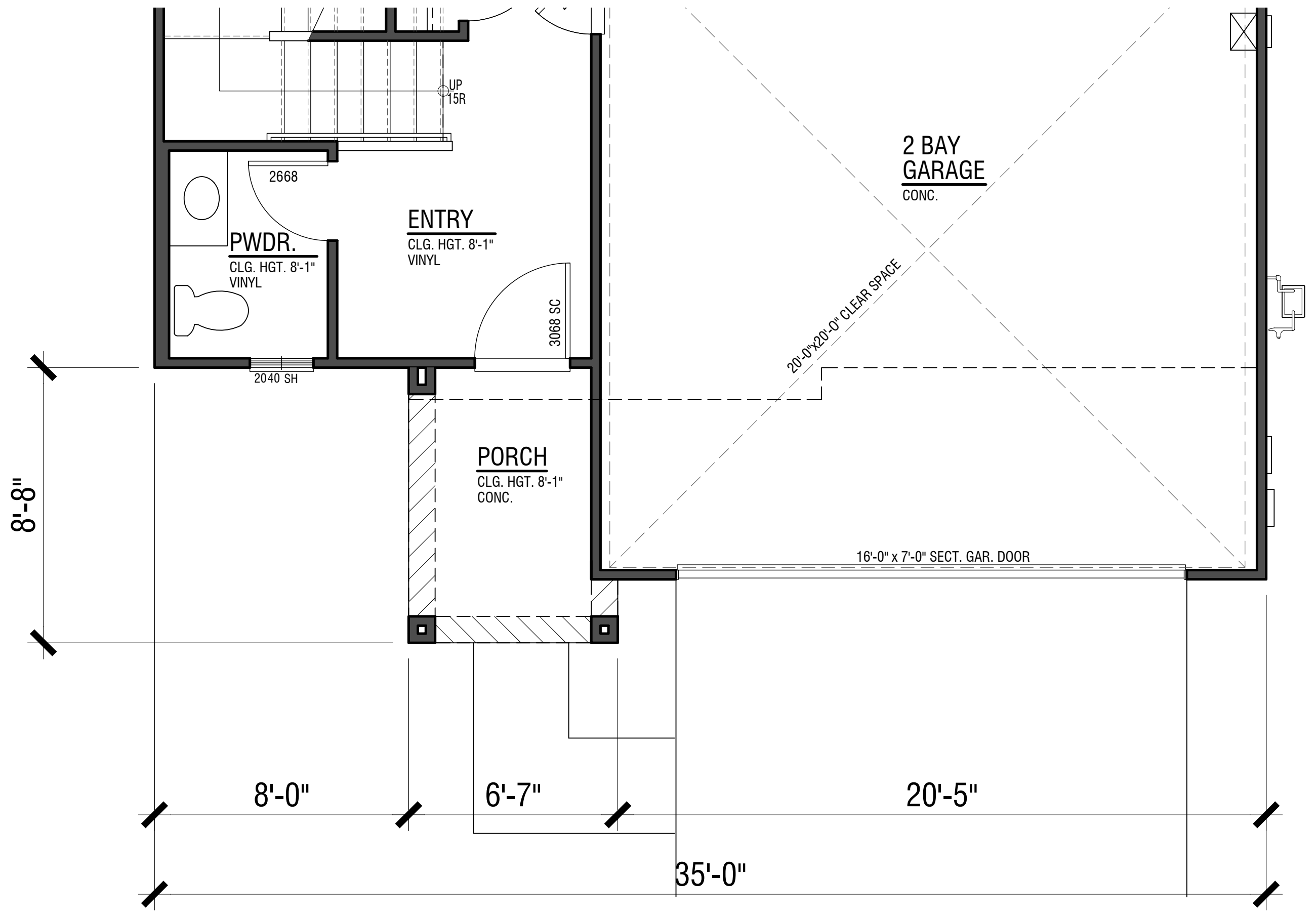
DESIGN REVIEW

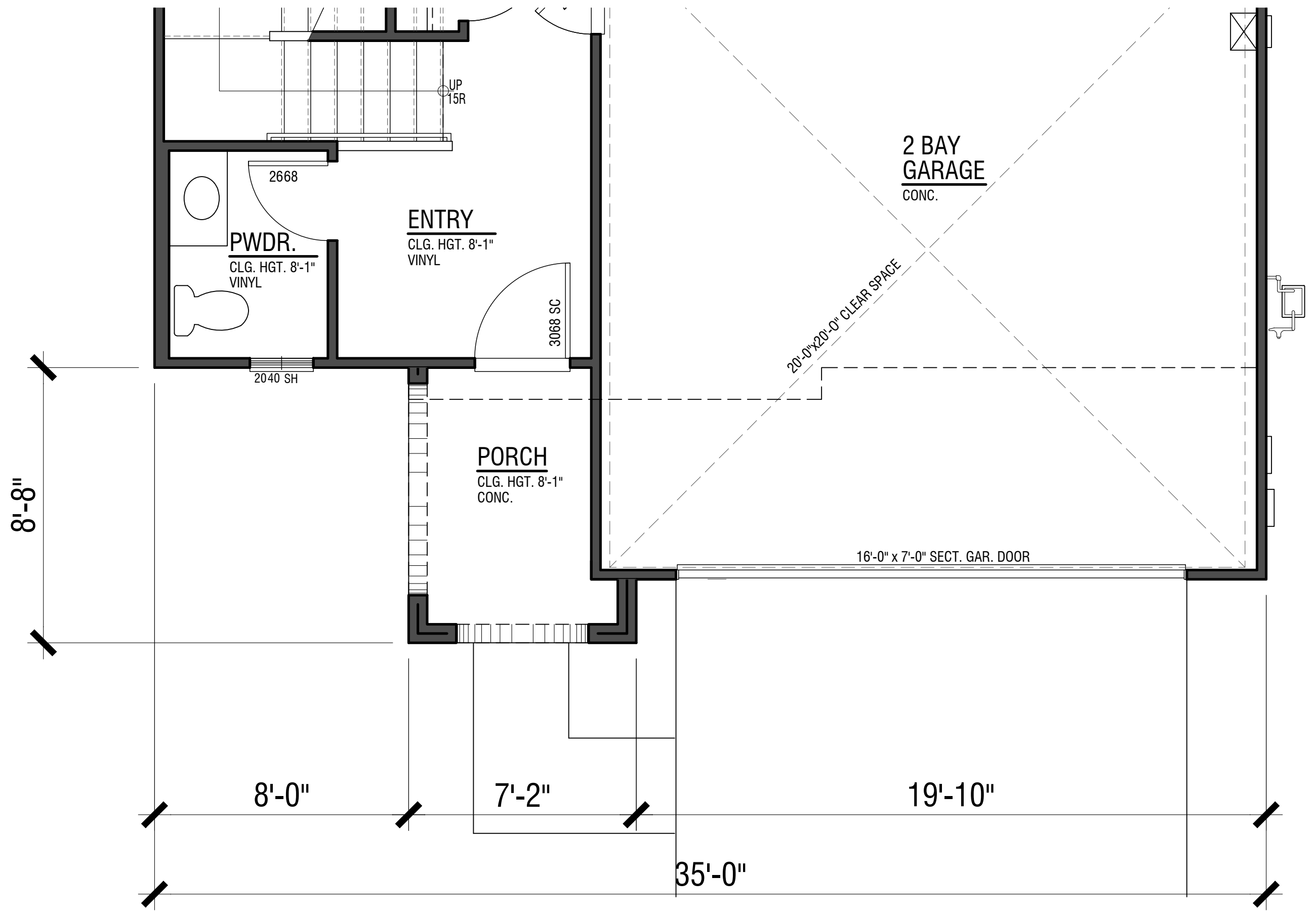
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA









Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 2.1705

1,705 SF
3 Bdrm | 2.5 Bath
2 Bay Garage
8' | 8' Plates

2B | Traditional

2D | Tuscan

Partial Floor Plans

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

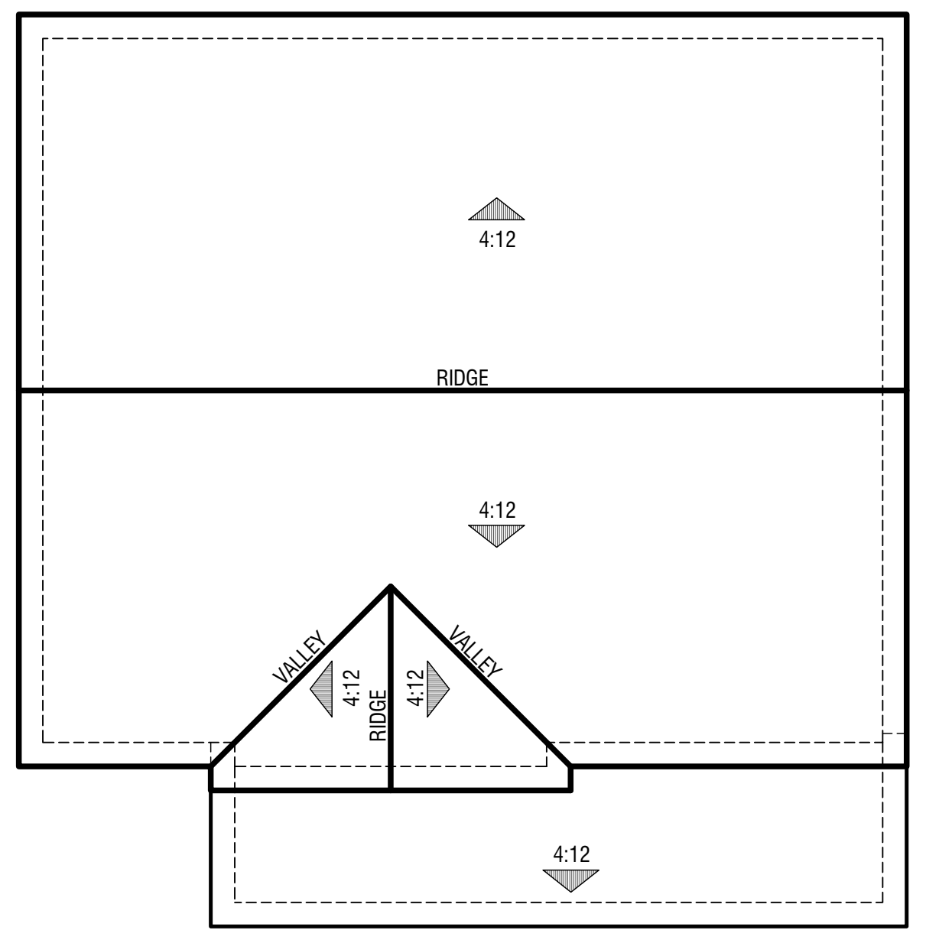
0 2 4 8

2.1

DESIGN REVIEW

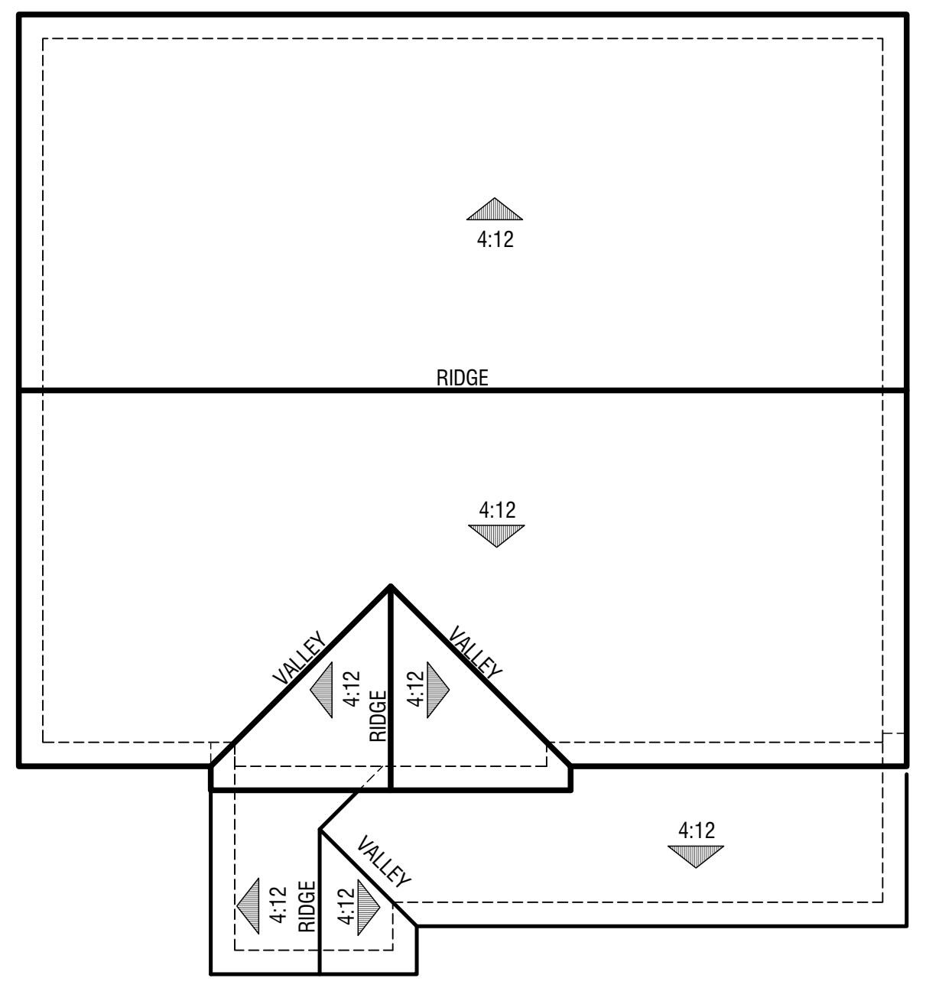
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



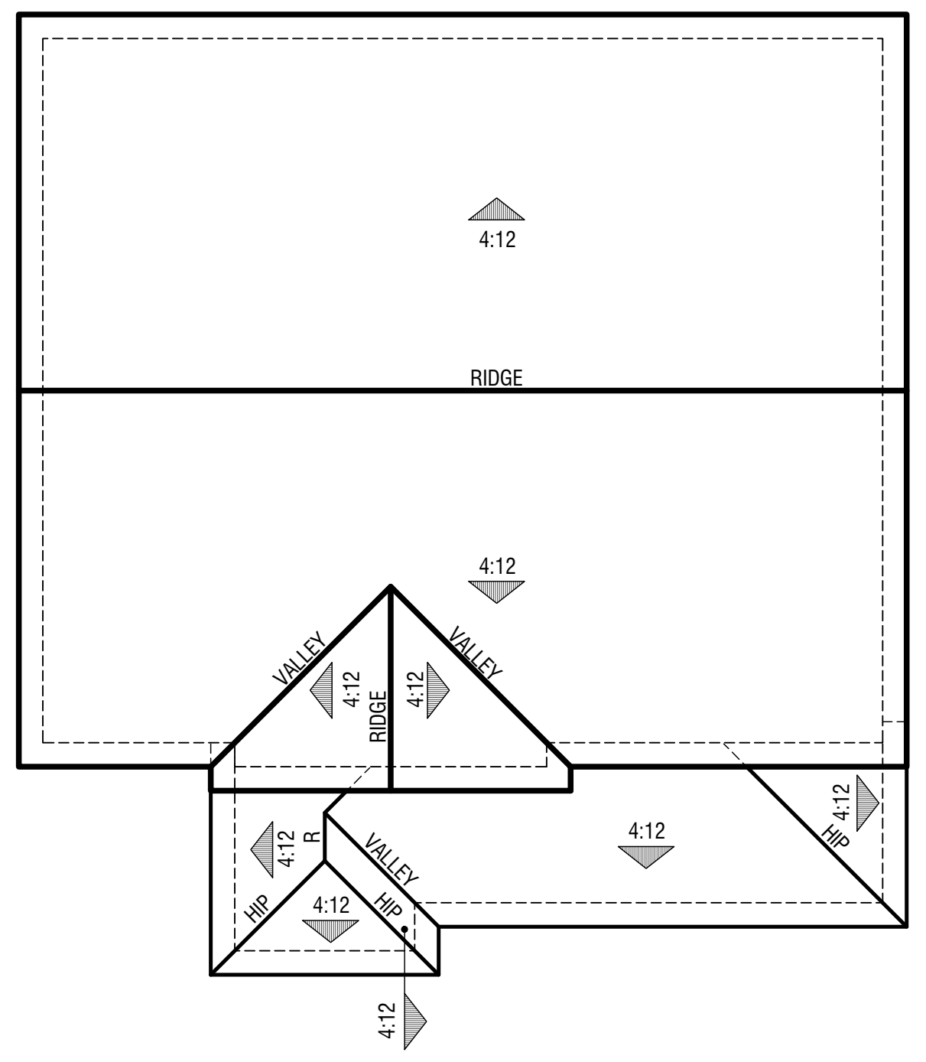
2A | Spanish

Eave 12" / Rake 12"
Concrete Low "S" Tile



2B | Traditional

Eave 12" / Rake 12"
Concrete Flat Tile



2D | Tuscan

Eave 18" / Rake 12"
Concrete Low "S" Tile

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 2.1705

Roof Plans

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

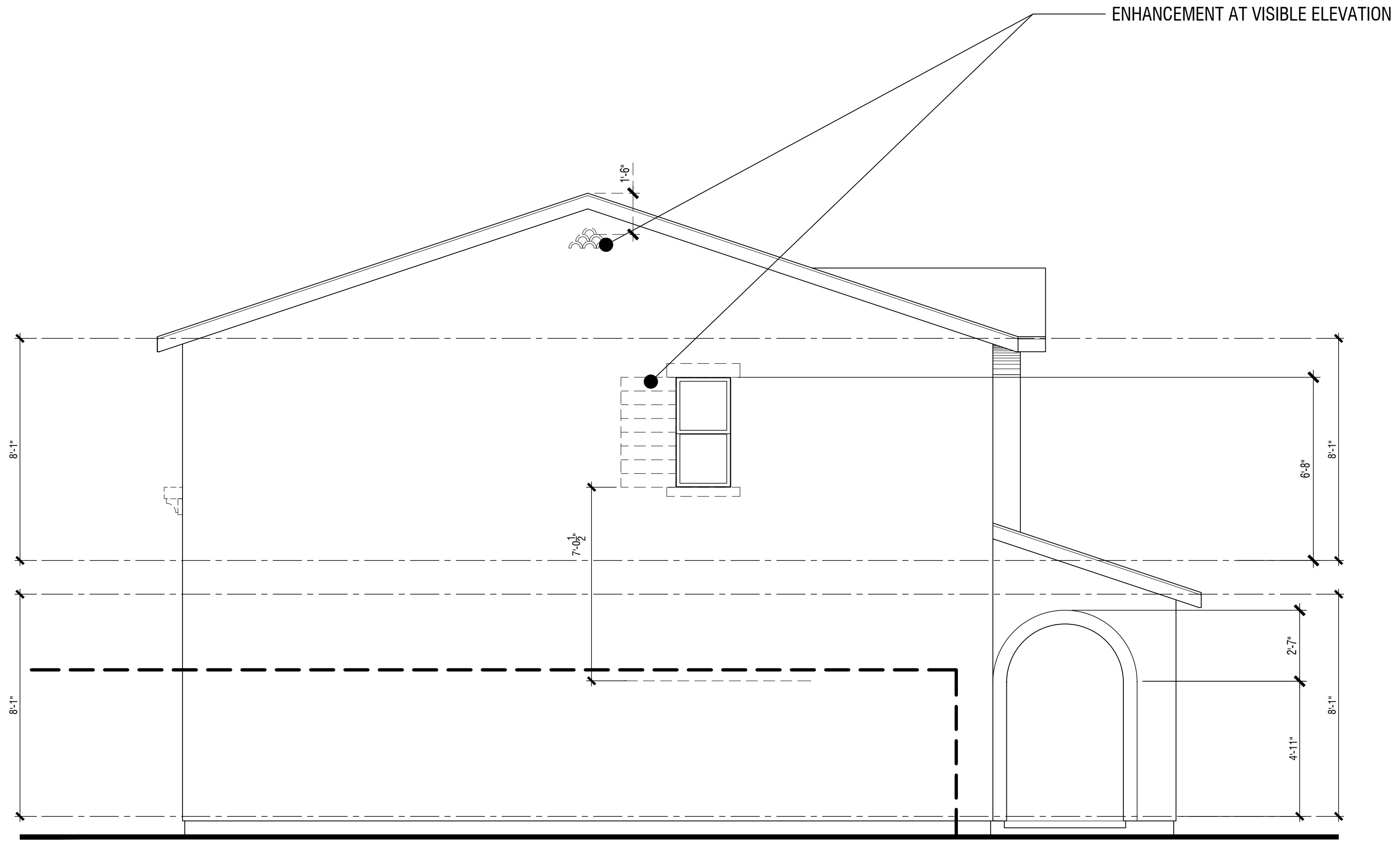
2.2

0 4 8 16

DESIGN REVIEW

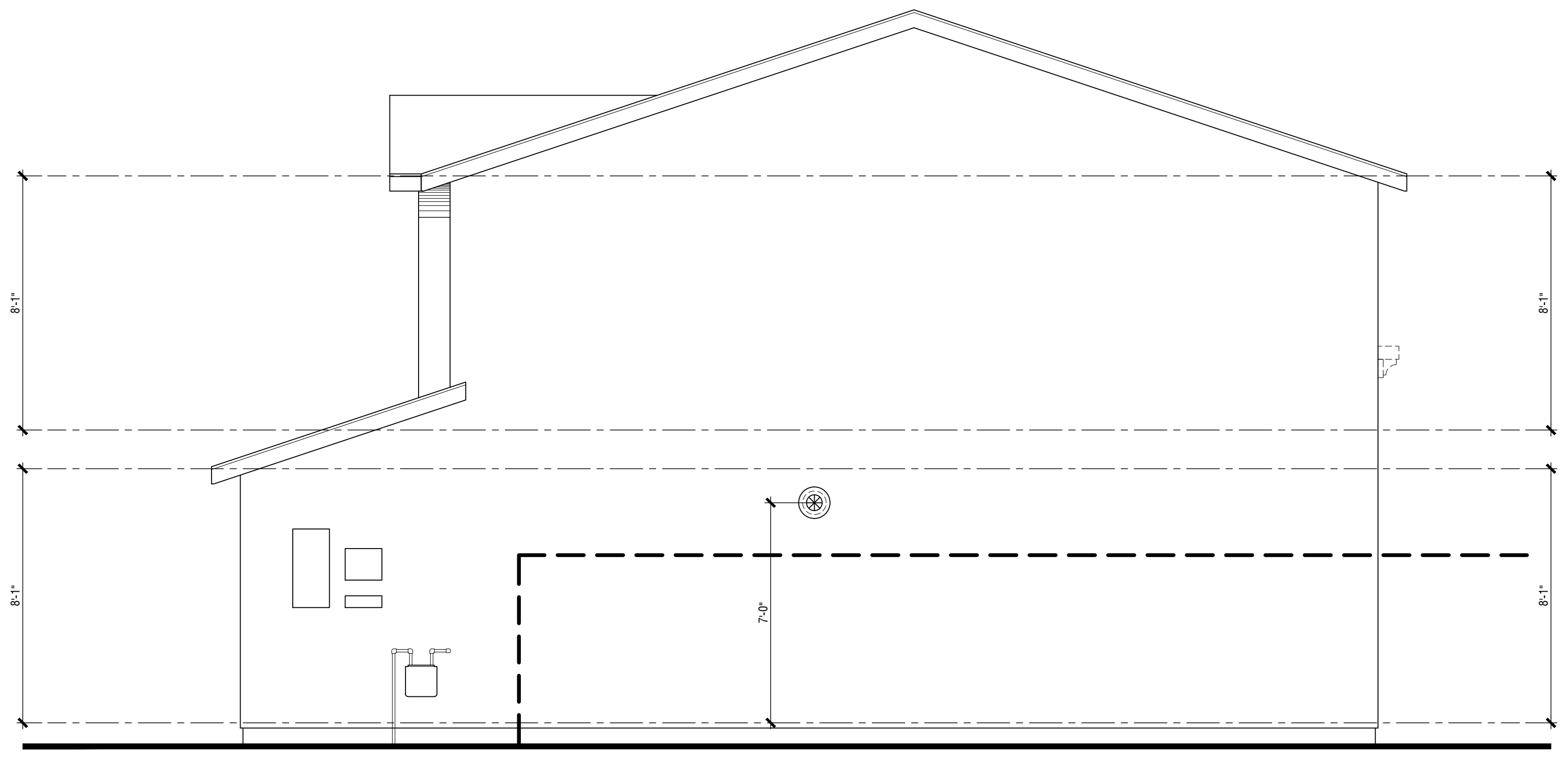
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

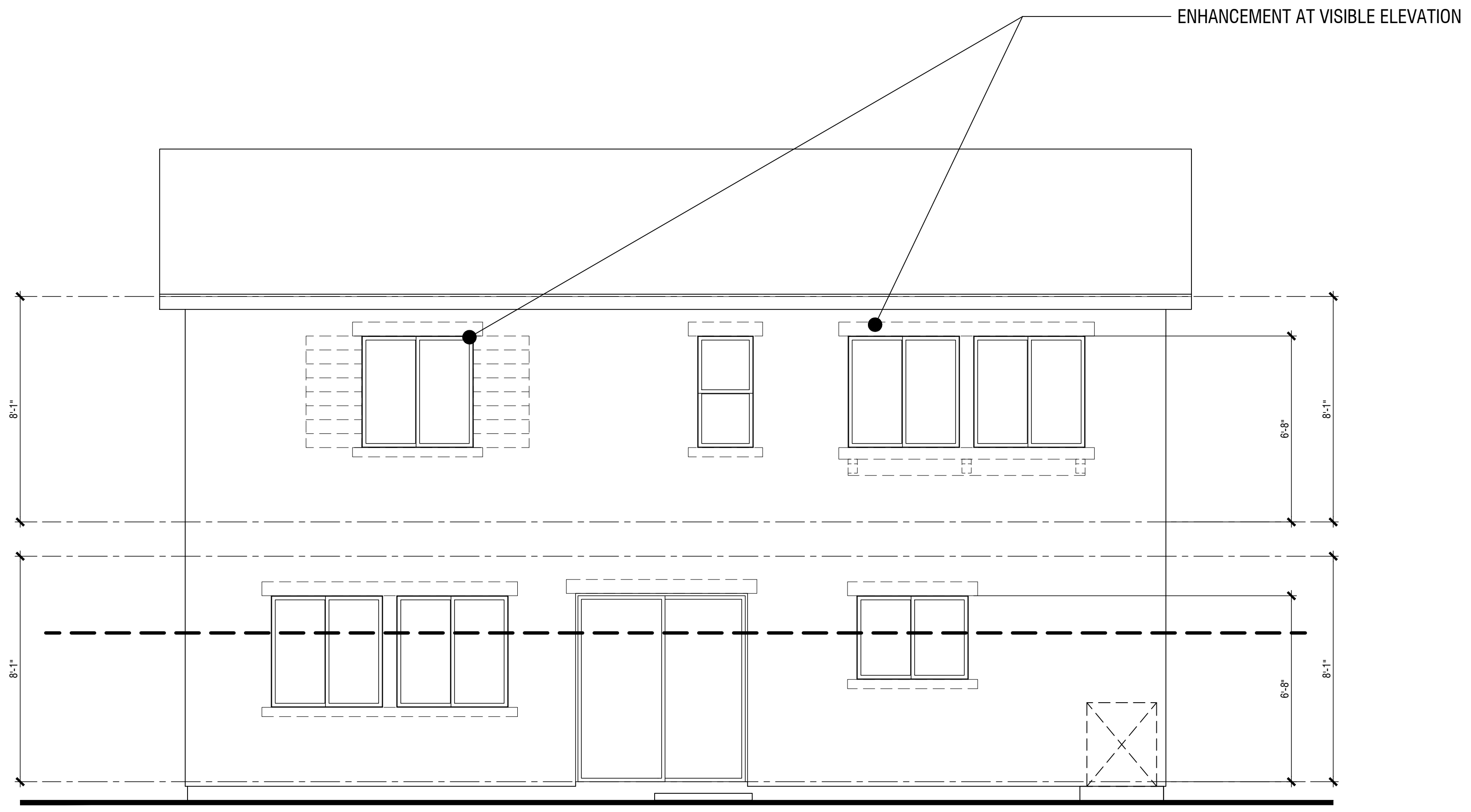


Left

Front



Right



Rear

PLAN 2A | SPANISH

Building Elevations

SKYLAR PLACE- 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

2.4

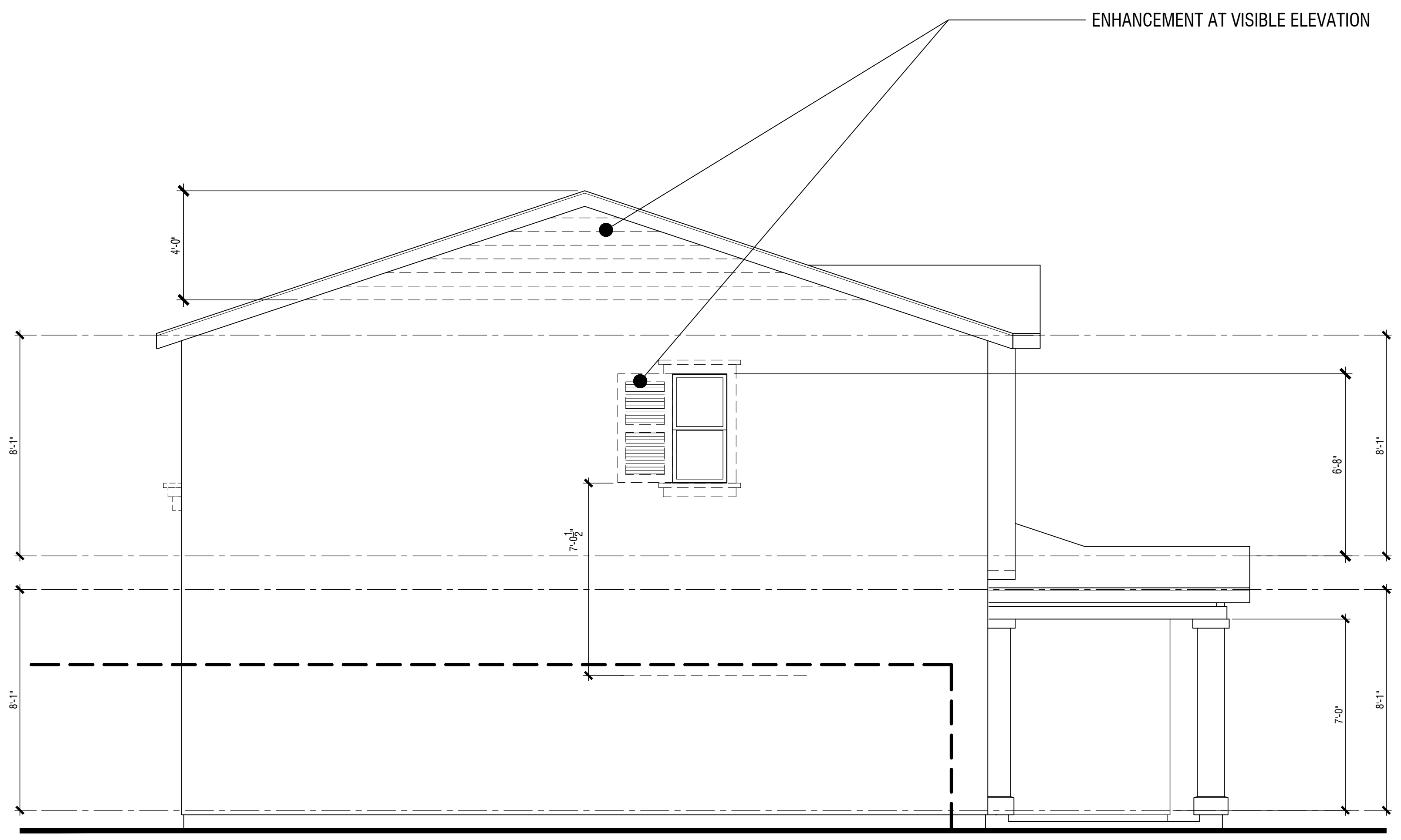
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

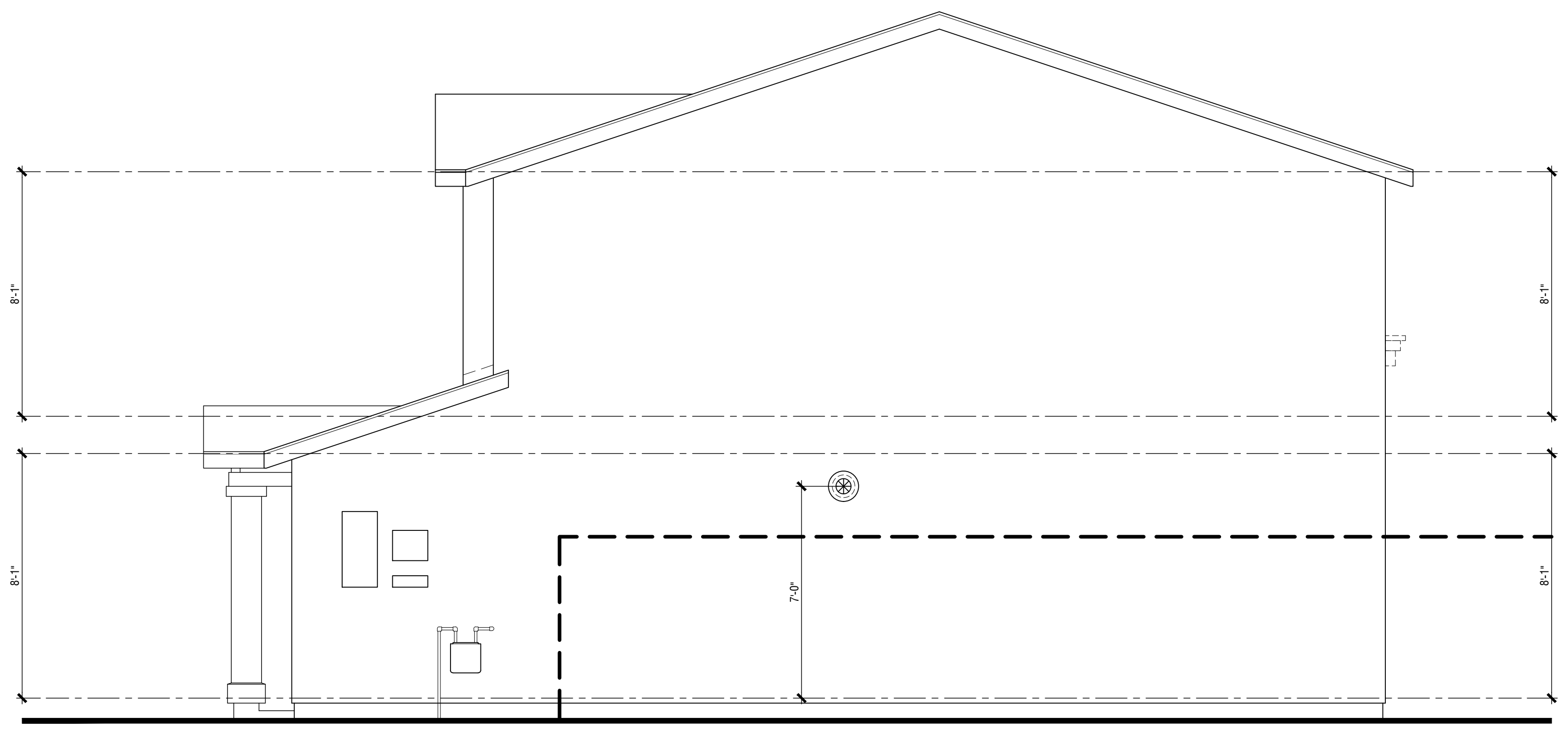
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

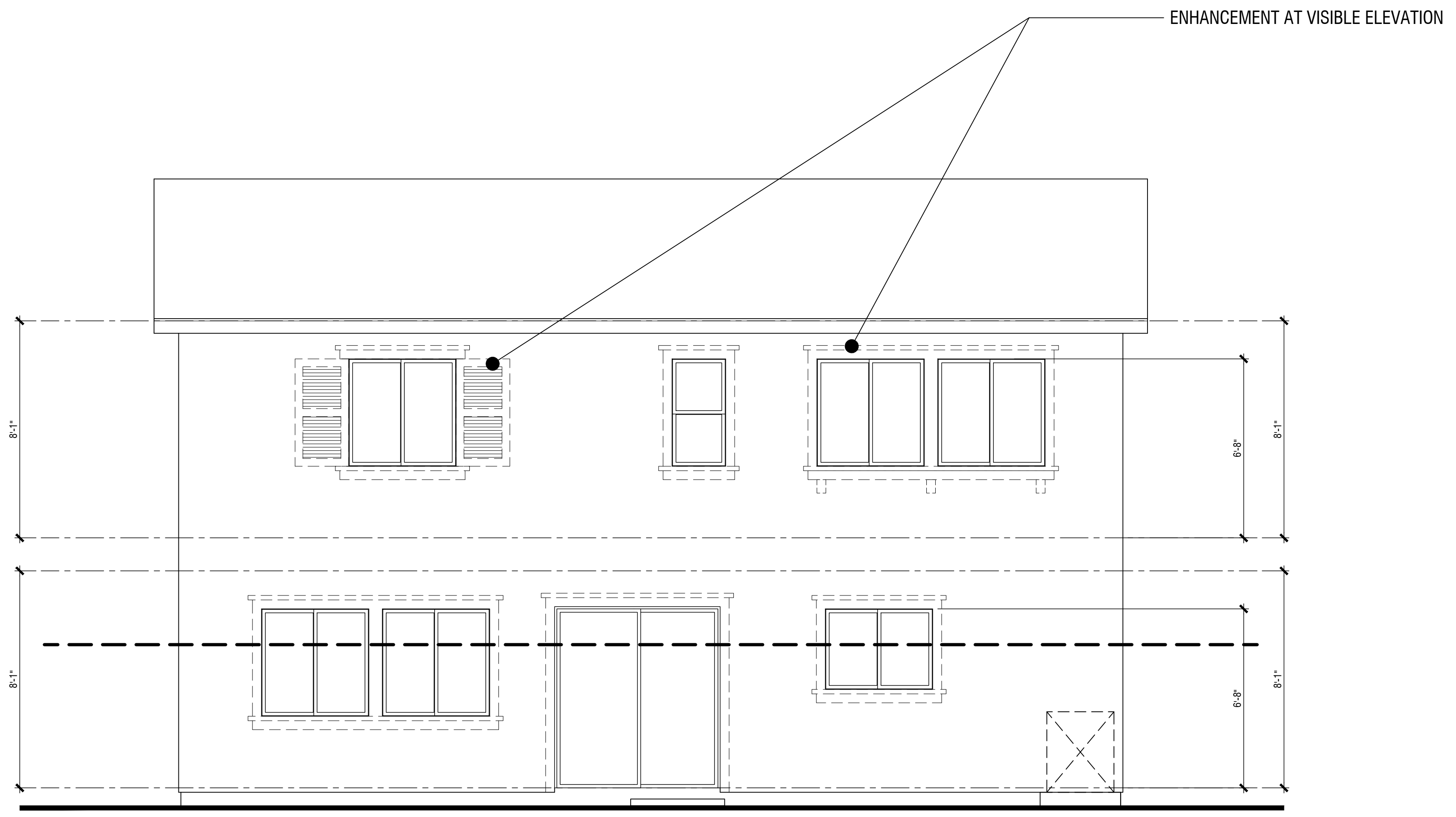


Left

Front



Right



Rear

PLAN 2B | TRADITIONAL

Building Elevations

SKYLAR PLACE- 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

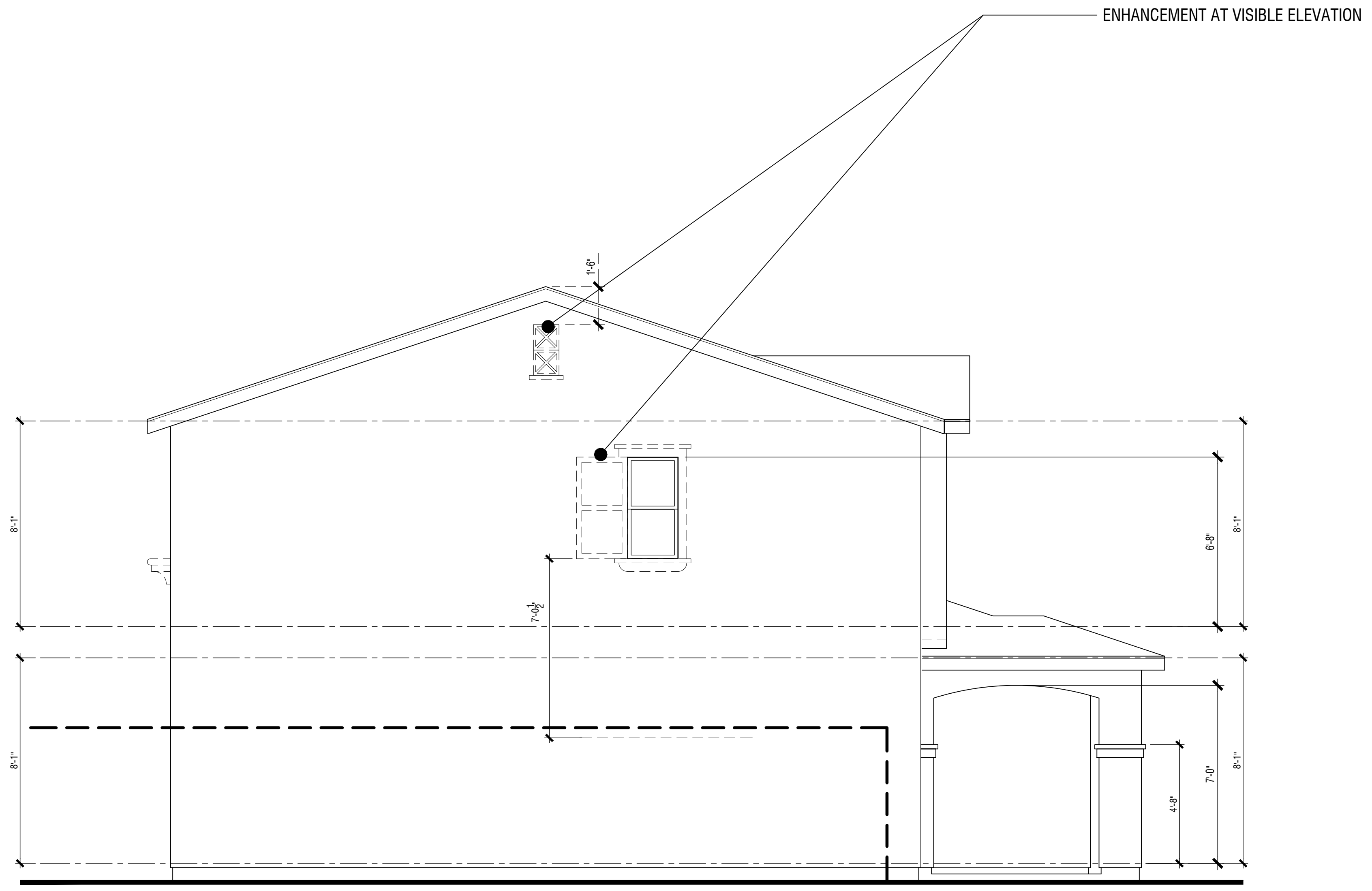
2.5

0 2 4 8

DESIGN REVIEW

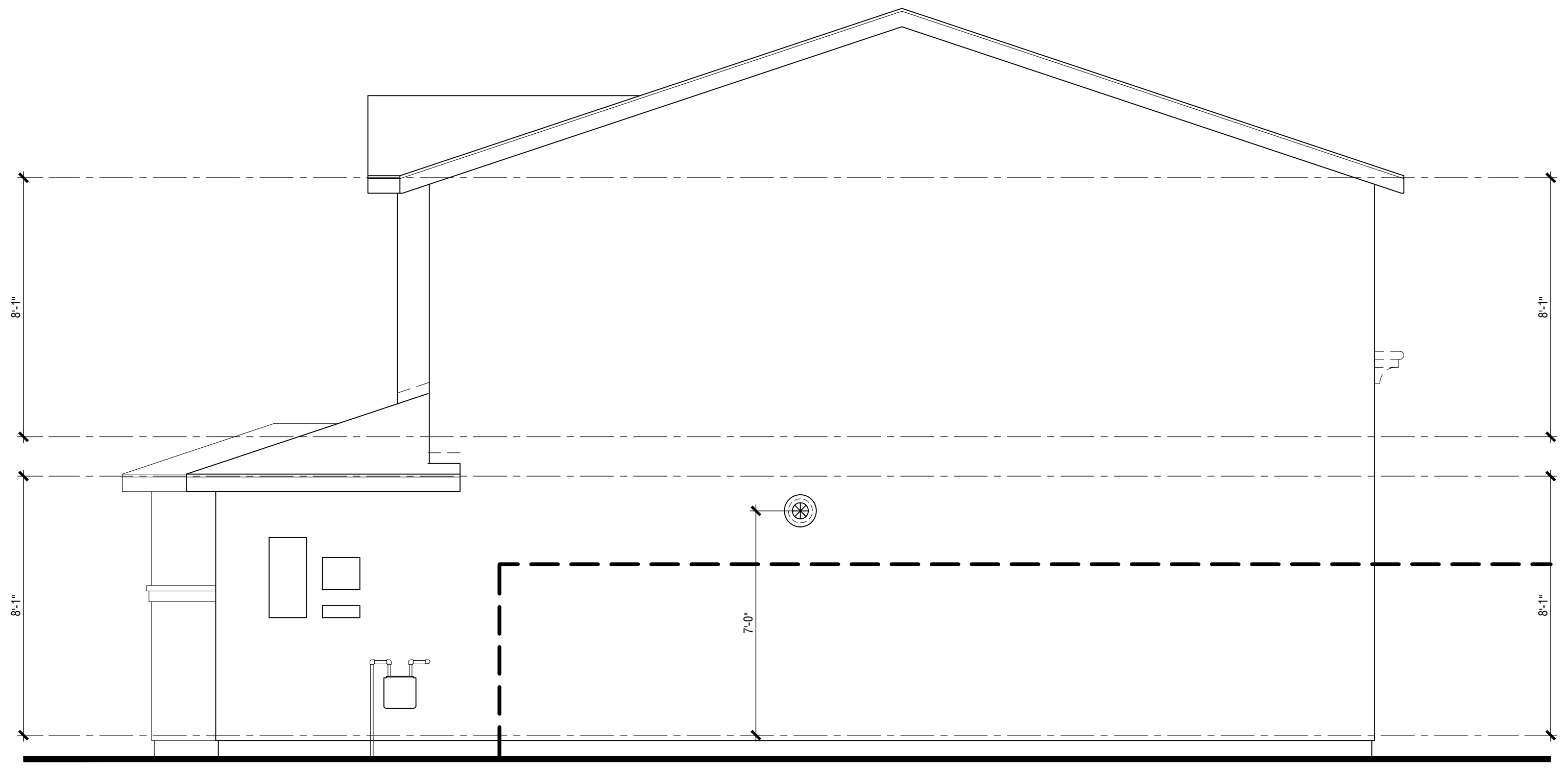
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA
ORANGE COUNTY . LOS ANGELES . BAY AREA

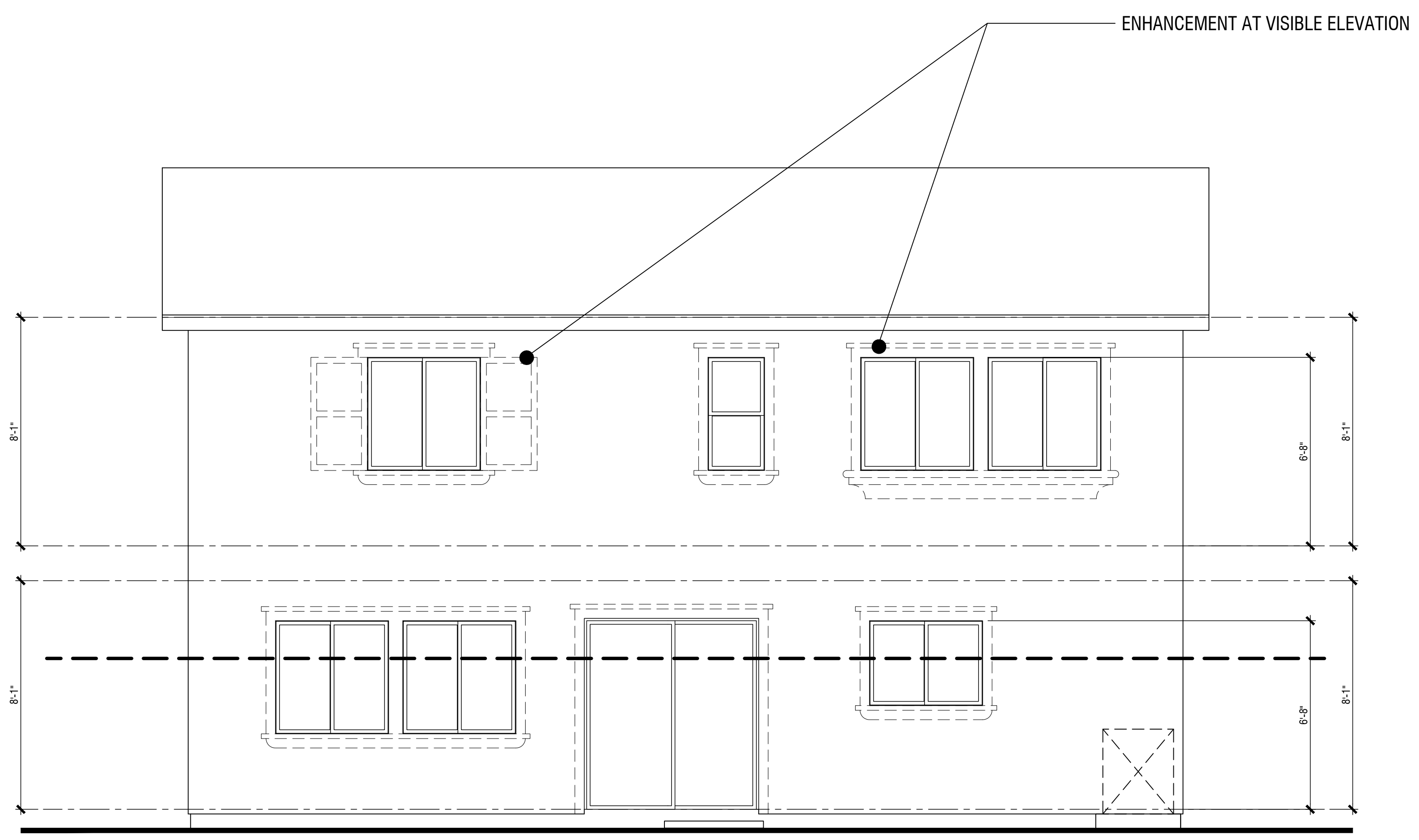


Left

Front



Right



Rear

PLAN 2D | TUSCAN

Building Elevations

SKYLAR PLACE- 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

2.6

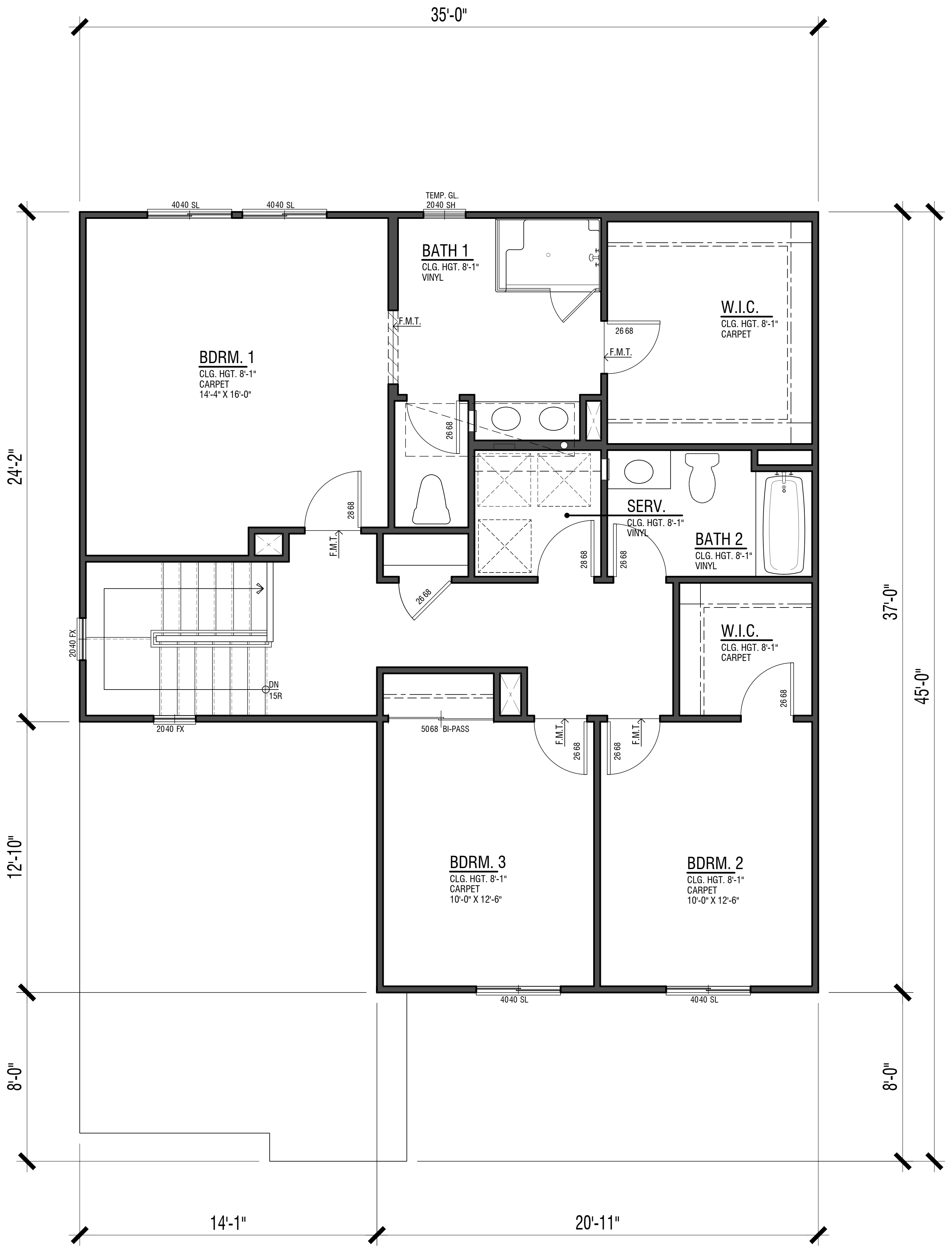
0 2 4 8

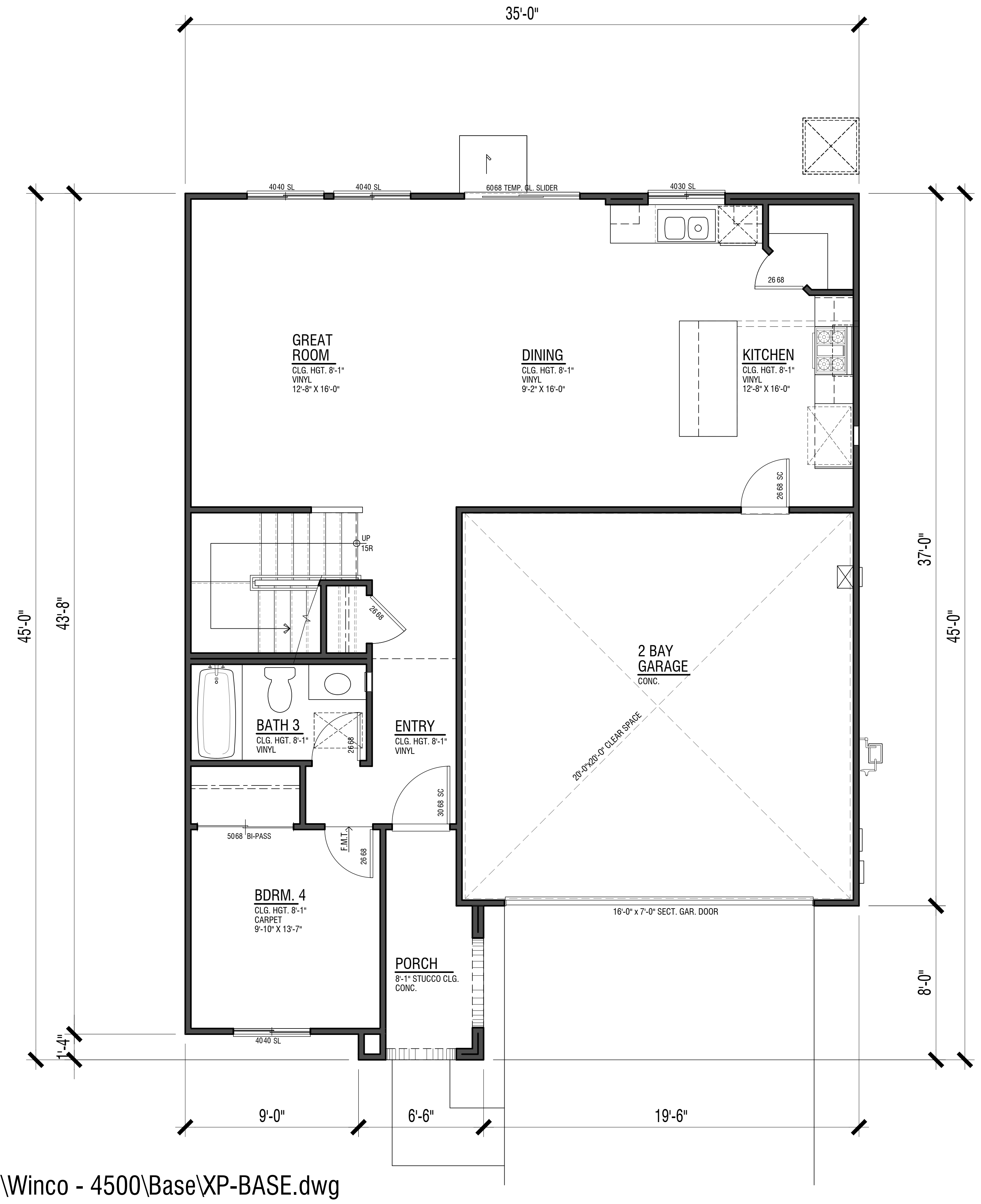
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)





ef\Winco - 4500\Base\XP-BASE.dwg

Upper Floor - 1045 SF

PLAN 3.1975

1,975 SF
4 Bdrm|3 Ba
2 Bay Garage
8' | 8' Plates

Lower Floor - 928 SF

3A | Spanish

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

3.1

0 2 4 8

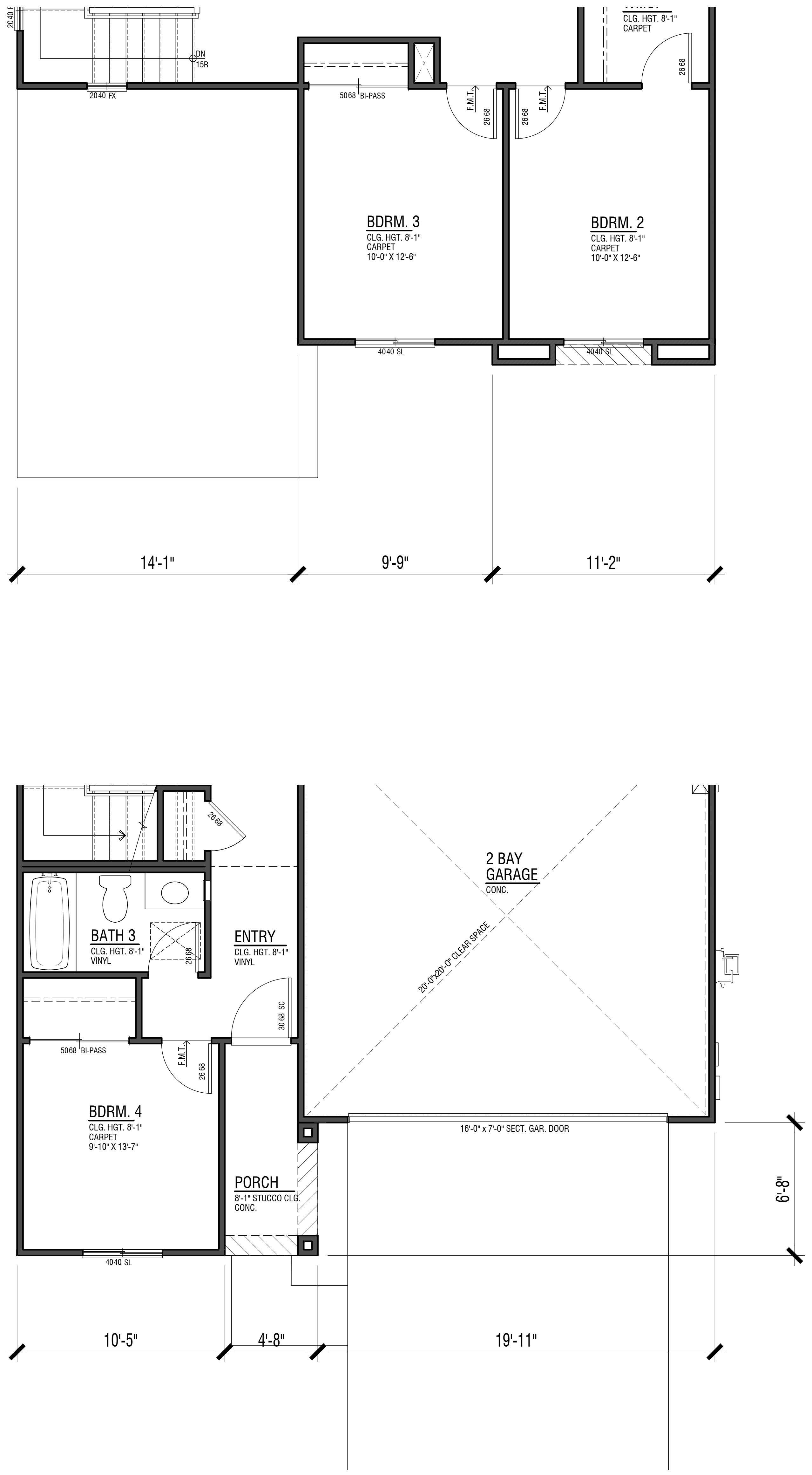
DESIGN REVIEW

| 2021272 | 09-09-21

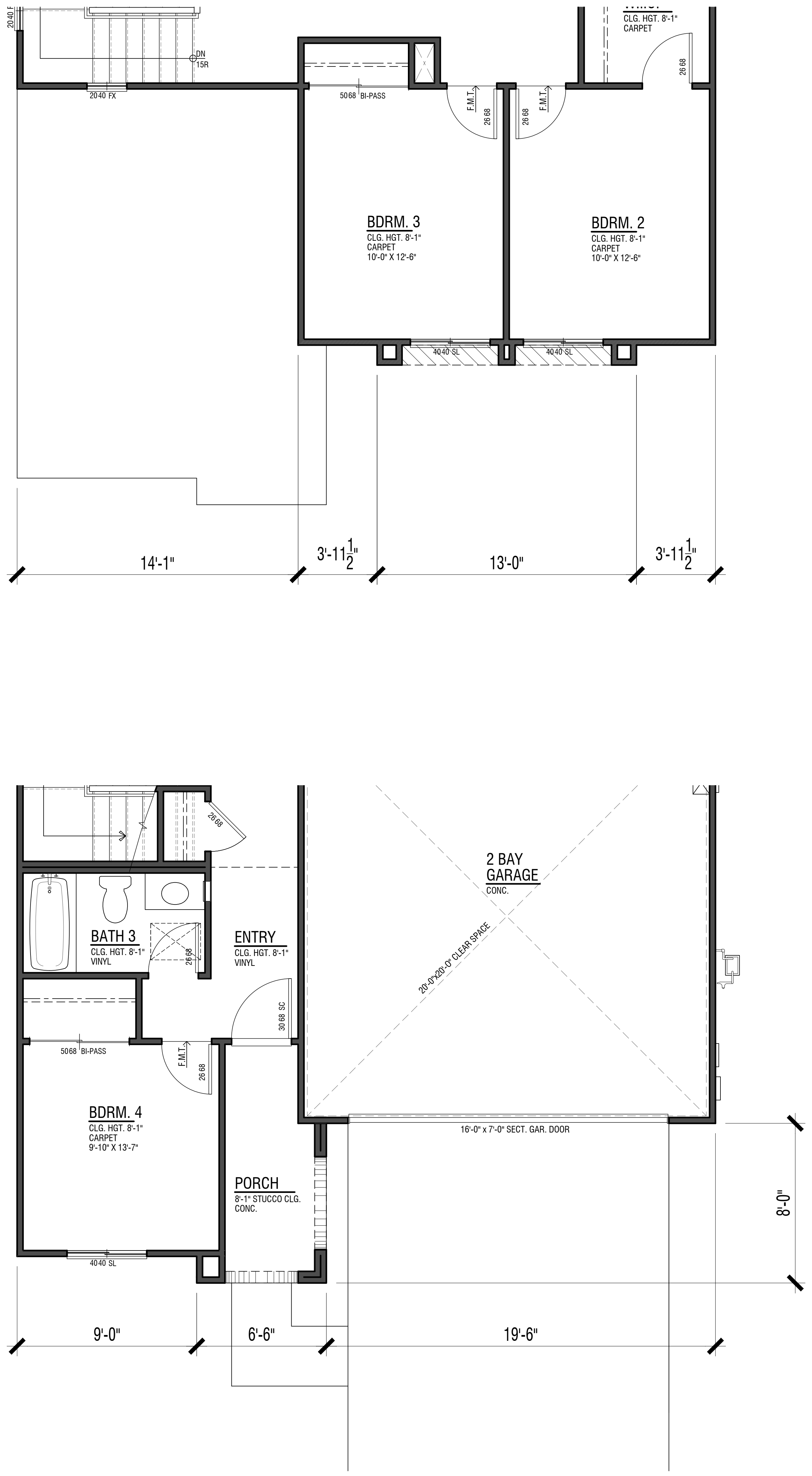
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

PLAN 3.1975

1,975 SF
4 Bdrm | 3 Ba
2 Bay Garage
8' | 8' Plates



3B | Traditional



3D | Tuscan

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

SKYLAR PLACE - 4500

Express HOMES
a D.R. Horton Company

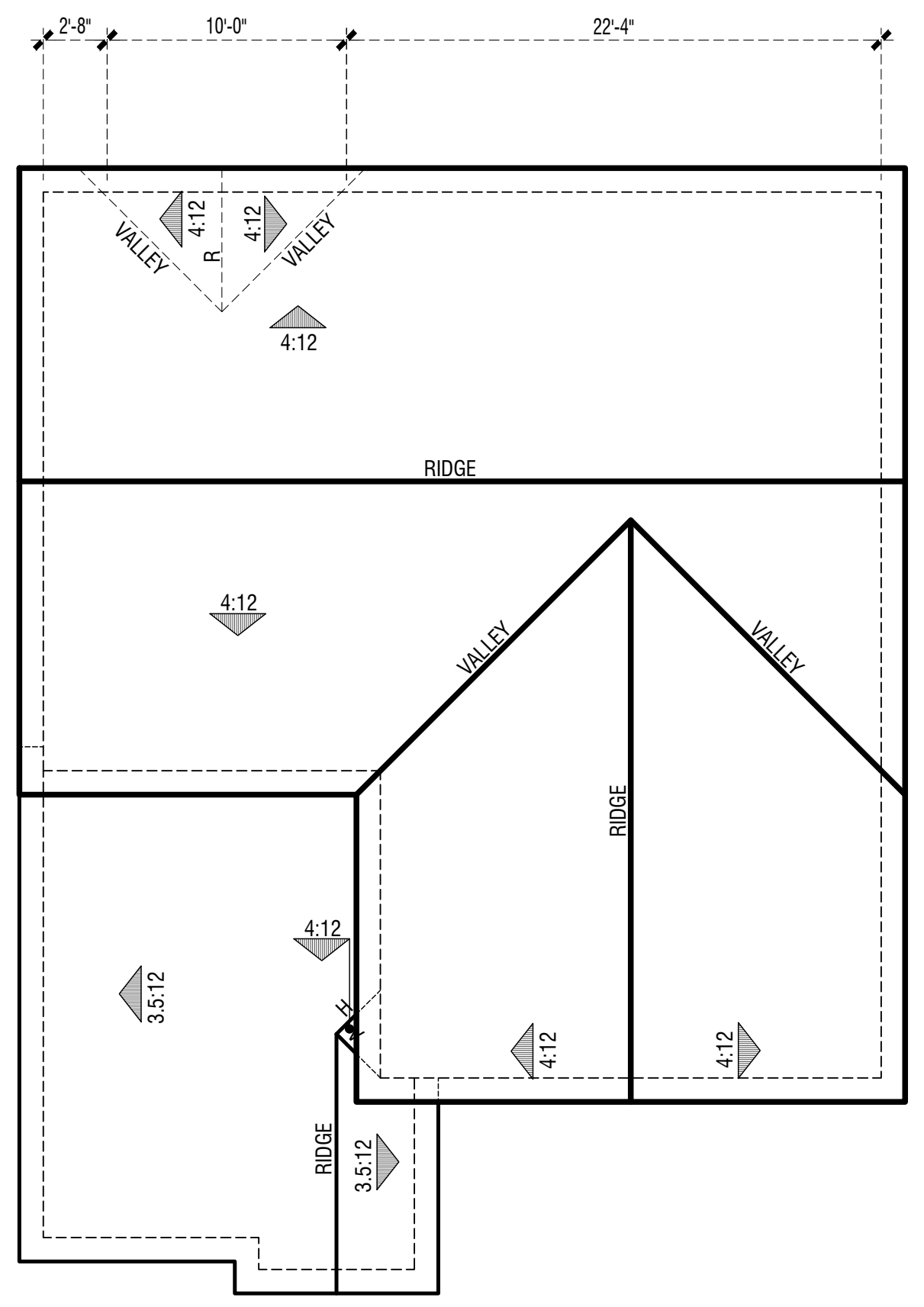
EXPRESS

MORENO VALLEY, CA

3.1.1
0 2 4 8

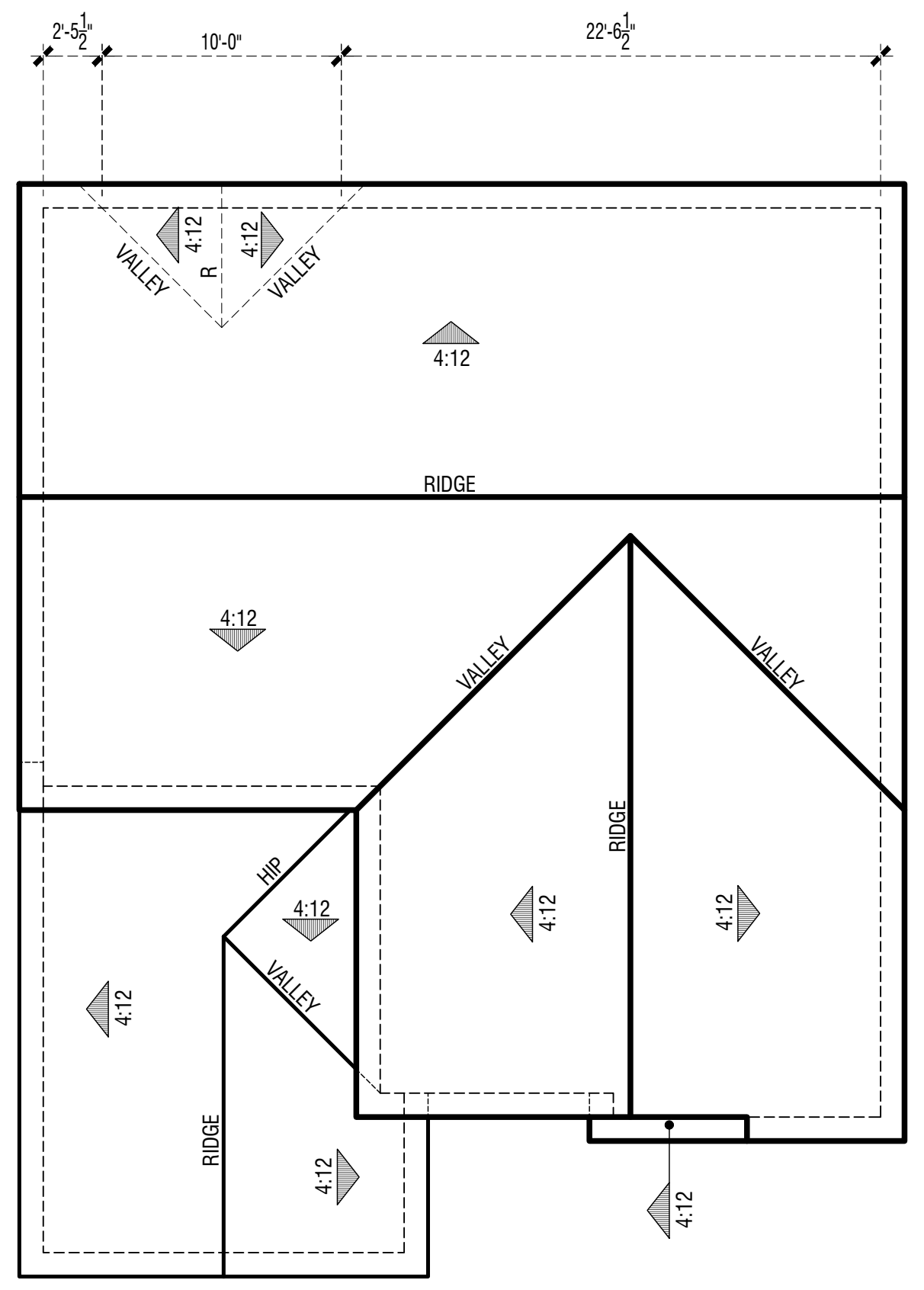
DESIGN REVIEW
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA
ORANGE COUNTY . LOS ANGELES . BAY AREA



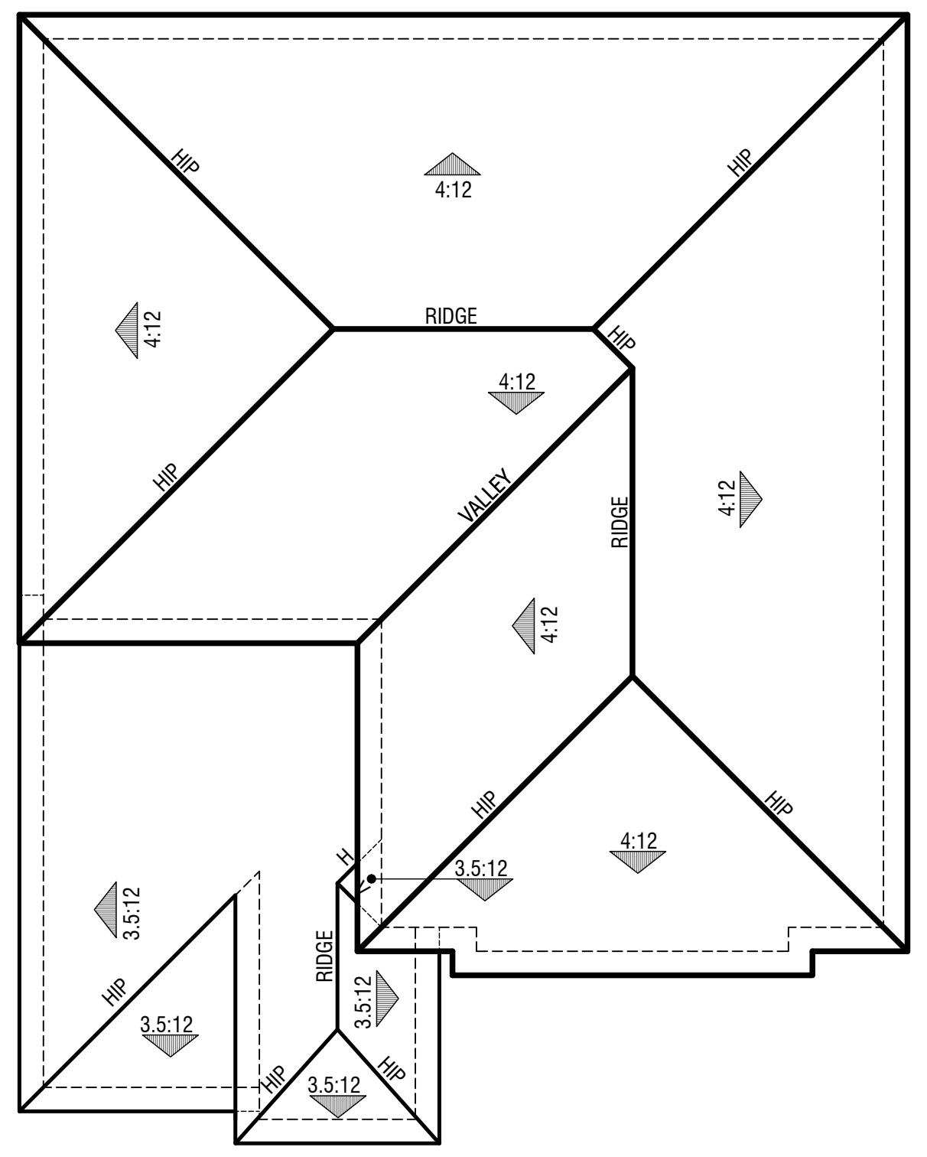
3A | Spanish

Eave 12" / Rake 12"
Concrete Low "S" Tile



3B | Traditional

Eave 12" / Rake 12"
Concrete Flat Tile



3D | Tuscan

Eave 12" / Rake 12"
Concrete Low "S" Tile

PLAN 3.1975

Roof Plans

SKYLAR PLACE - 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

3.2

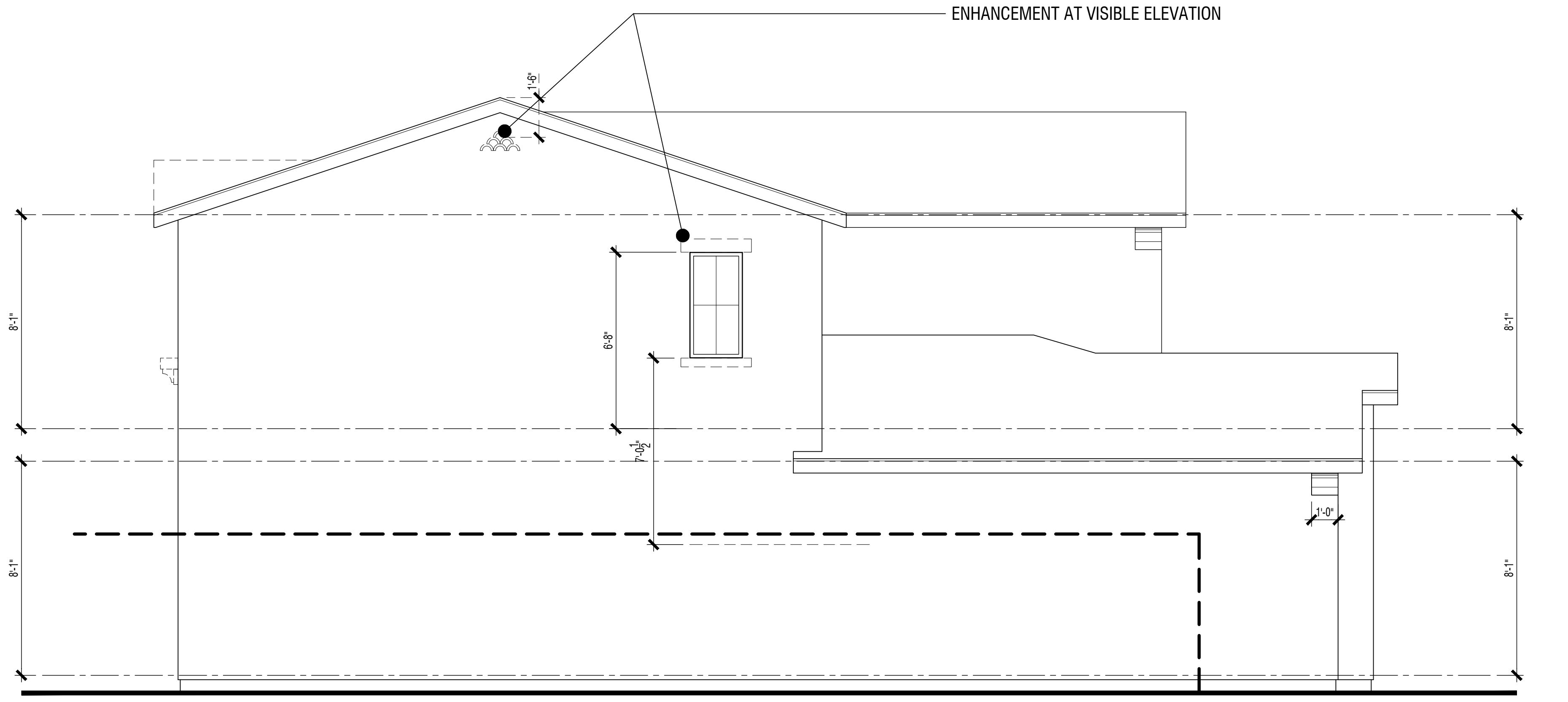
0 4 8 16

DESIGN REVIEW

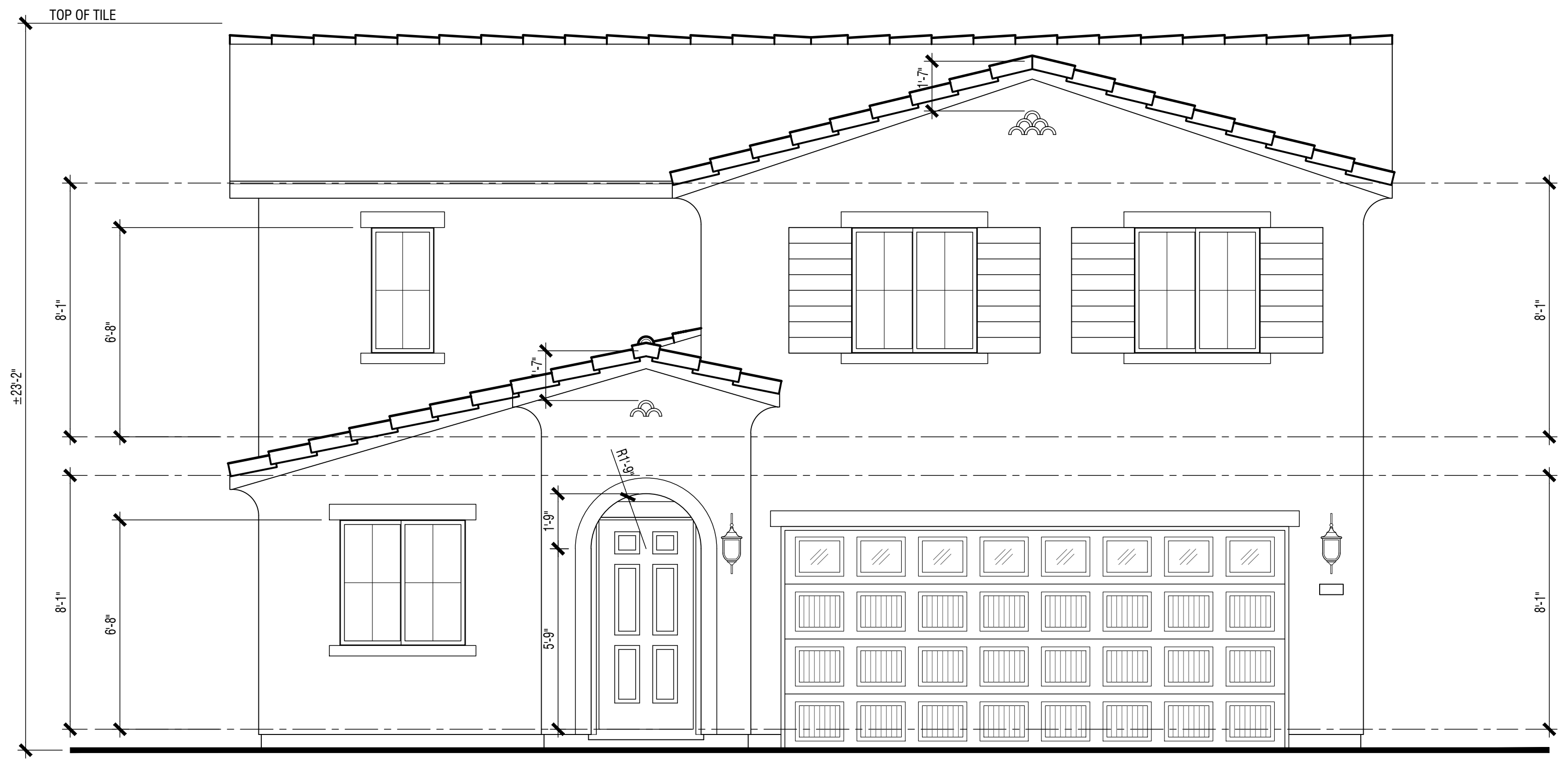
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

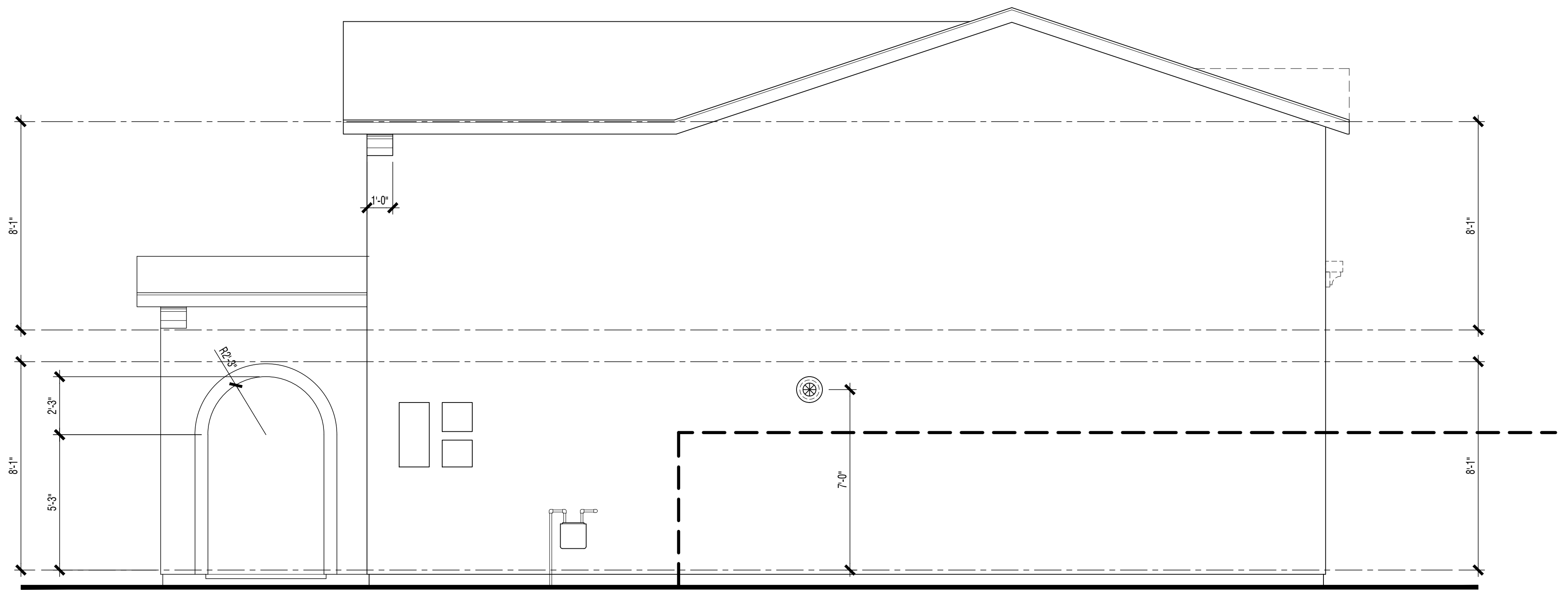
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



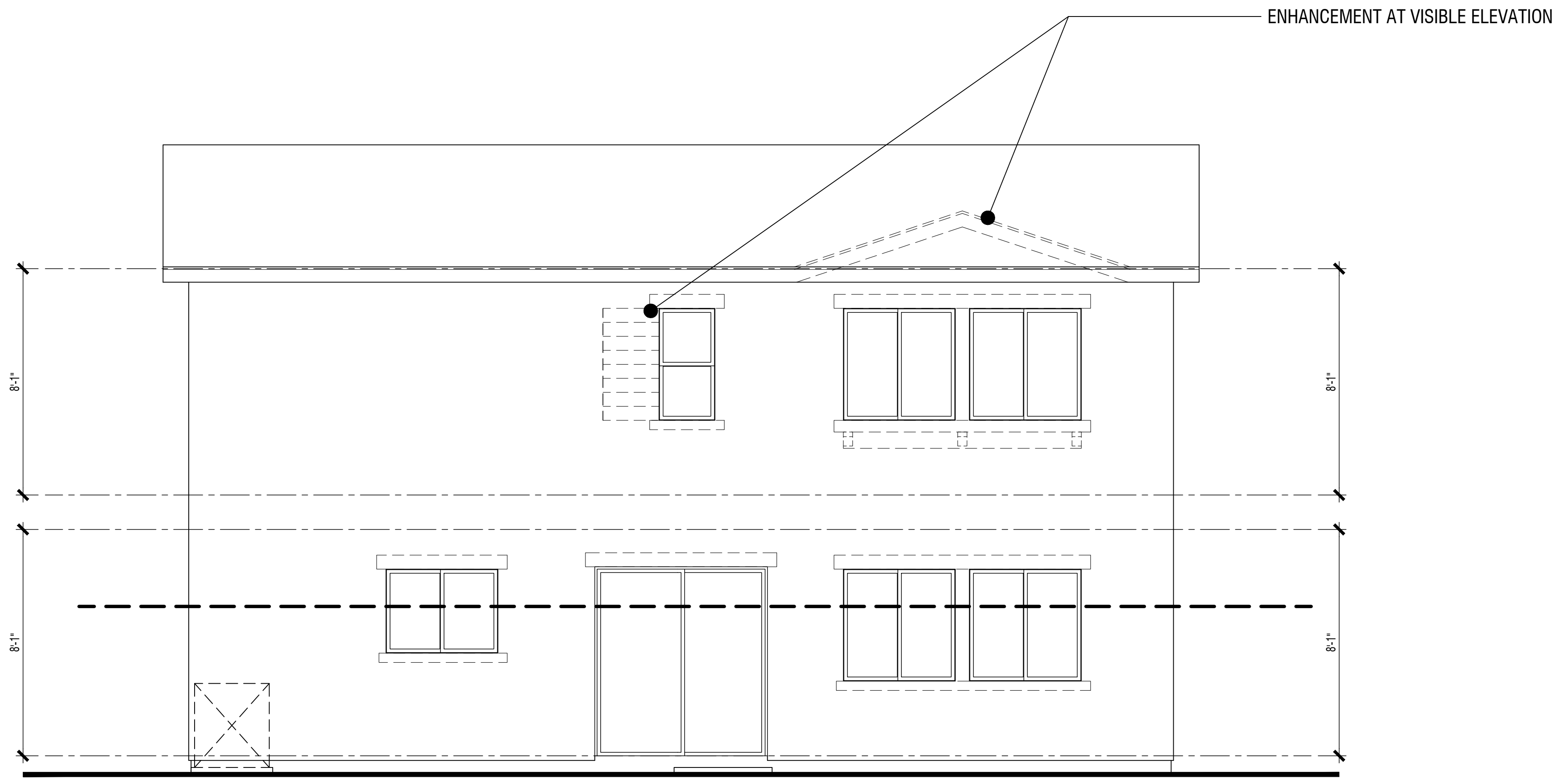
Left



Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 3A | SPANISH

Building Elevations

SKYLAR PLACE- 4500

Express
HOMES
a D.R. Horton Company

EXPRESS

MORENO VALLEY, CA

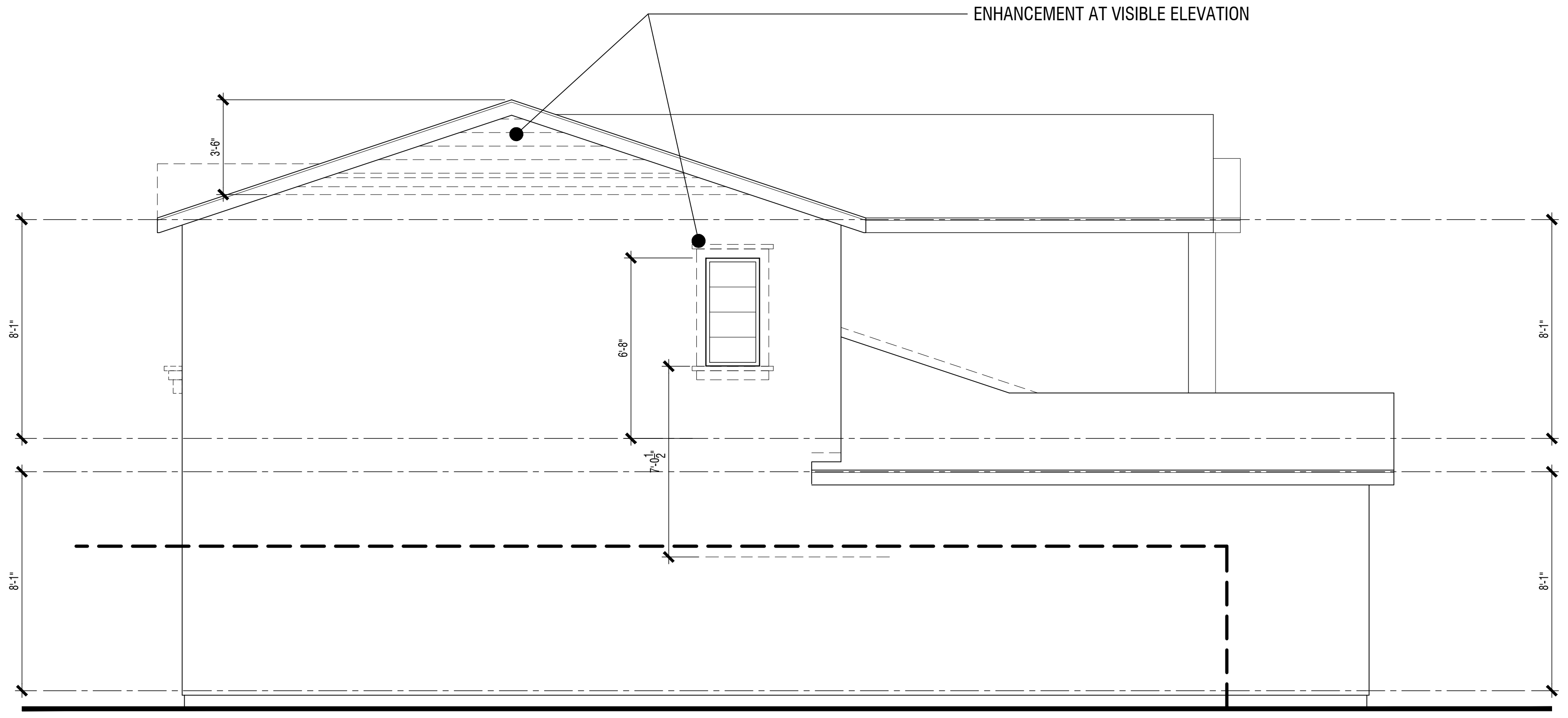
3.4

0 2 4 8

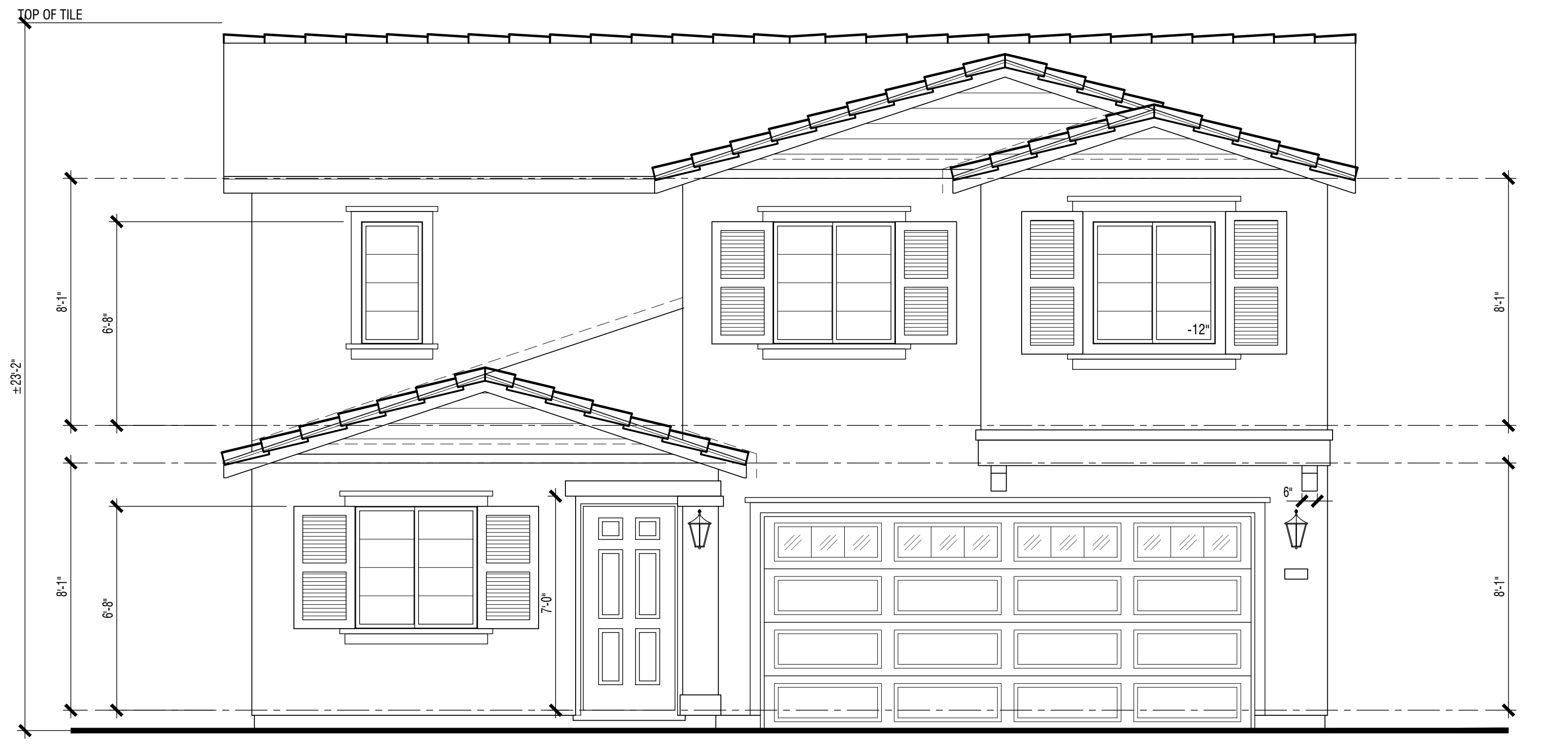
DESIGN REVIEW

| 2021272 | 09-09-21

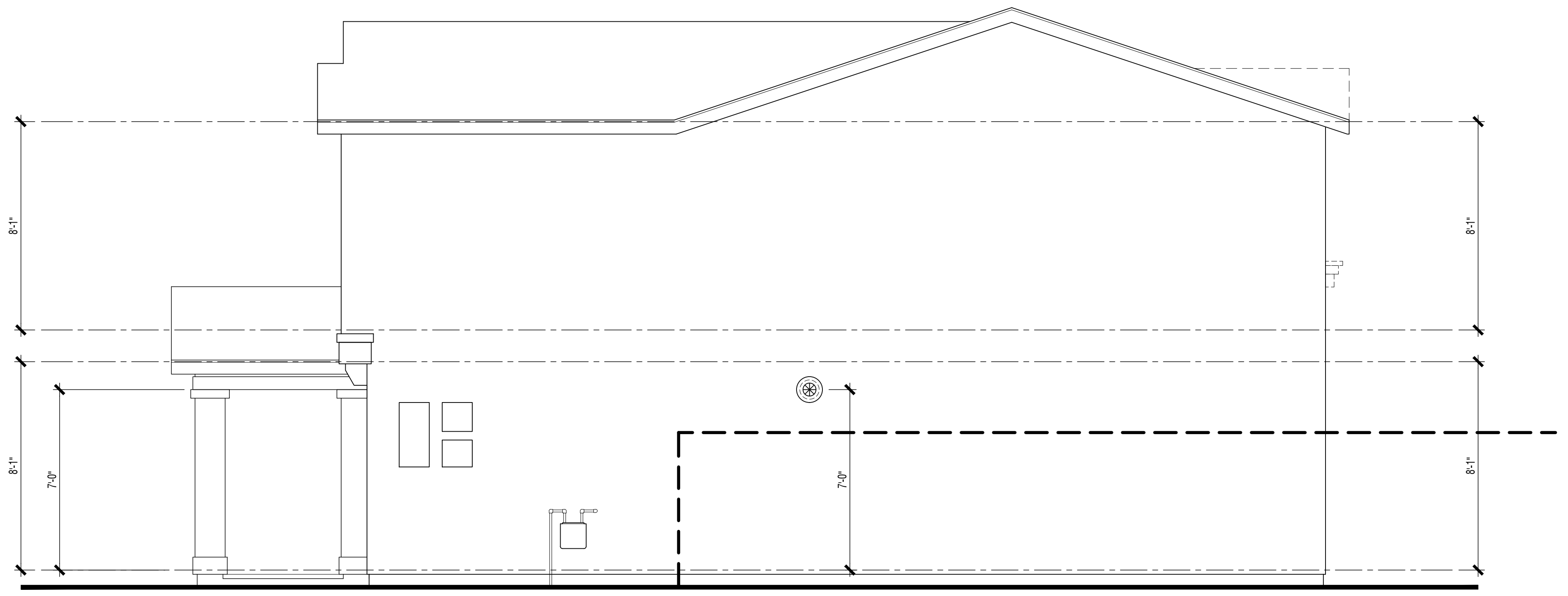
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



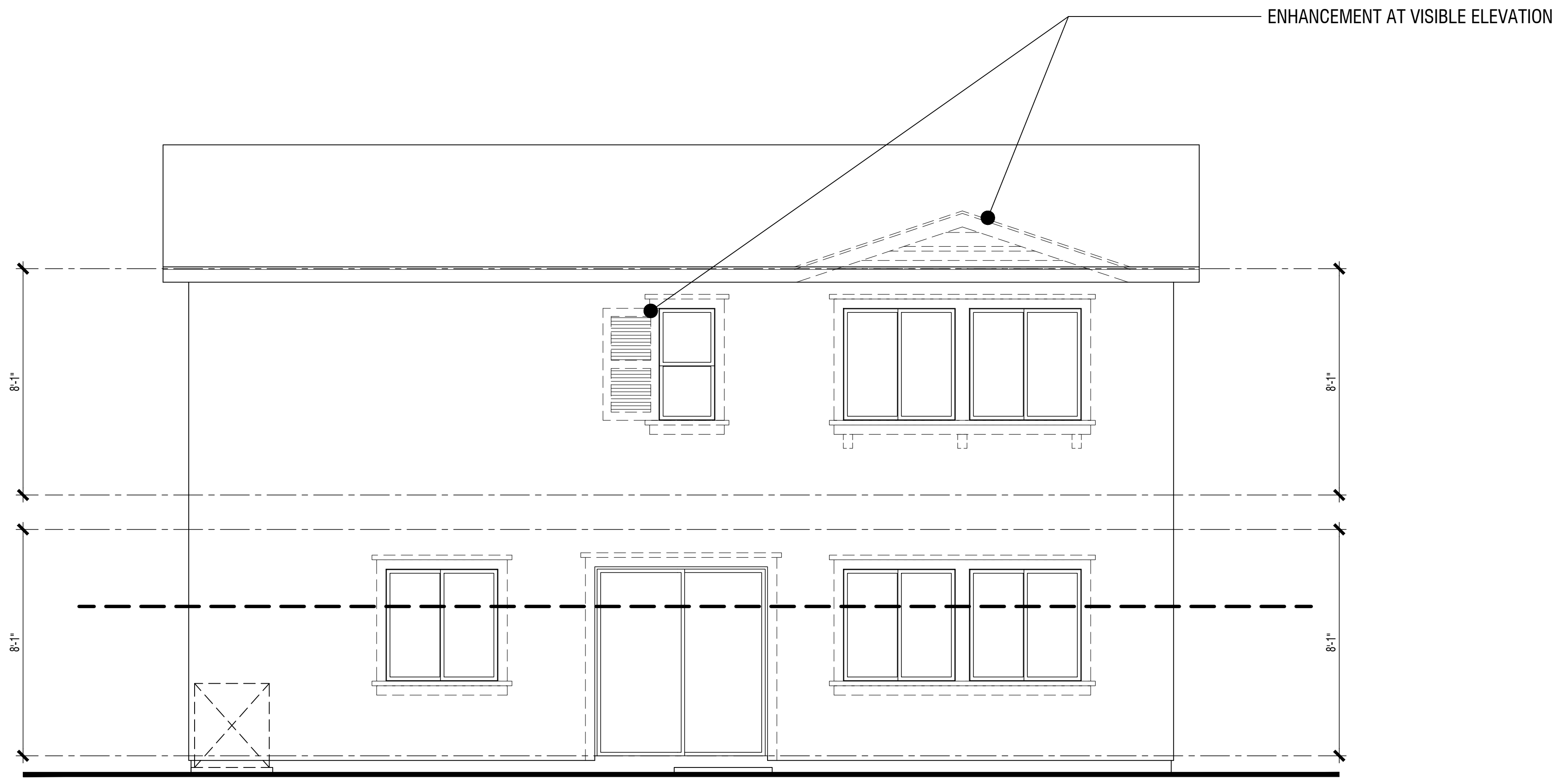
Left



Front



Right

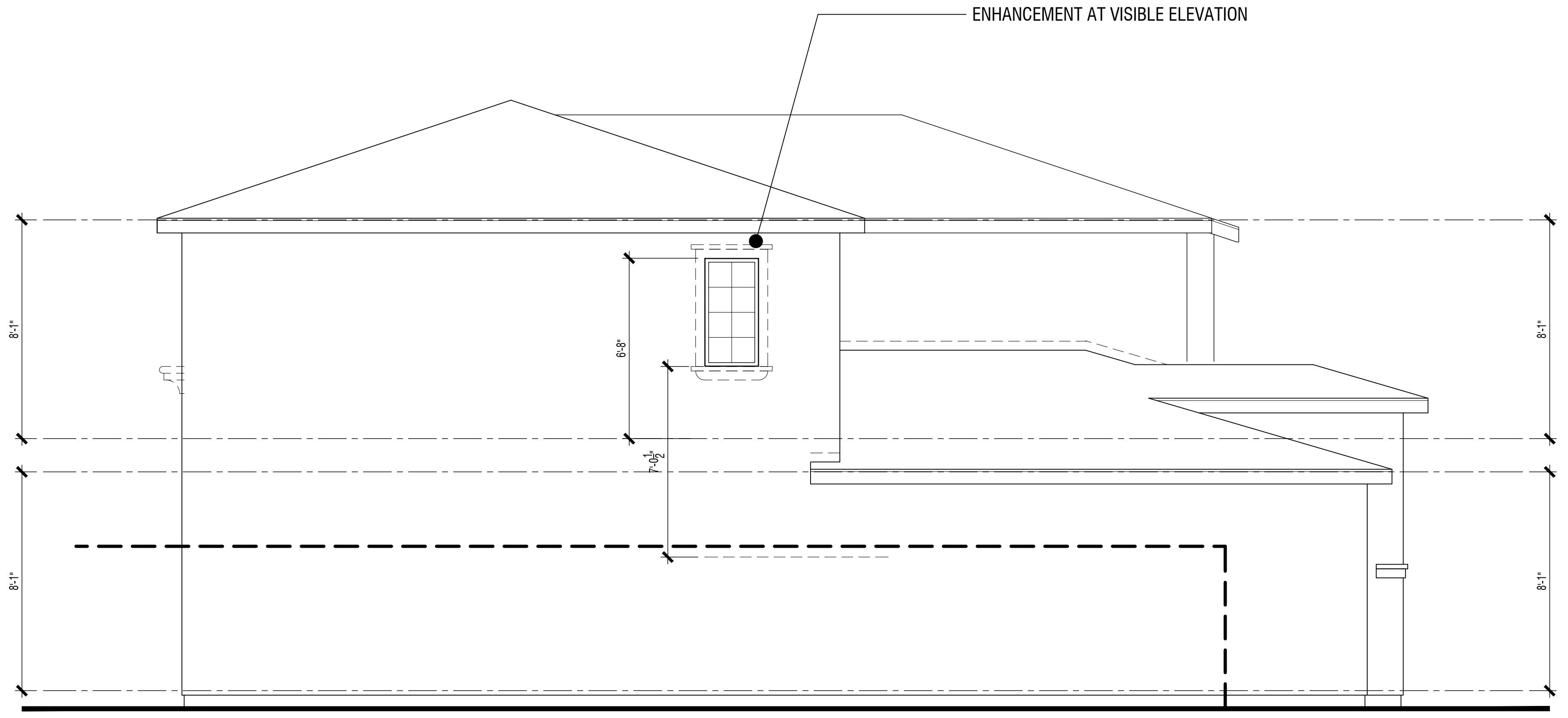


Rear

PLAN 3B | TRADITIONAL

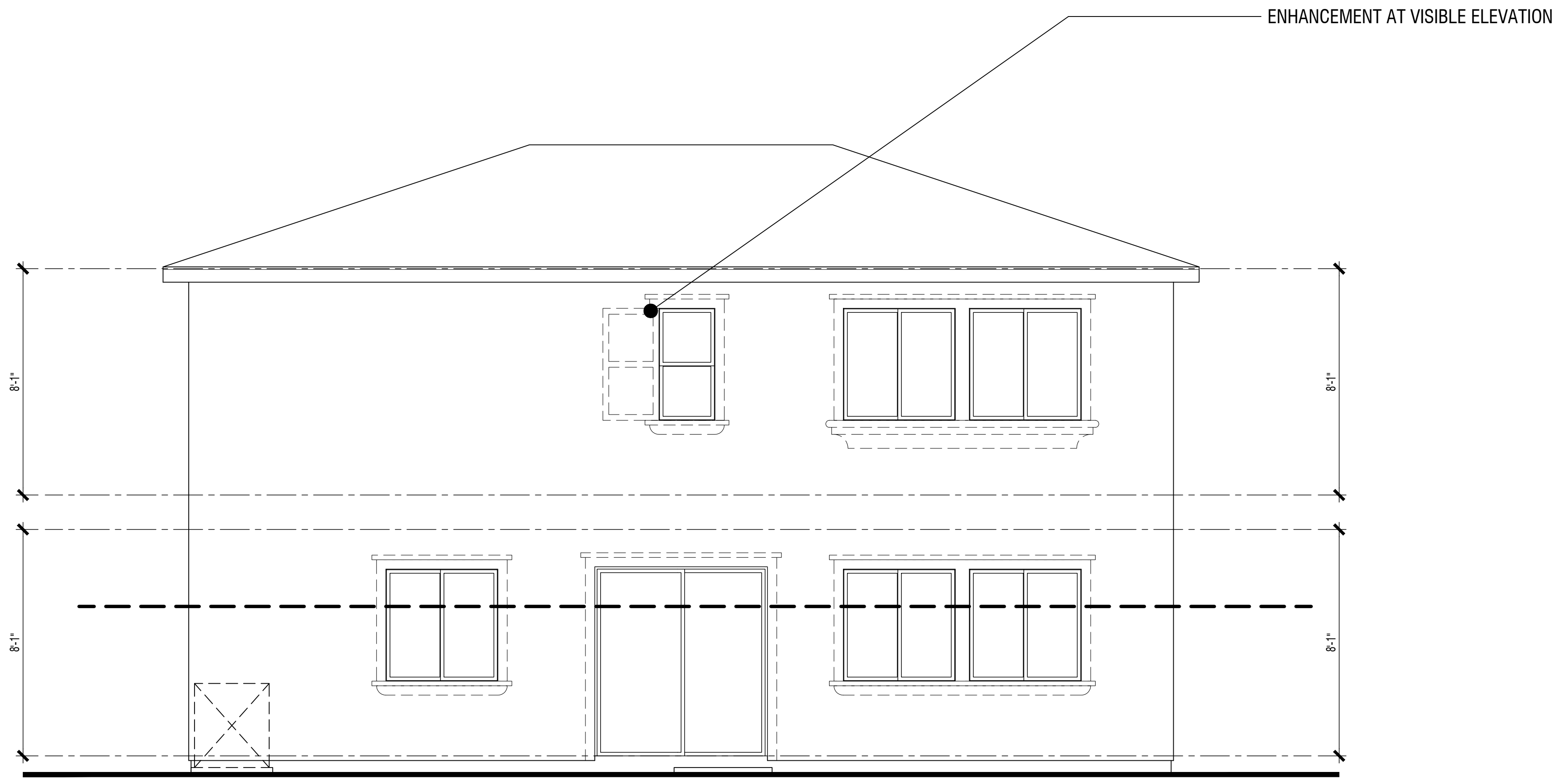
Building Elevations

3.5

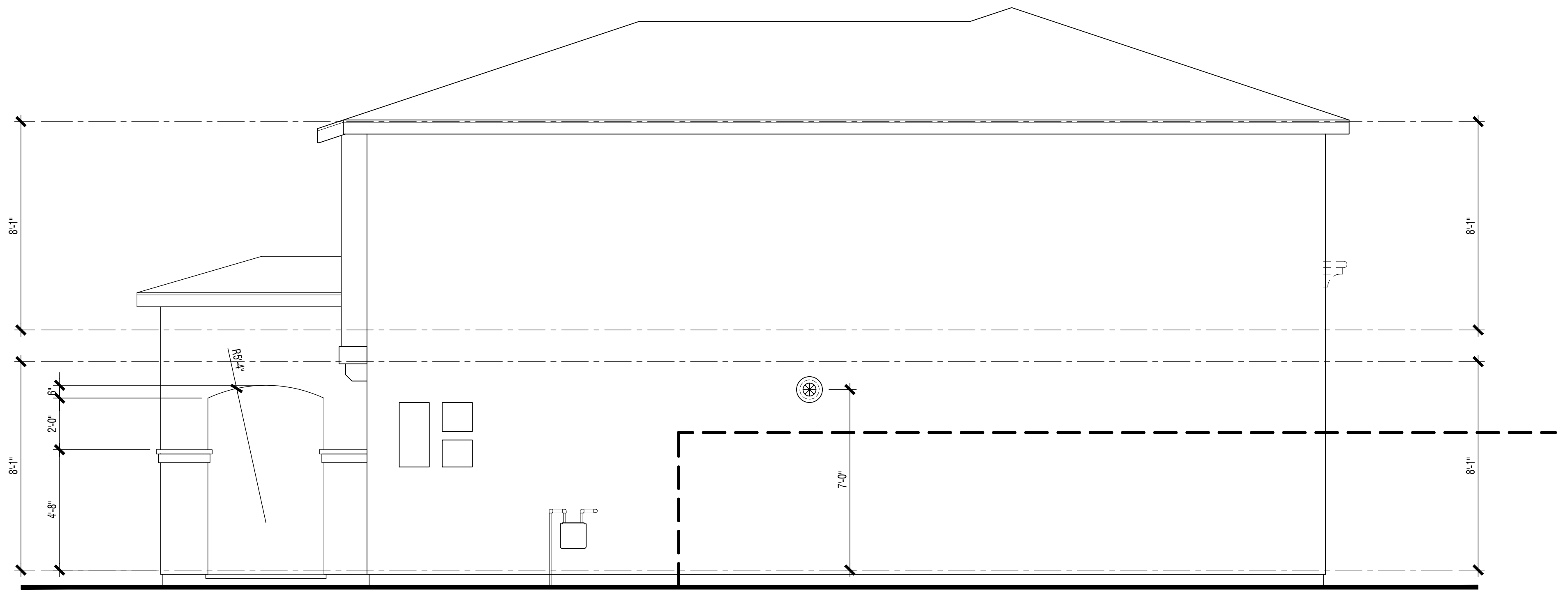


Left

Front



Rear



Right

PLAN 3D | TUSCAN

Building Elevations

3.6

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1.1898 | C - CRAFTSMAN

PLAN 4.2435 | D - TUSCAN

PLAN 3.2537 | A - SPANISH

PLAN 1.1898 | A - SPANISH

PLAN 2.2239 | D - TUSCAN

PLAN 2.2239 | B - TRADITIONAL

WINDSONG - 5000

D·R·HORTON America's Builder

Note: Artist's Conception; Colors, Materials And Application May Vary.

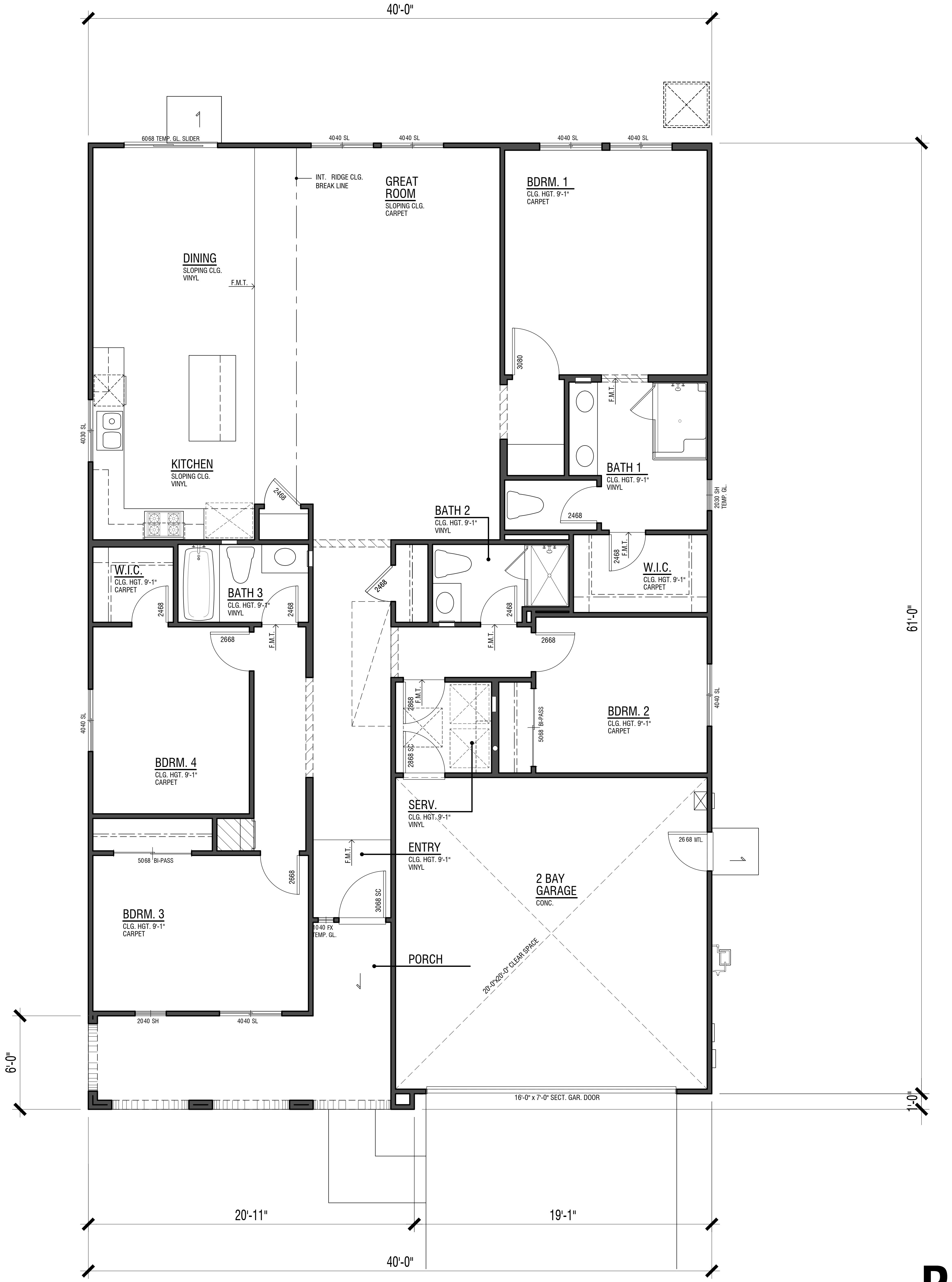
HORTON E

MORENO VALLEY, CA

DESIGN REVIEW

| 2021272 | 09-09-21

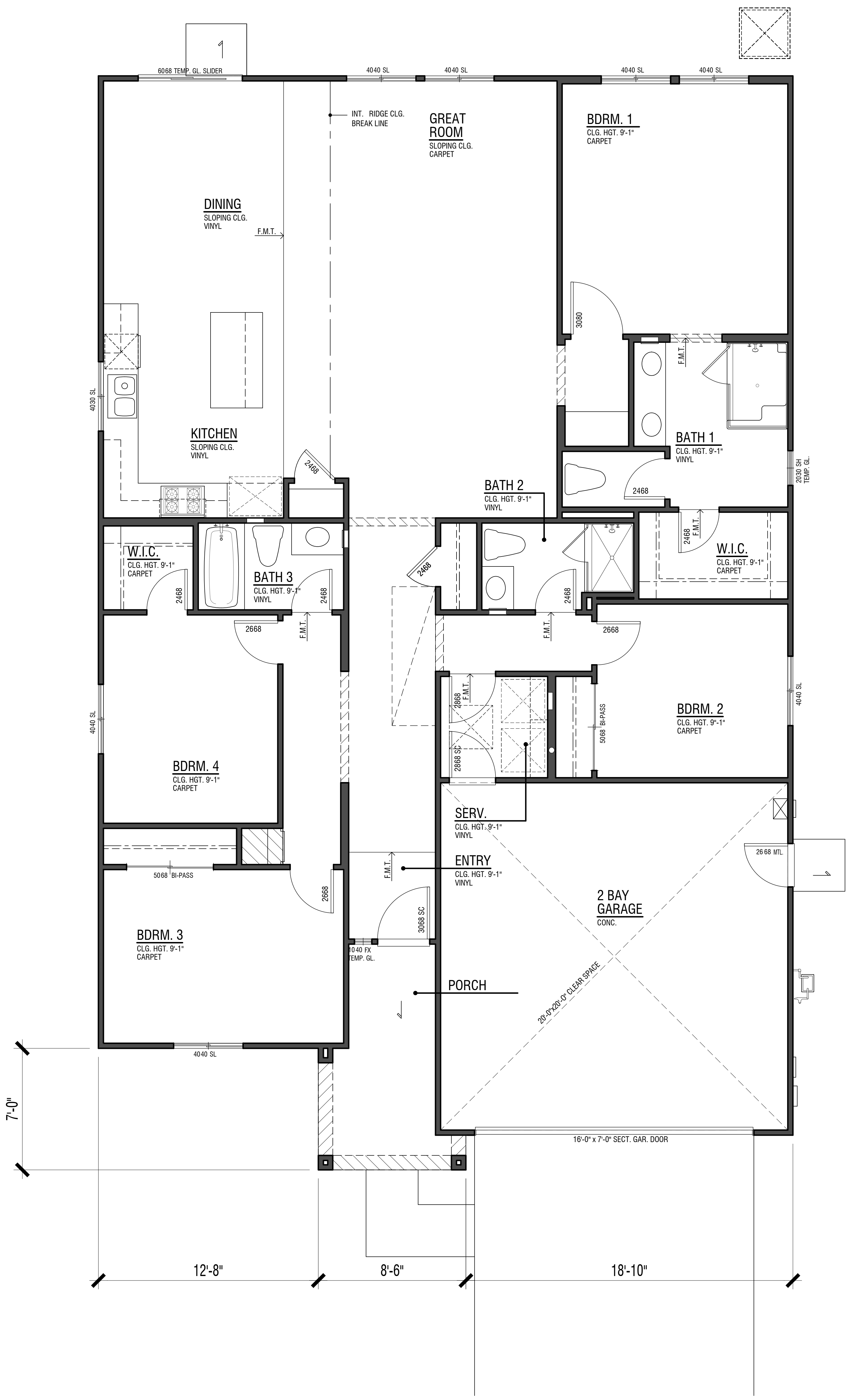
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



1A | Spanish

PLAN 1.1898

1,898 SF
4 Bdrm | 3 Bath
2 Bay Garage
9' Plate



1B | Traditional

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

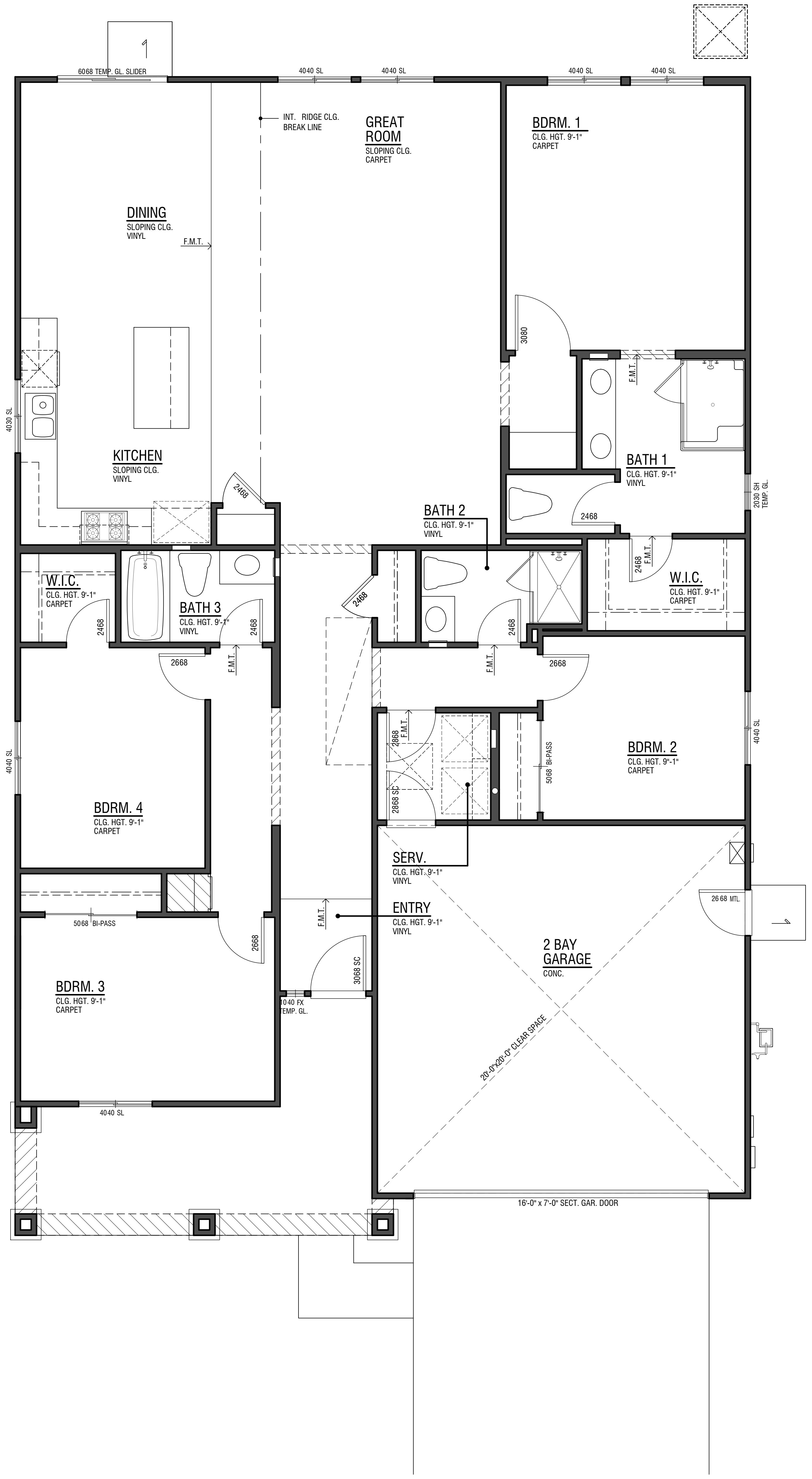
1.0

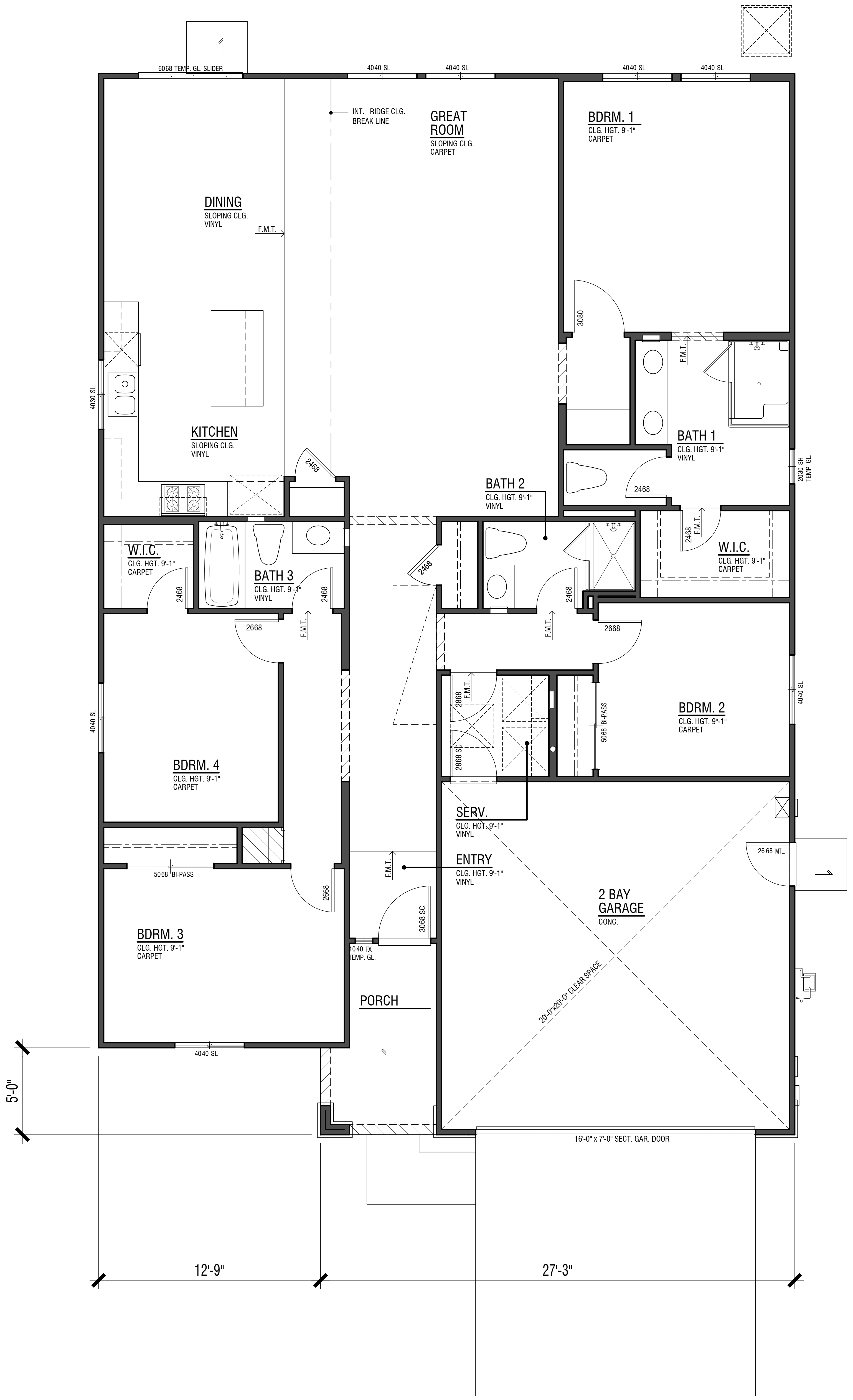
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA





PLAN 1.1898

1,898 SF
4 Bdrm | 3 Bath
2 Bay Garage
9' Plate

1C | CRAFTSMAN

1D | Tuscan

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

1.1

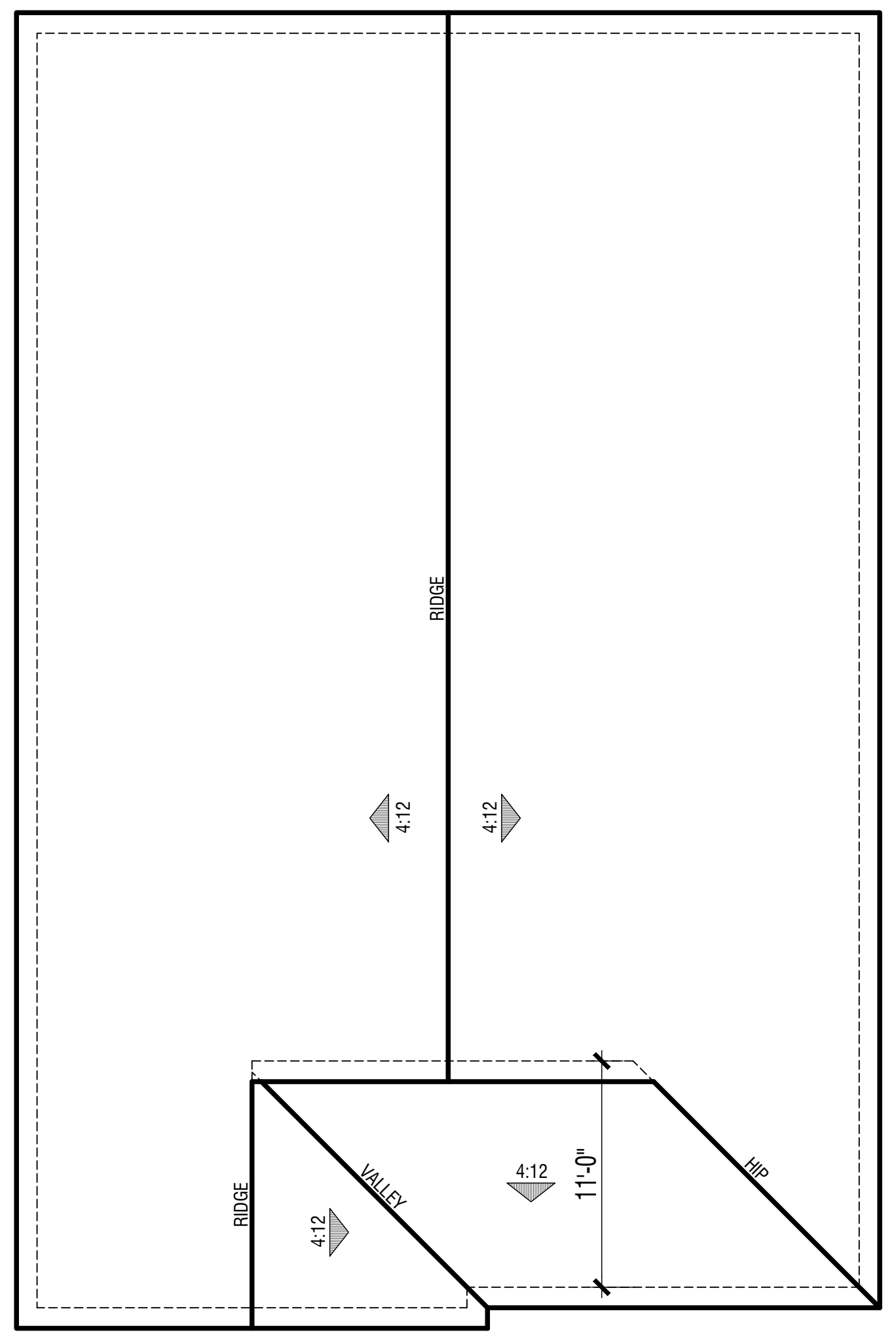
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

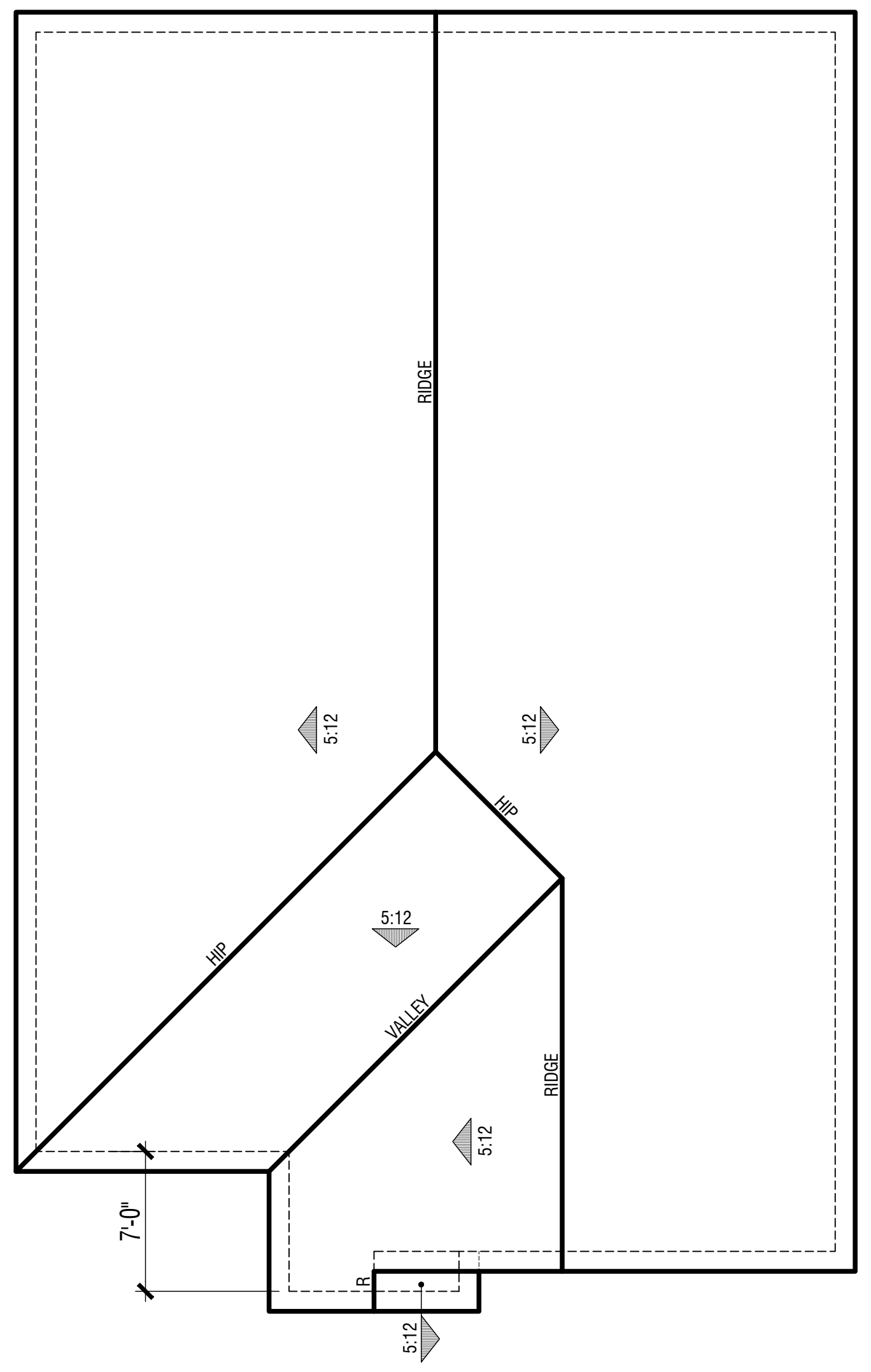
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



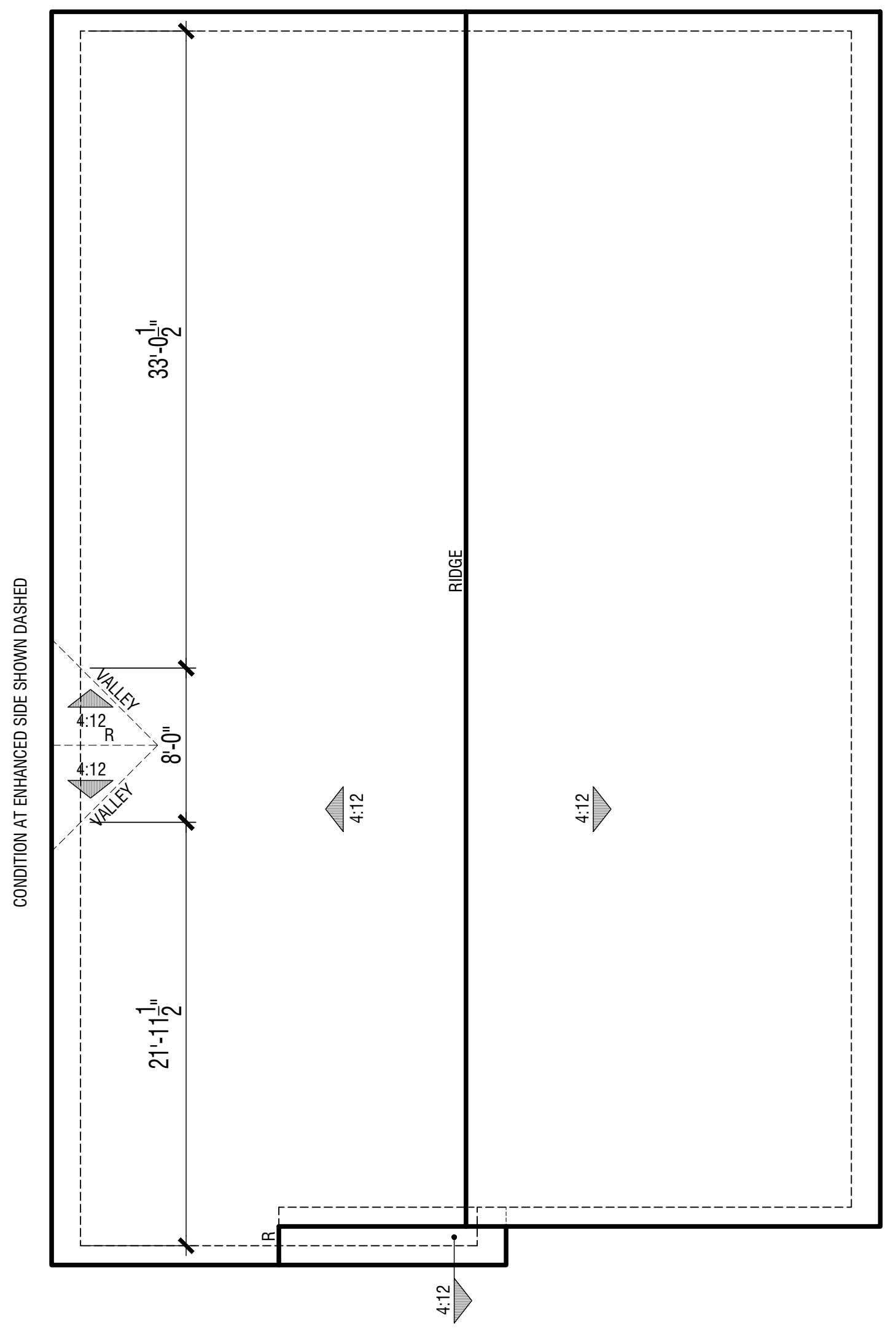
1A | Spanish

Eave 12" / Rake 12"
Concrete "S" Tile



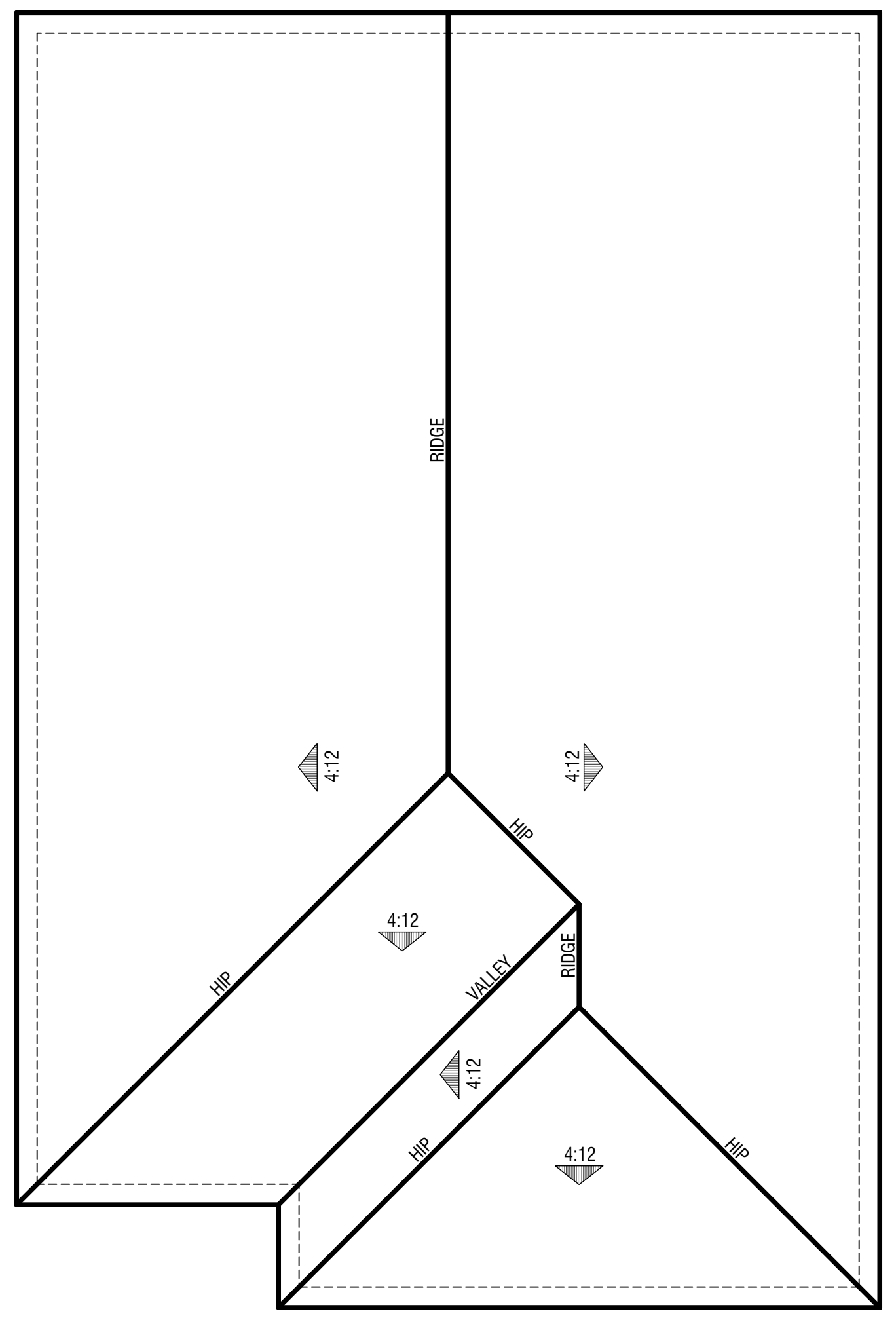
1B | Traditional

Eave 12" / Rake 12"
Concrete Flat Tile



1C | Craftsman

Eave 12" / Rake 12"
Concrete Flat Tile



1D | Tuscan

Eave 12" / Rake 12"
Concrete "S" Tile

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1.1898

Roof Plans

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

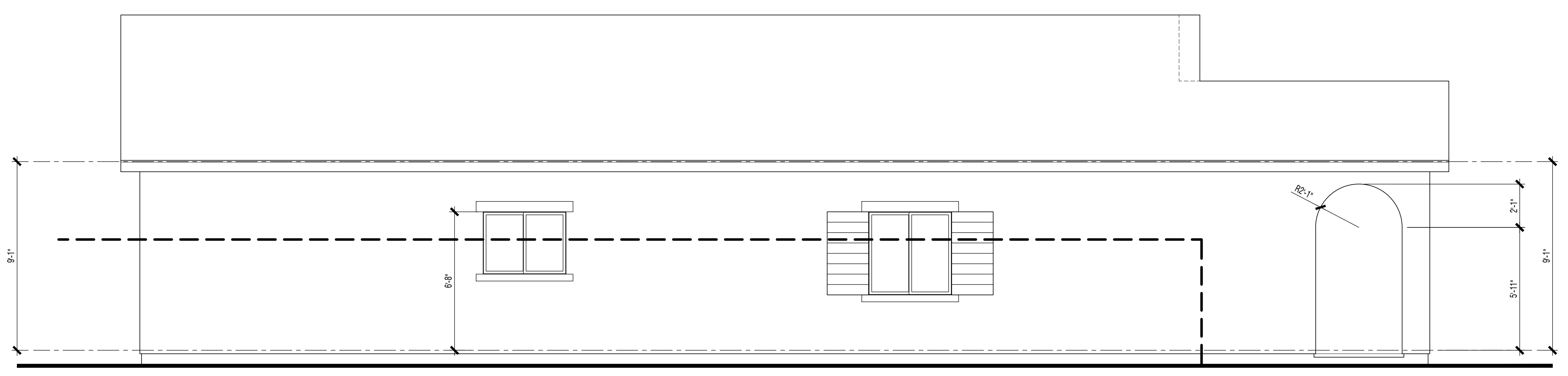
1.2

0 4 8 16

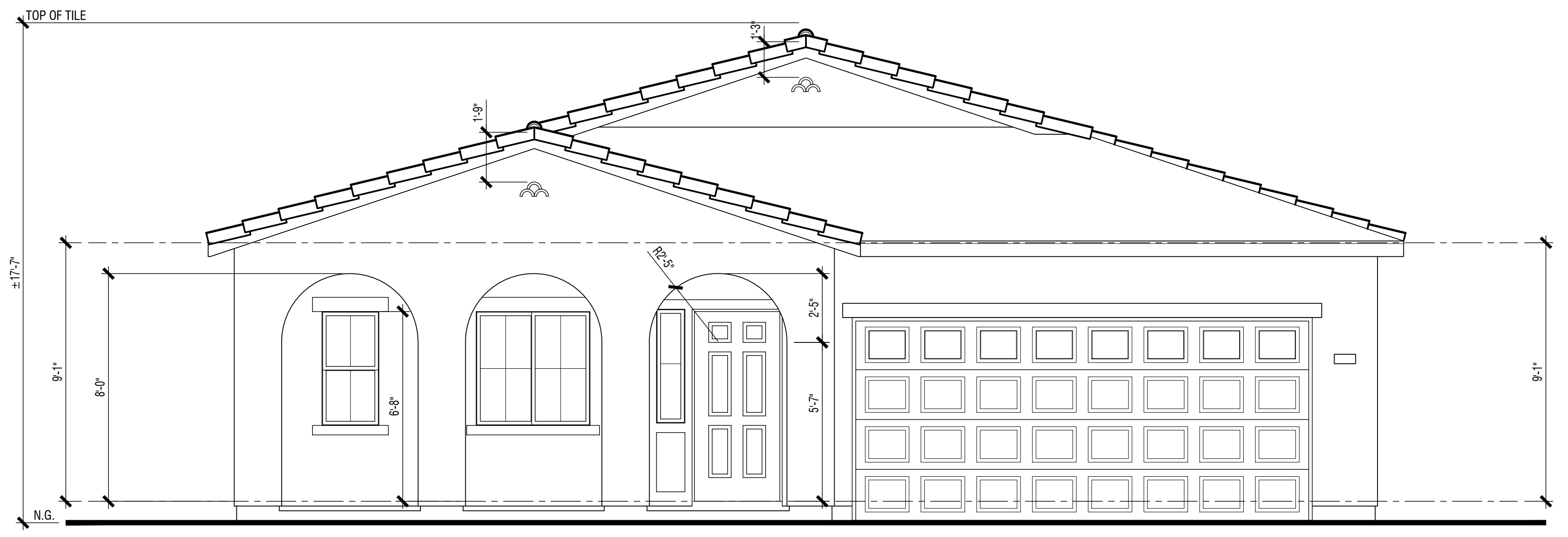
DESIGN REVIEW

| 2021272 | 09-09-21

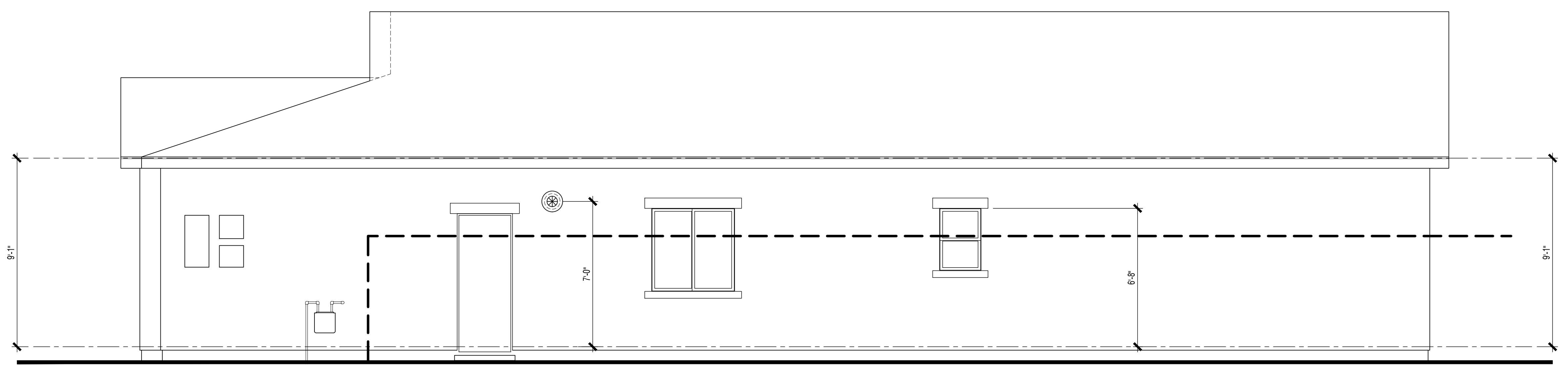
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



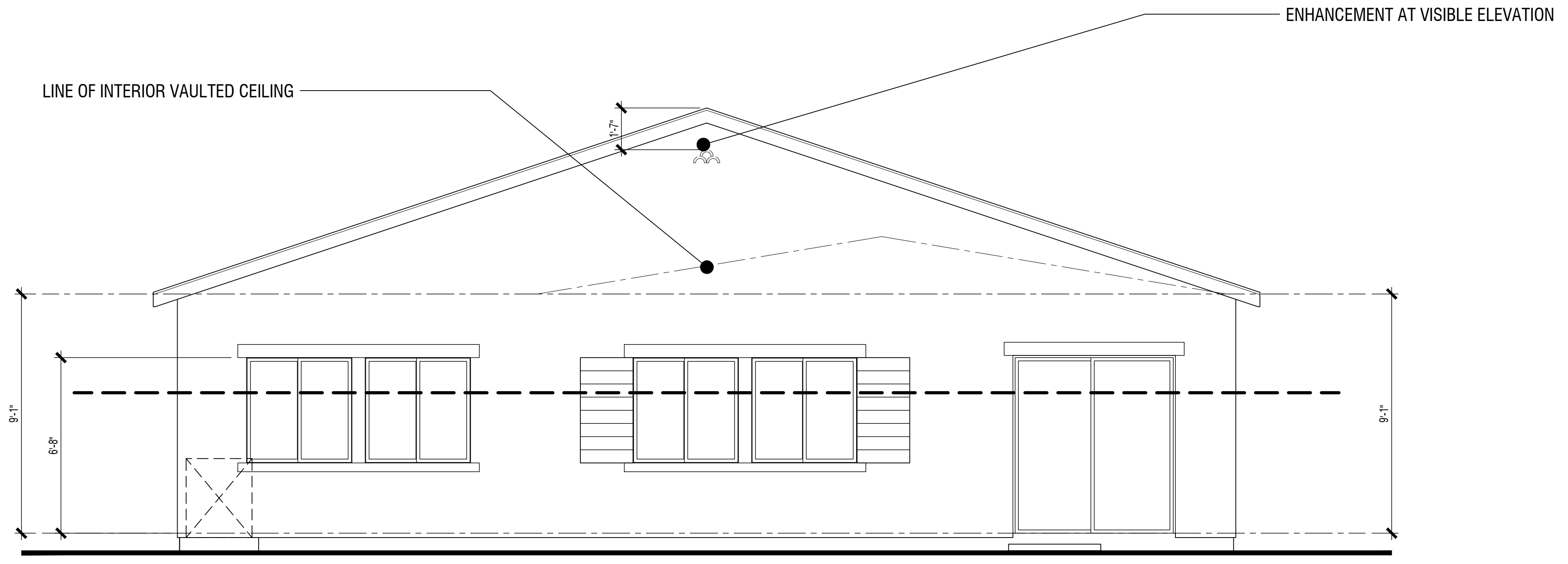
Left



Front



Right



Rear

PLAN 1A | SPANISH

Building Elevations

WINDSONG - 5000

D·R·HORTON DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

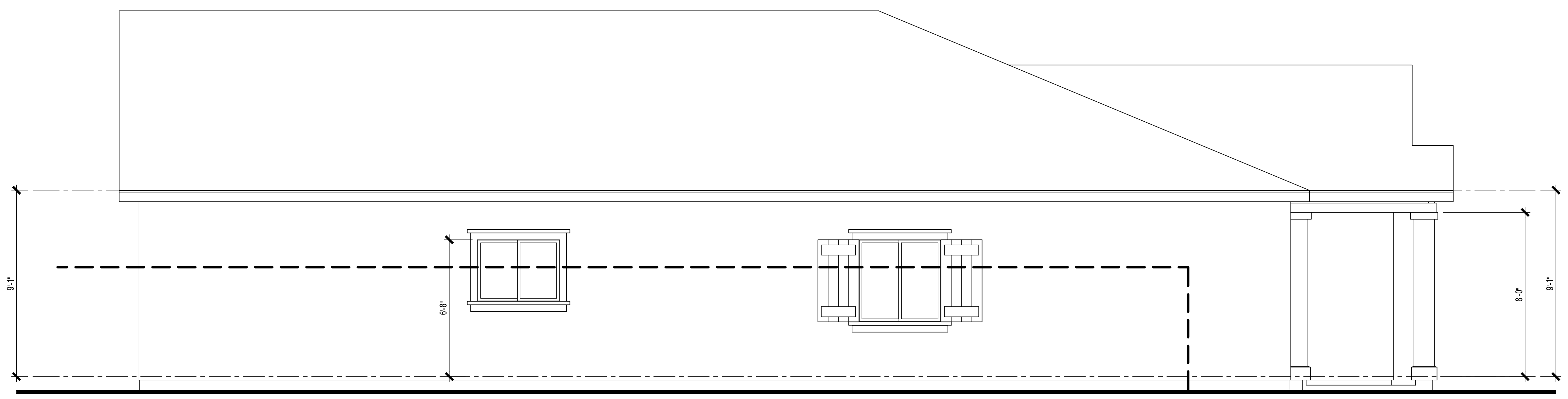
1.4

0 2 4 8

DESIGN REVIEW

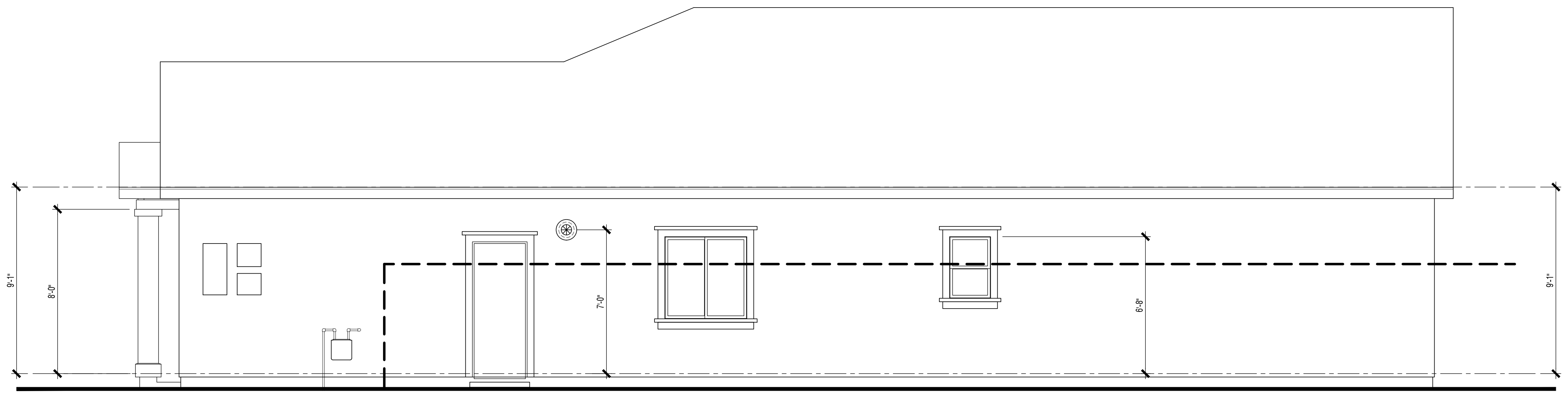
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

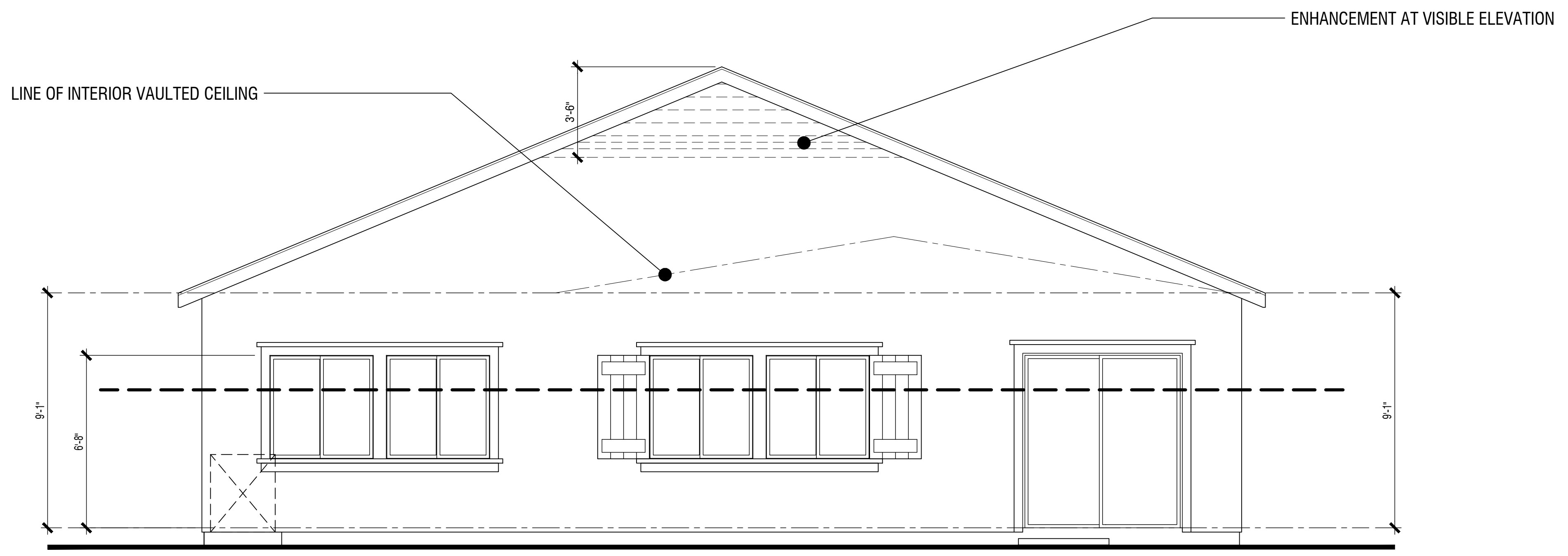


Left

Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1B | TRADITIONAL

Building Elevations

WINDSONG- 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

1.5

0 2 4 8

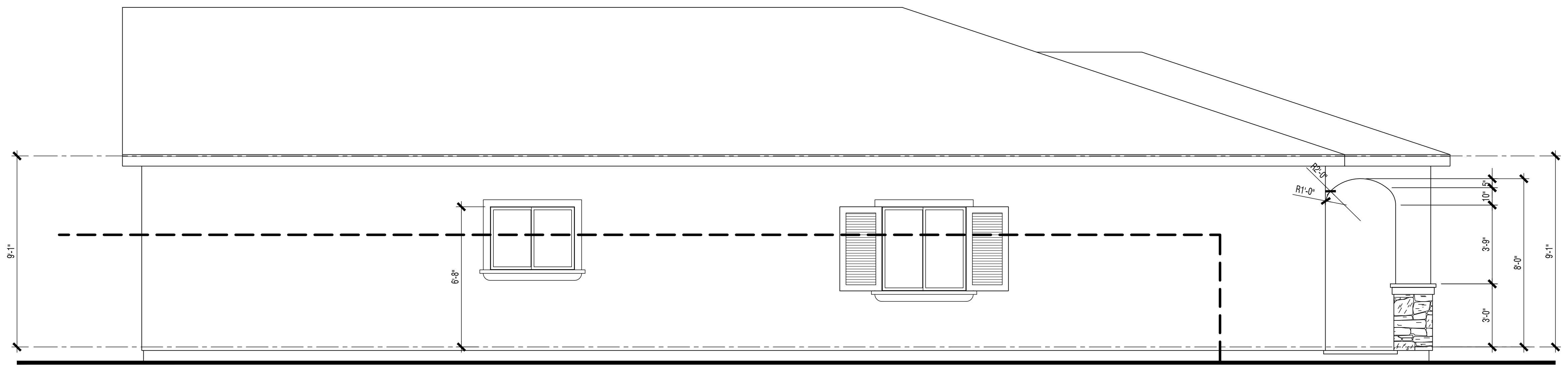
DESIGN REVIEW

| 2021272 | 09-09-21

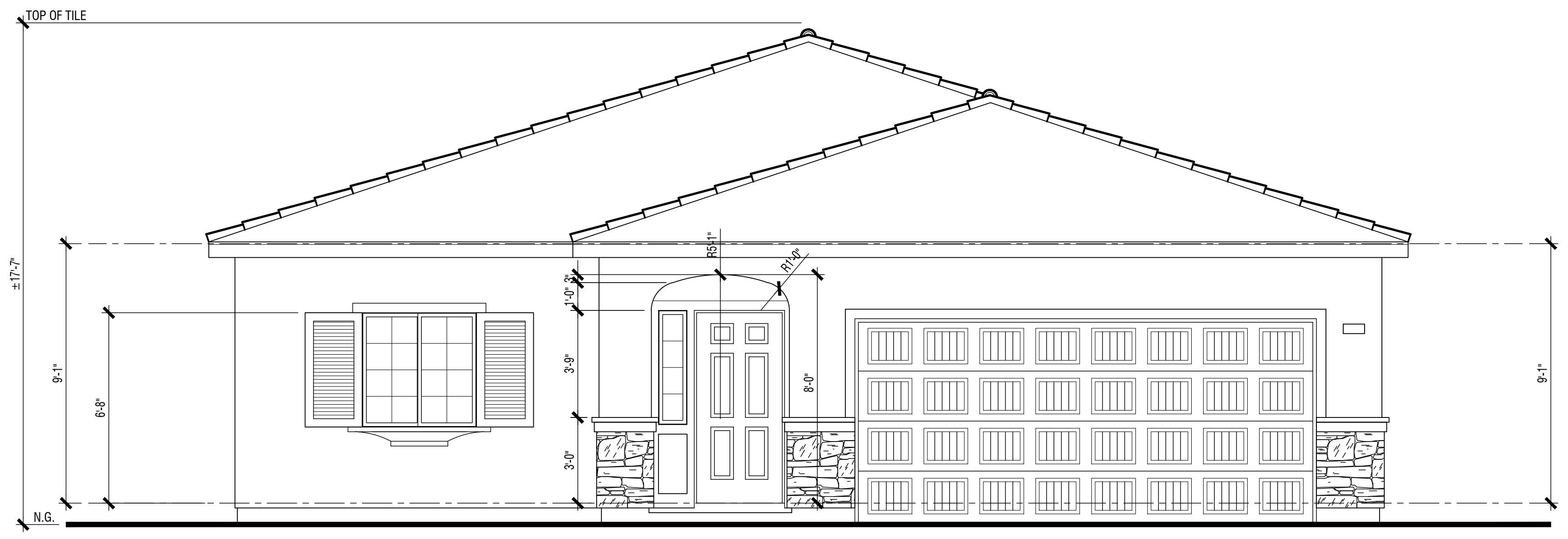
ARCHITECTS . PLANNERS . DESIGNERS

WHA.

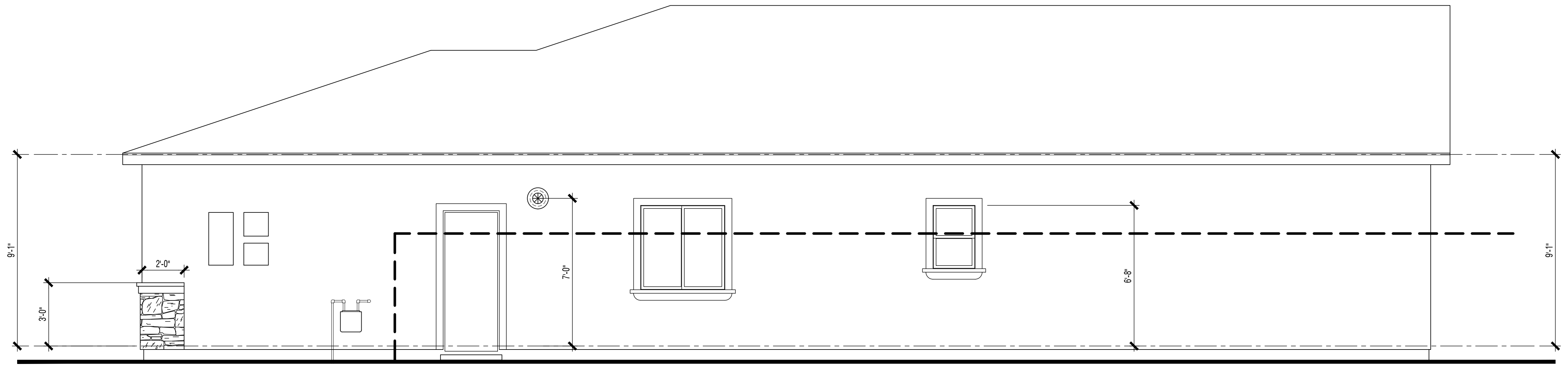
ORANGE COUNTY . LOS ANGELES . BAY AREA



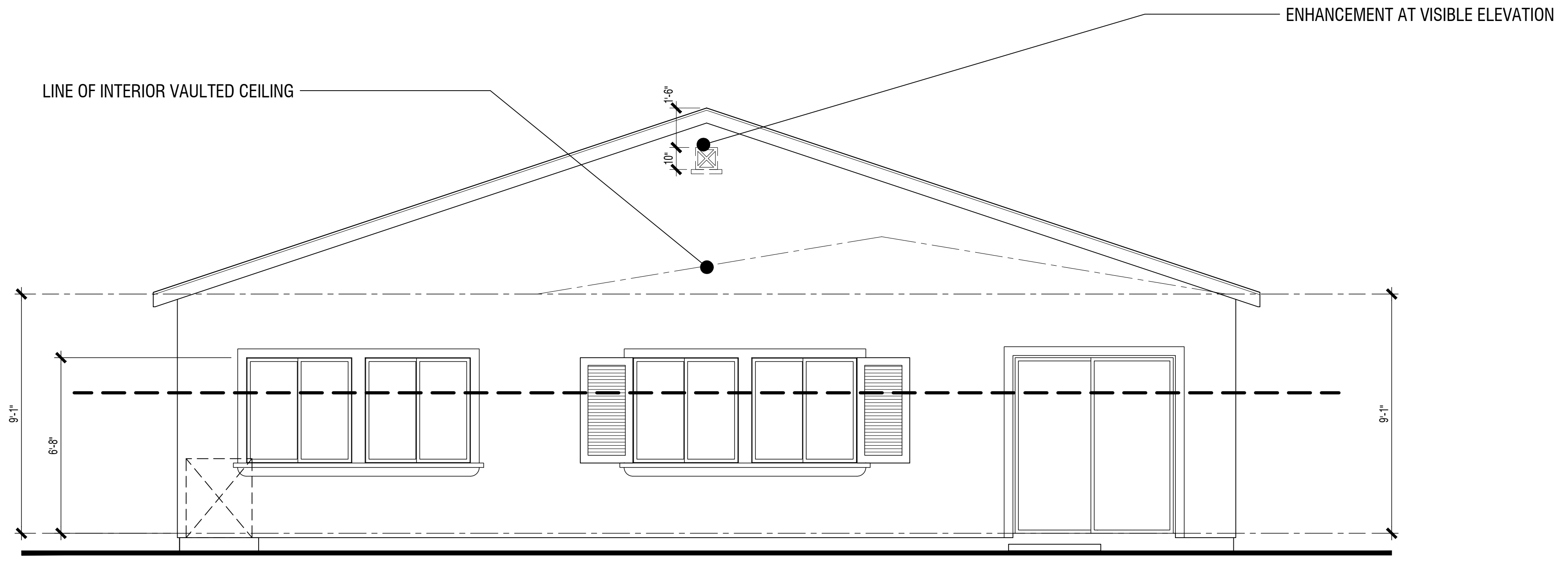
Left



Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 1D | TUSCAN

Building Elevations

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

1.6

0 2 4 8

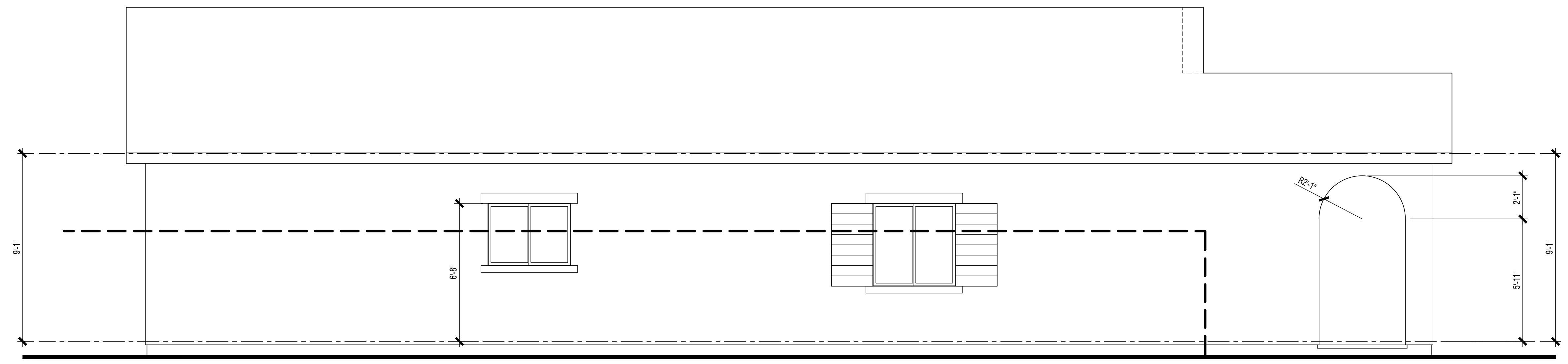
DESIGN REVIEW

| 2021272 | 09-09-21

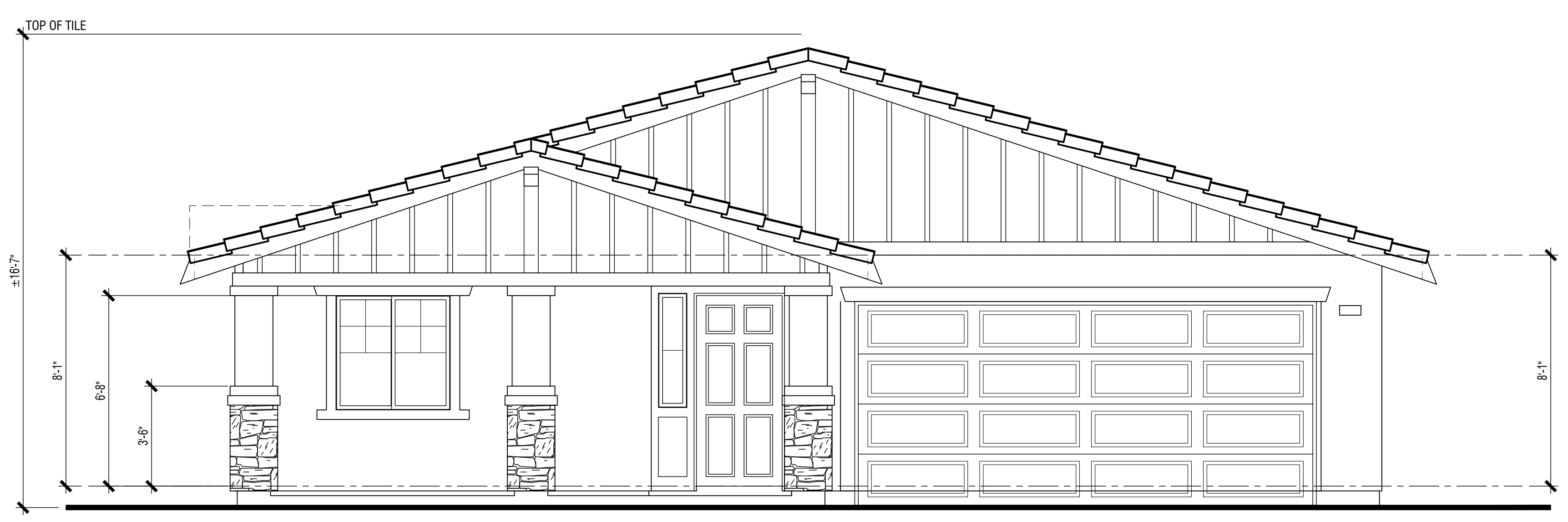
ARCHITECTS . PLANNERS . DESIGNERS

WHA.

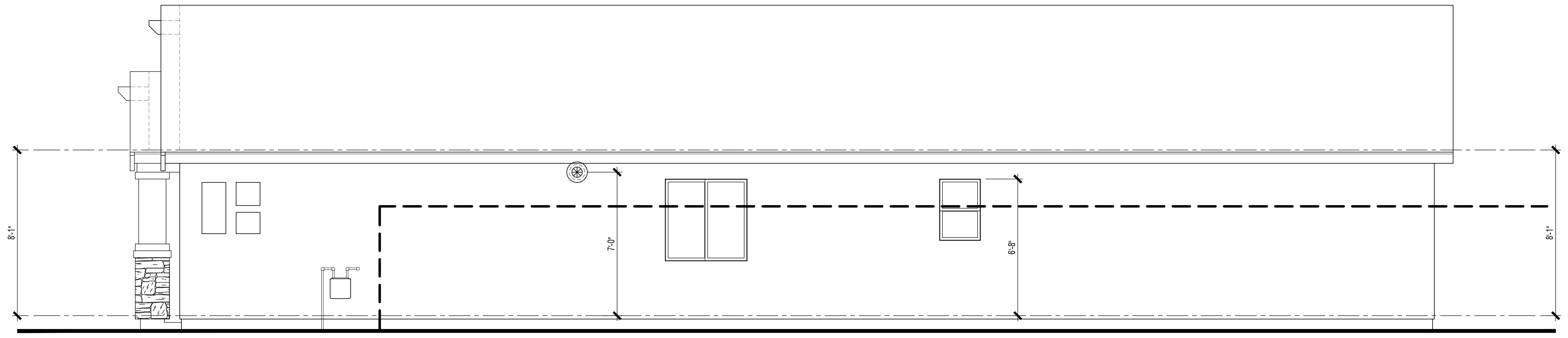
ORANGE COUNTY . LOS ANGELES . BAY AREA



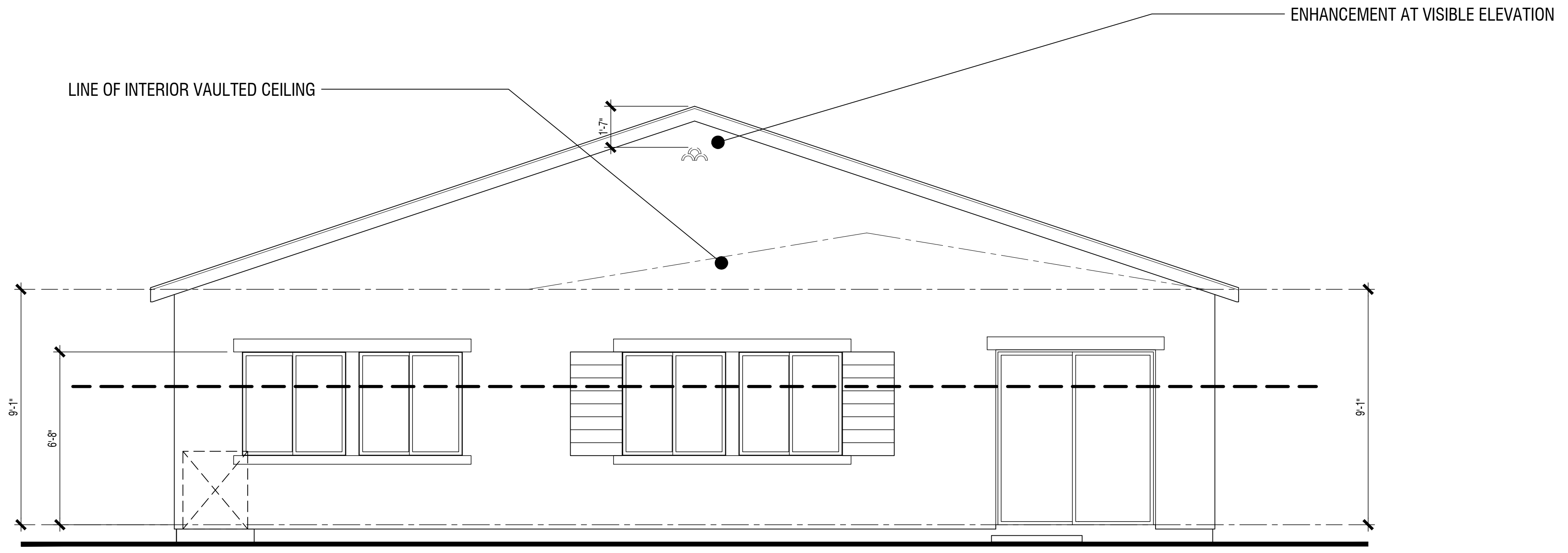
Left



Front



Right



Rear

PLAN 1C | CRAFTSMAN

Building Elevations

WINDSONG - 5000

D·R·HORTON DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

1.7

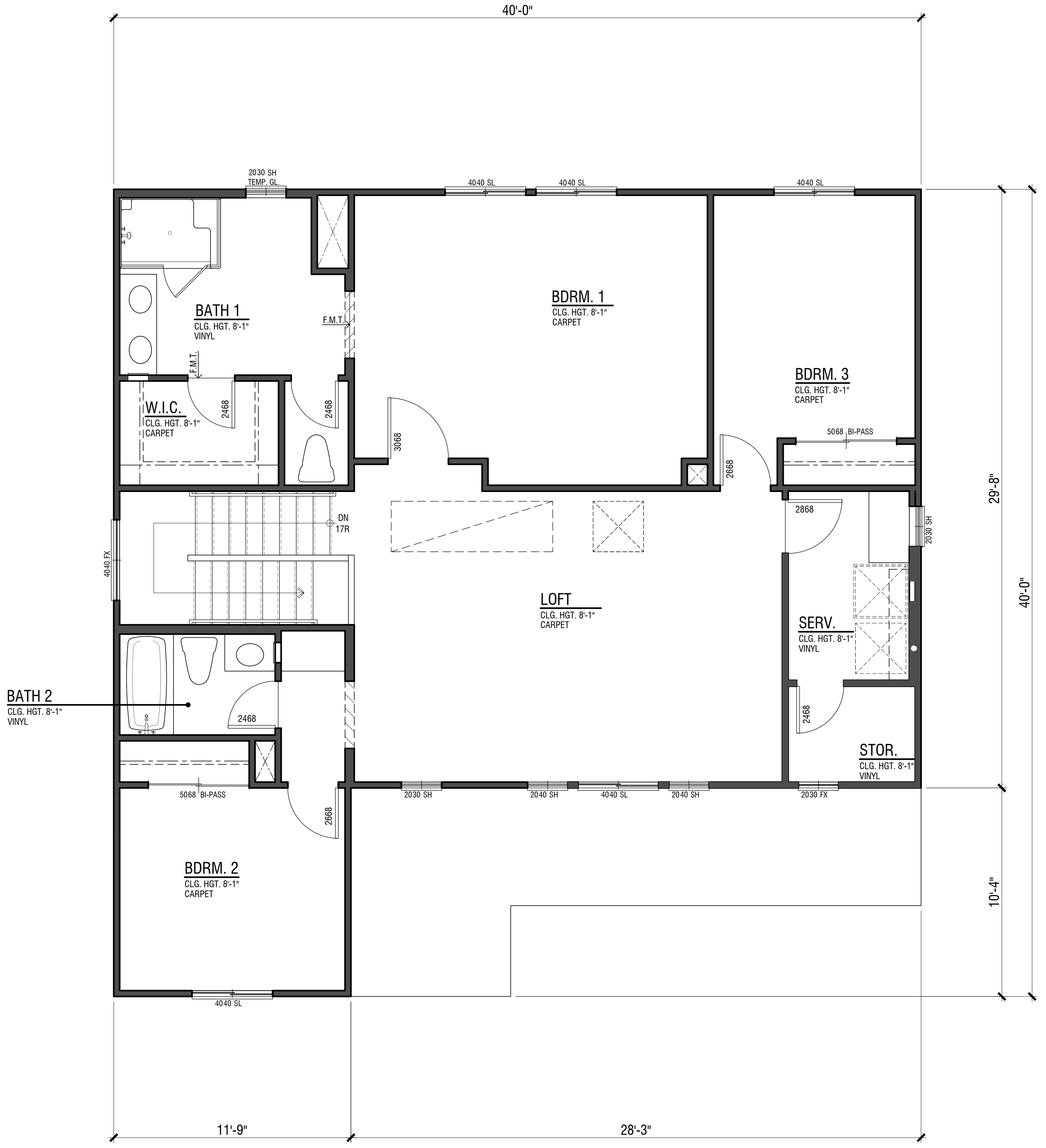
0 2 4 8

DESIGN REVIEW

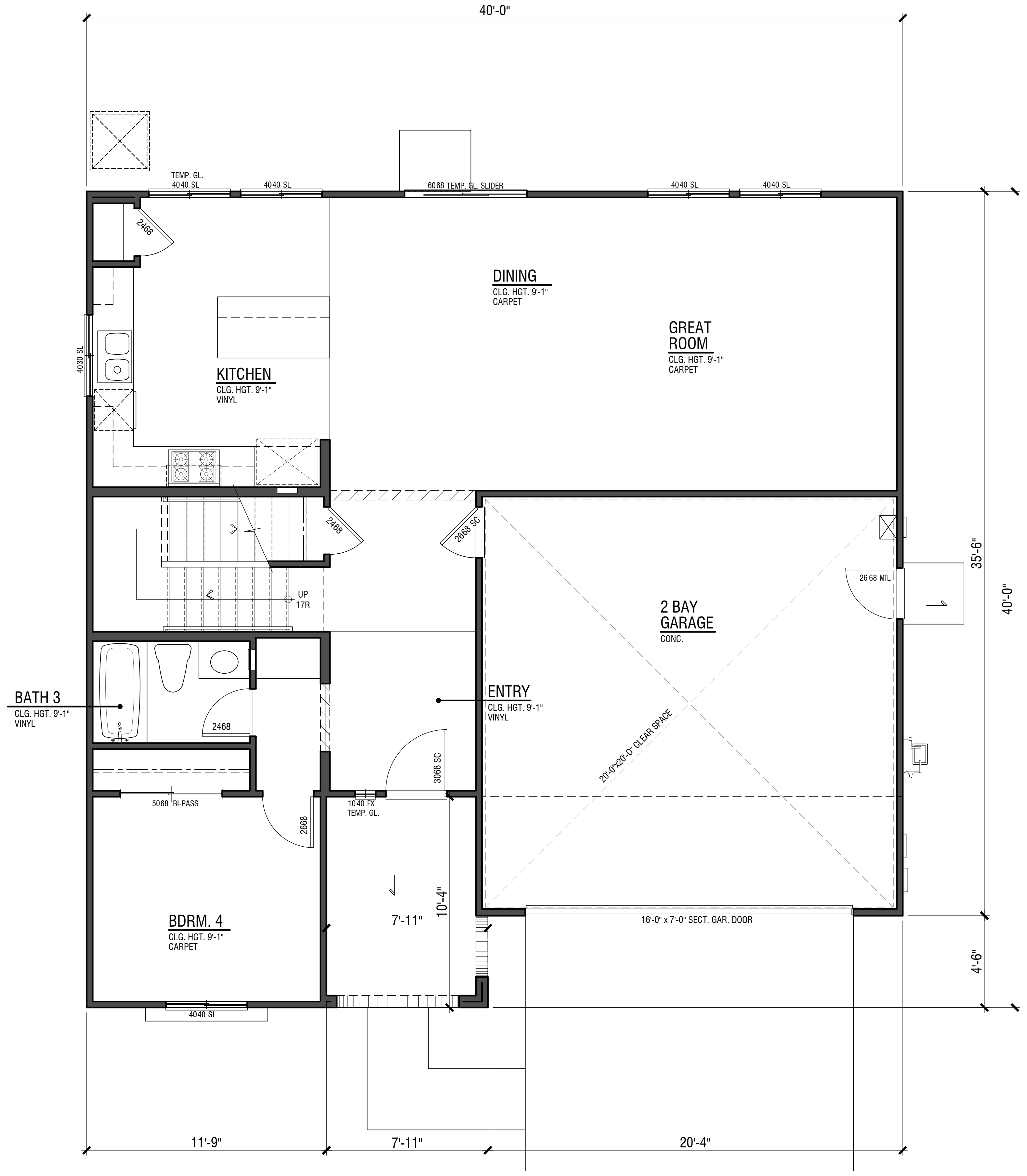
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Upper Floor - 1,234 SF



Lower Floor - 1,005 SF

PLAN 2.2239

2,239 SF
4 Bdrm | 3 Bath | Loft
2 Bay Garage
8' | 9' Plates

2A | SPANISH

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

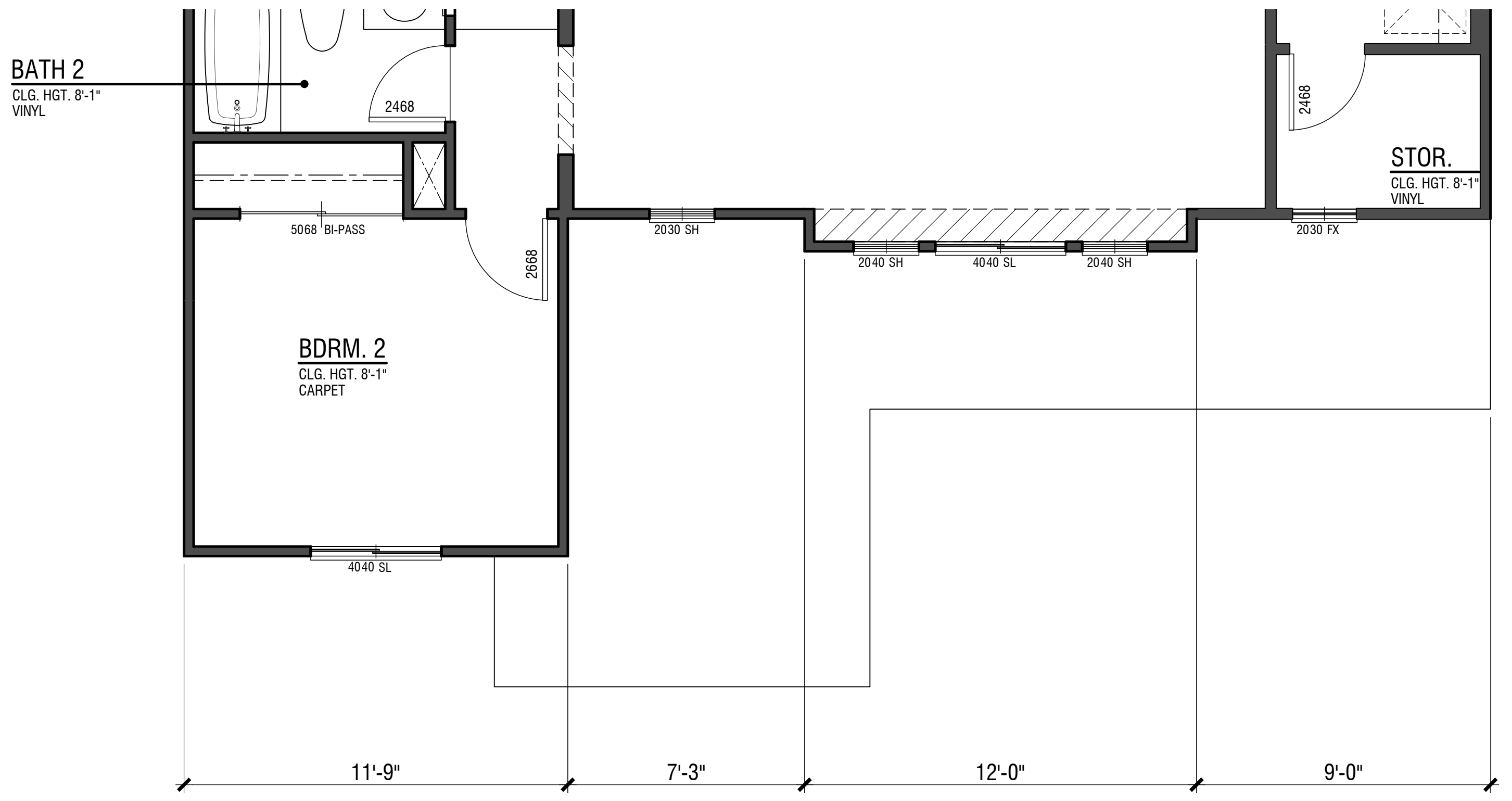
2.0

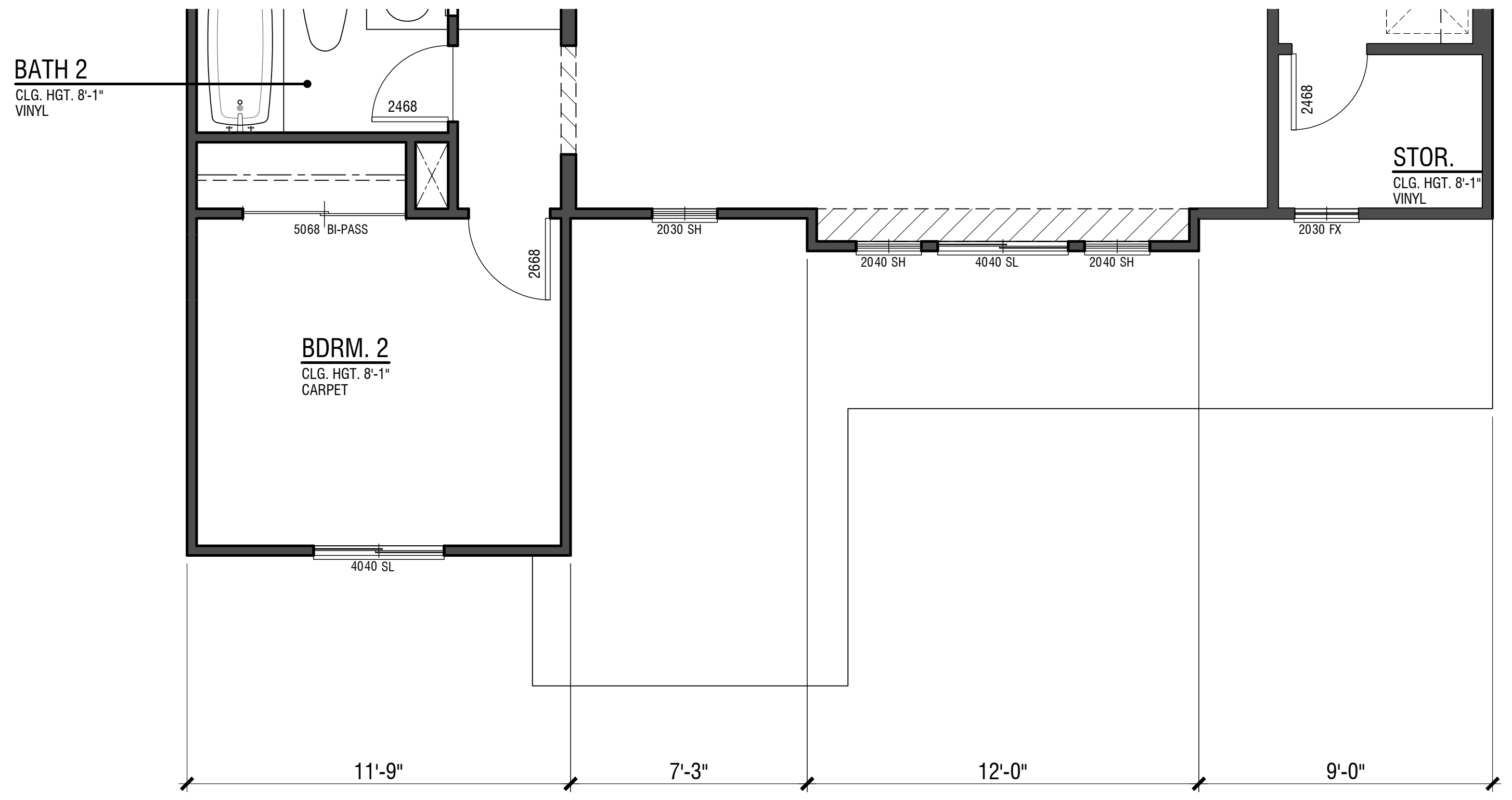
0 2 4 8

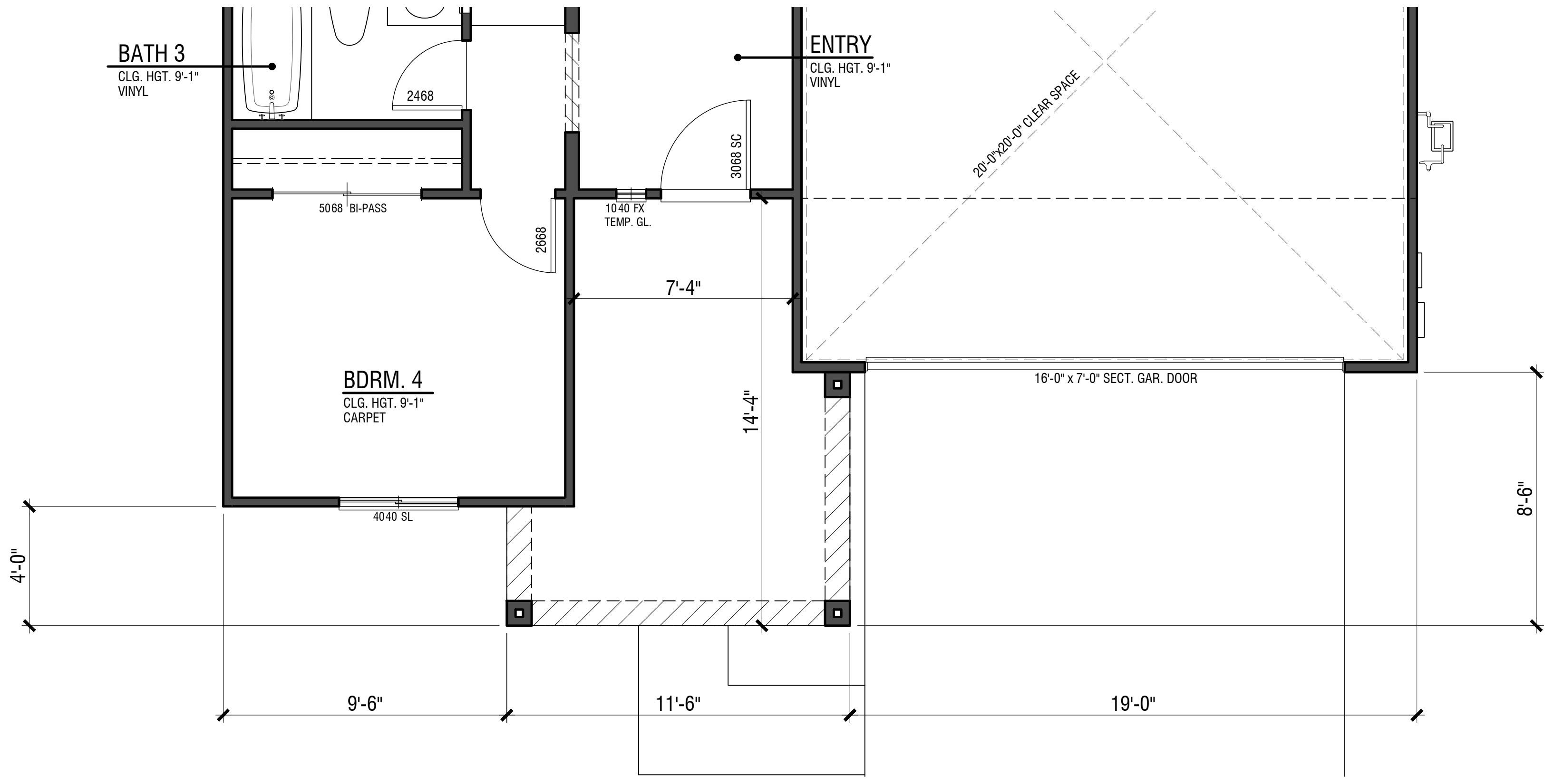
DESIGN REVIEW

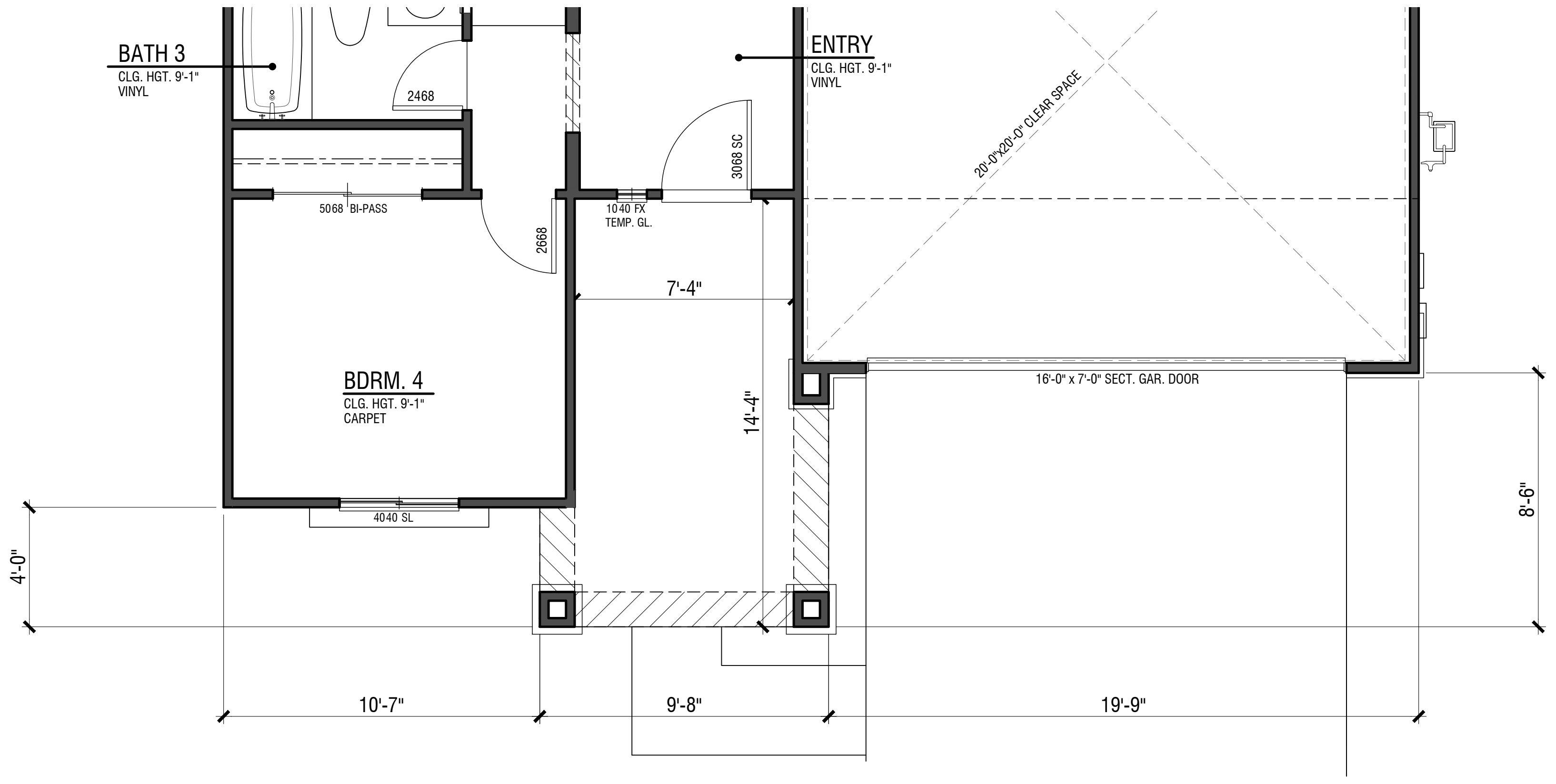
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA









PLAN 2.2239

2,239 SF
4 Bdrm | 3 Bath | Loft
2 Bay Garage
8' | 9' Plates

2B | TRADITIONAL

2C | CRAFTSMAN

WINDSONG - 5000

2.1

0 2 4 8

D·R·HORTON DHI NYSE
America's Builder

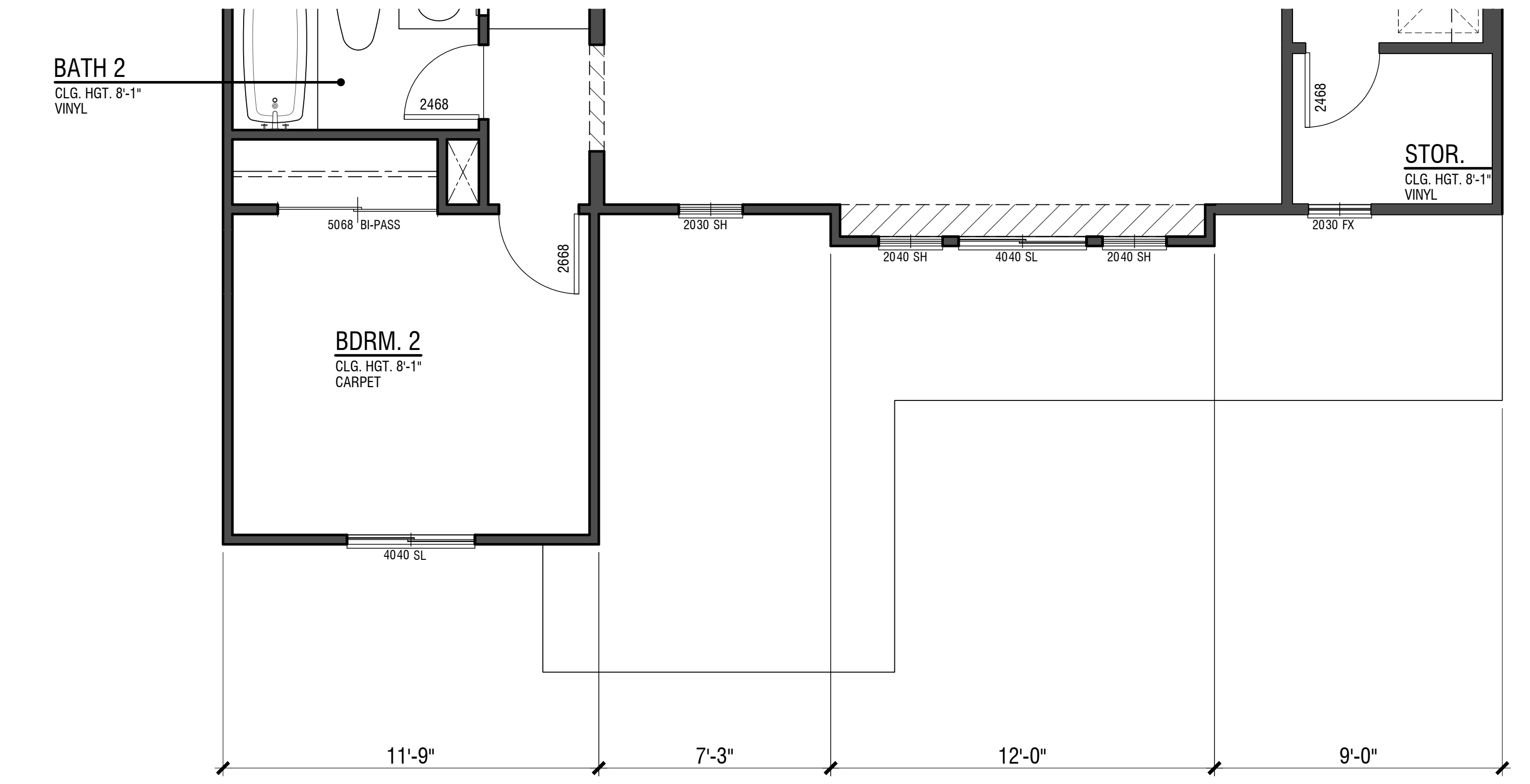
HORTON E

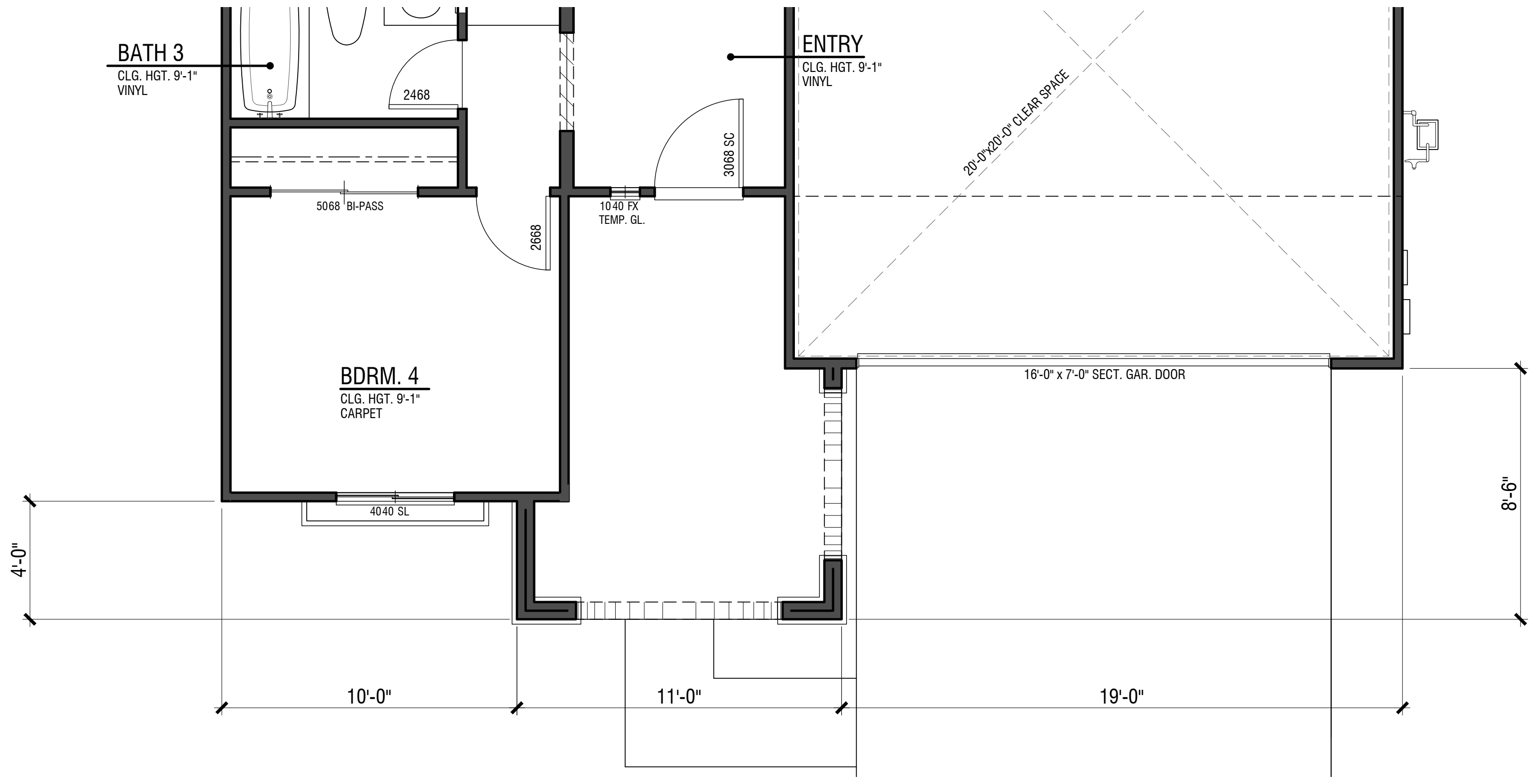
MORENO VALLEY, CA

DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA





PLAN 2.2239

2,239 SF
4 Bdrm | 3 Bath | Loft
2 Bay Garage
8' | 9' Plates

2D | Tuscan

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

WINDSONG- 5000

D·R·HORTON® America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

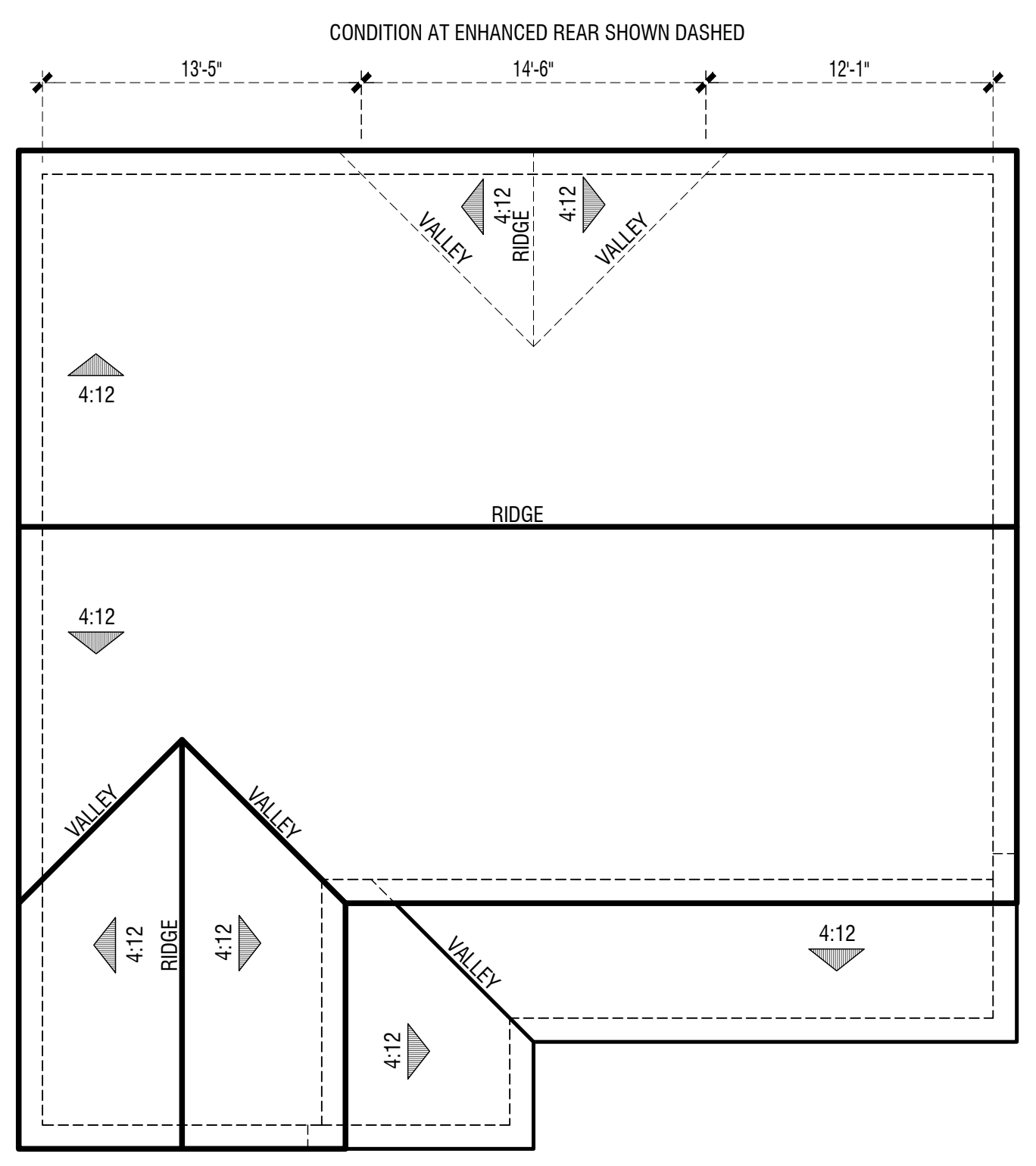
2.1

0 2 4 8

DESIGN REVIEW

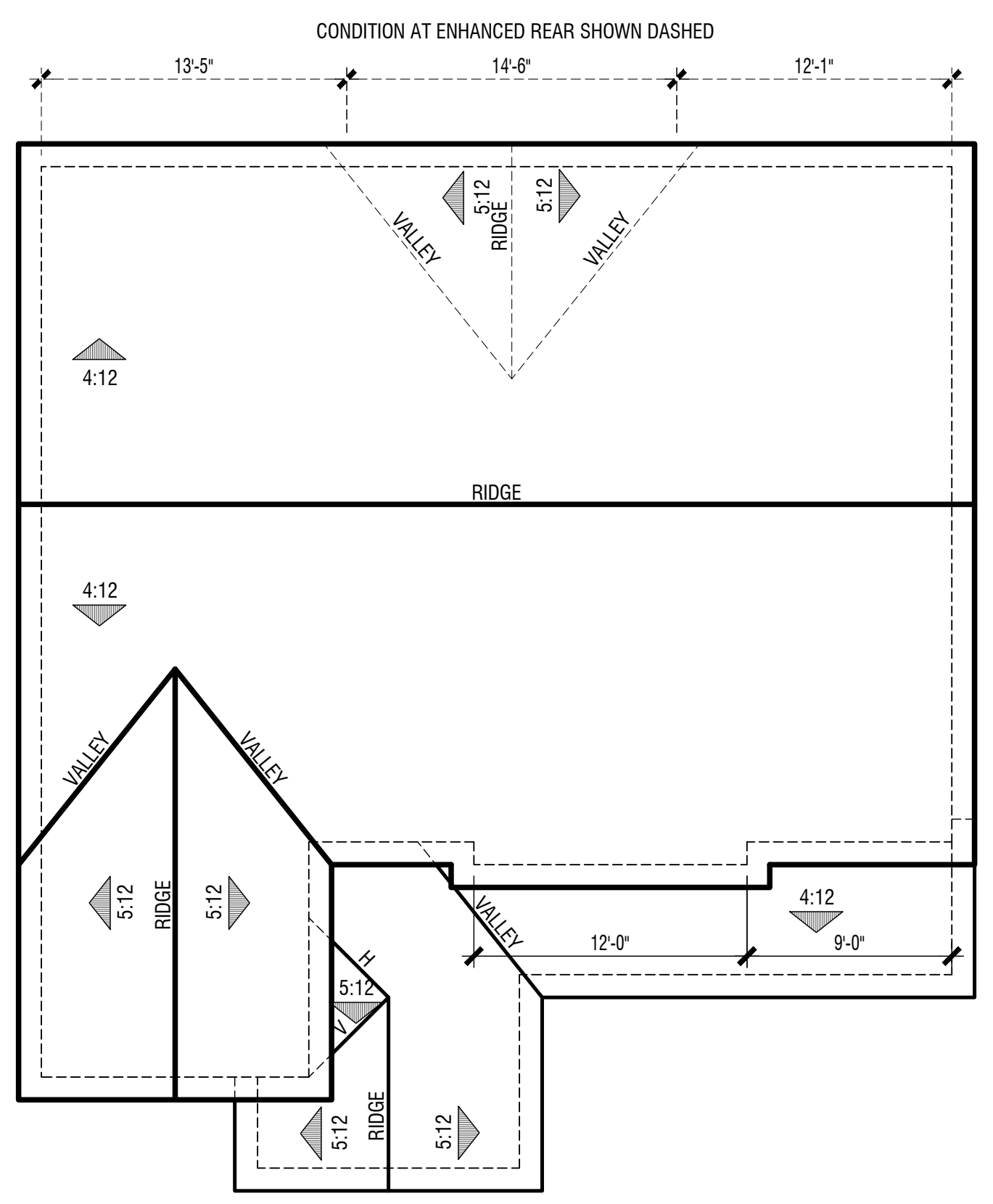
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA
ORANGE COUNTY . LOS ANGELES . BAY AREA



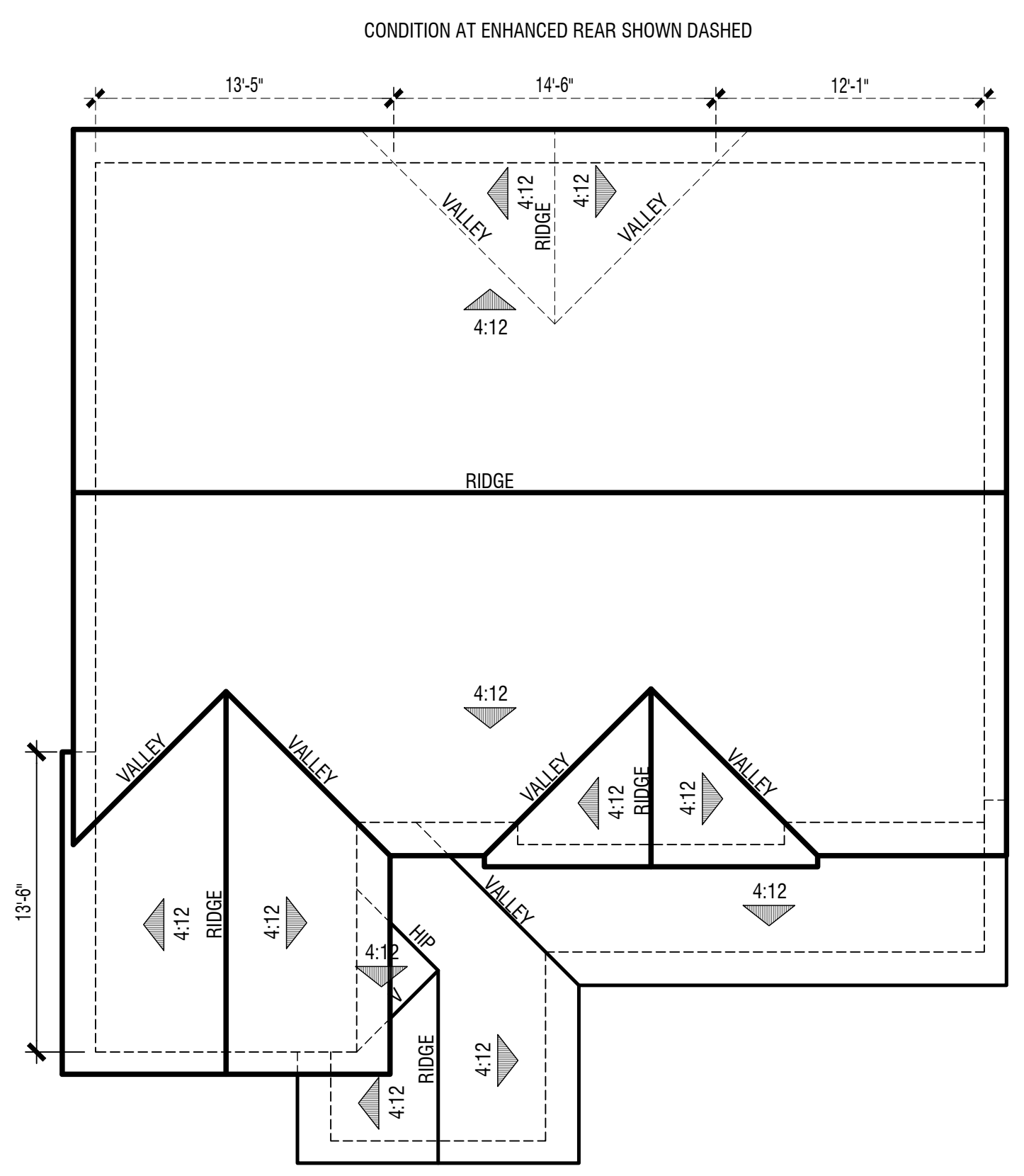
2A | SPANISH

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile



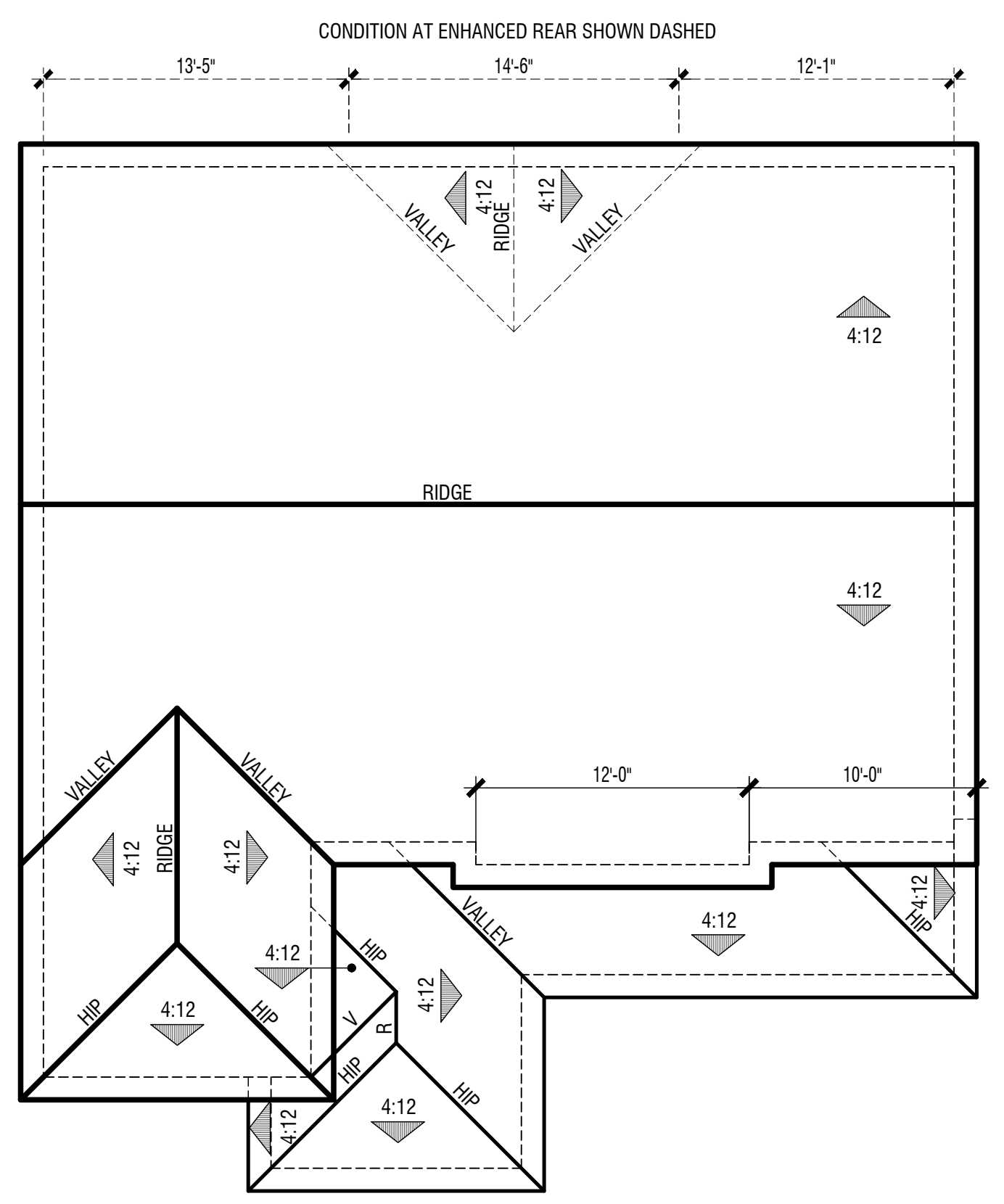
2B | TRADITIONAL

Eave 12" / Rake 12"
Concrete Flat Tile



2C | CRAFTSMAN

Eave 12" / Rake 12"
Concrete Flat Tile



2D |Tuscan

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile

PLAN 2.2239

Roof Plans

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

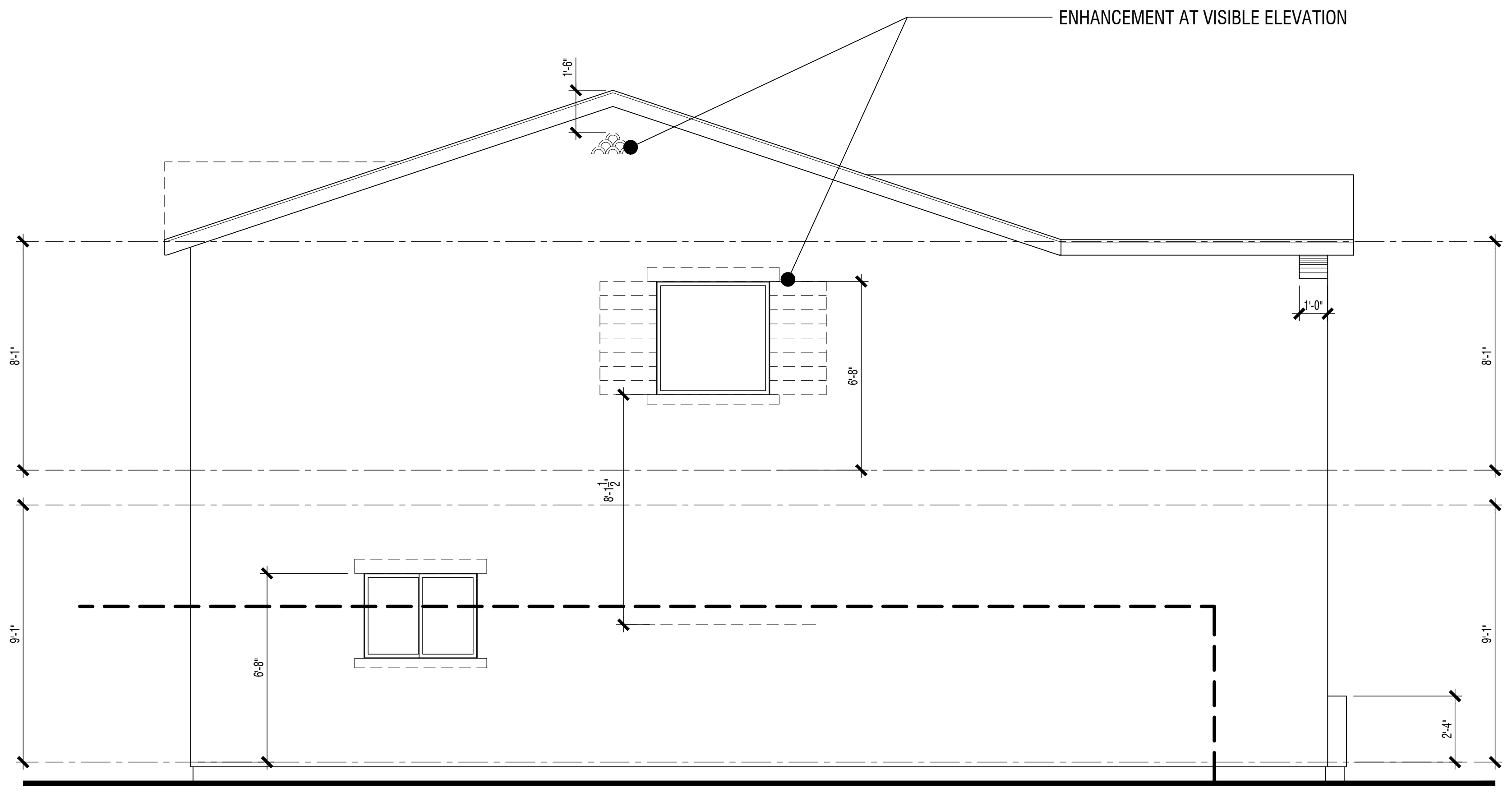
2.2

0 4 8 16

DESIGN REVIEW

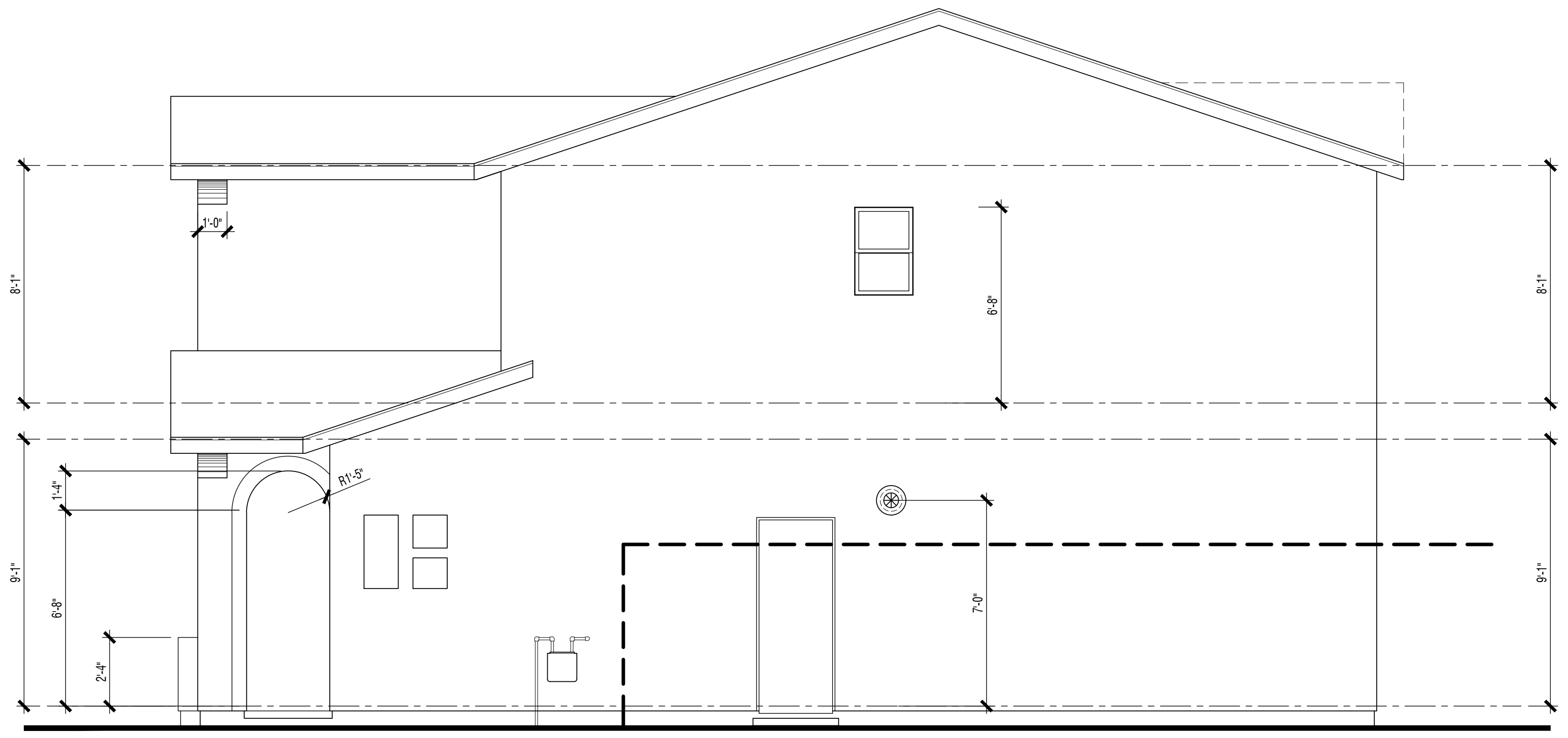
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

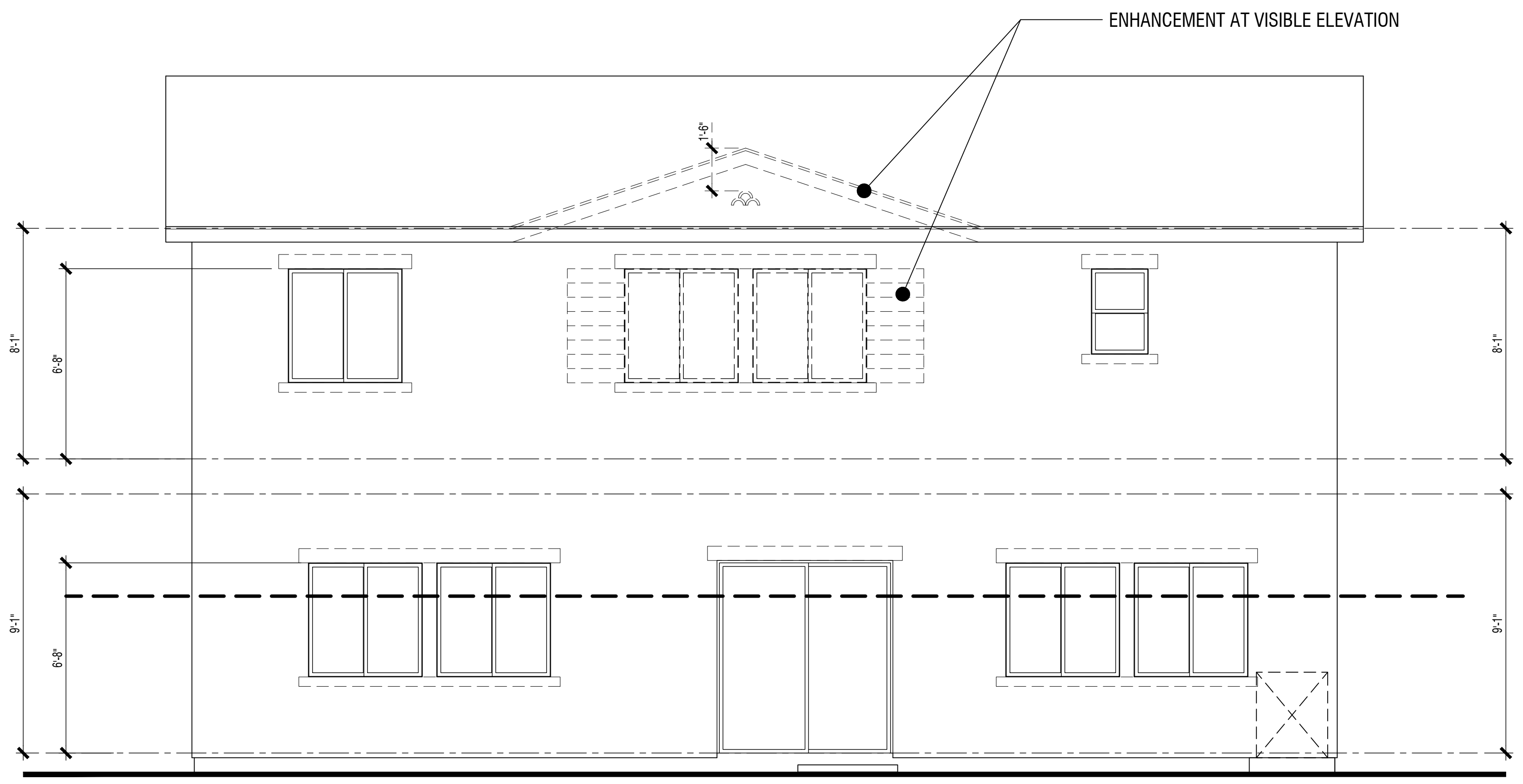


Left

Front



Right



Rear

PLAN 2A | SPANISH

Building Elevations

WINDSONG - 5000

2.4

0 2 4 8

D·R·HORTON DHI NYSE
America's Builder

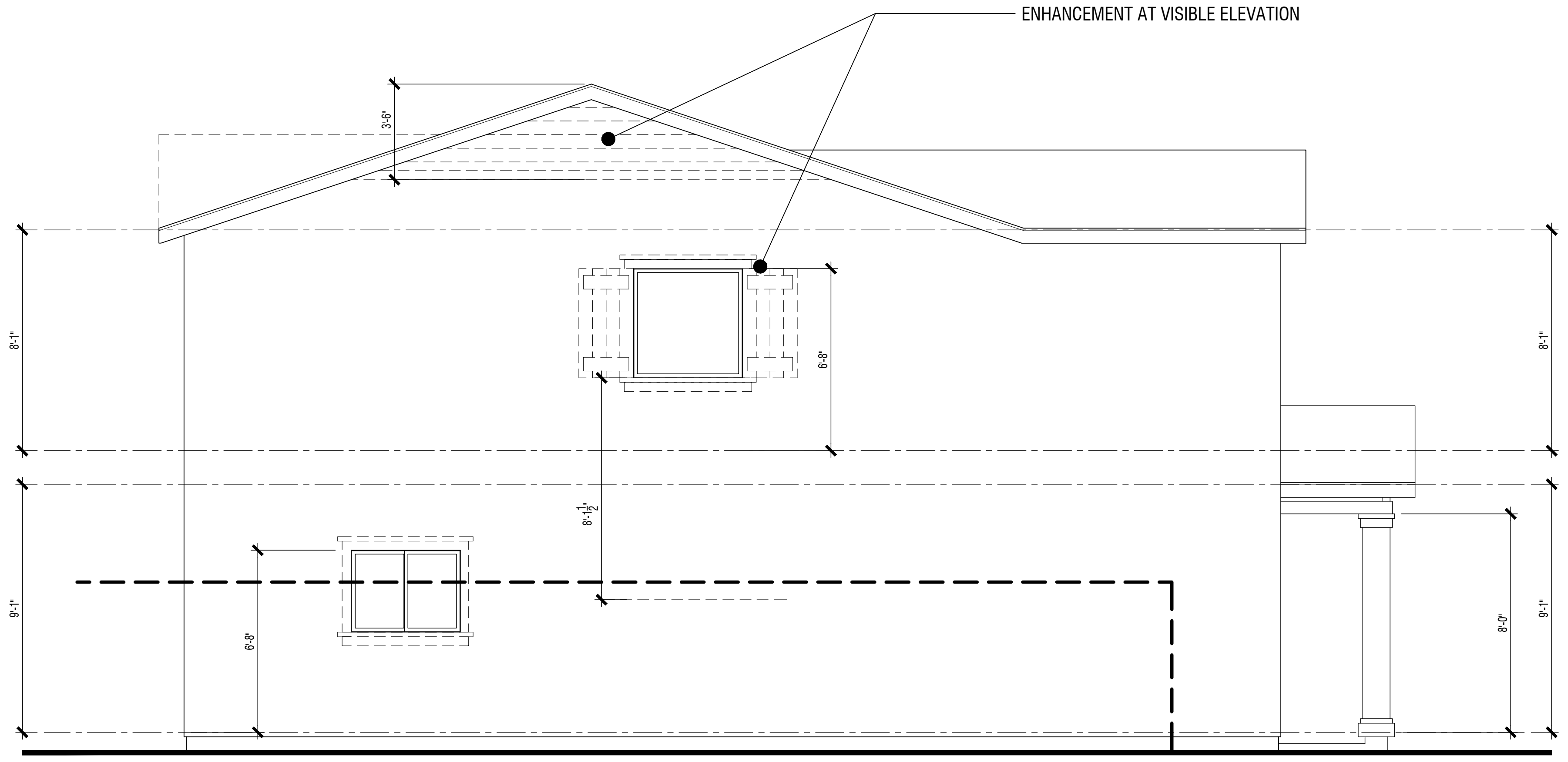
HORTON E

MORENO VALLEY, CA

DESIGN REVIEW

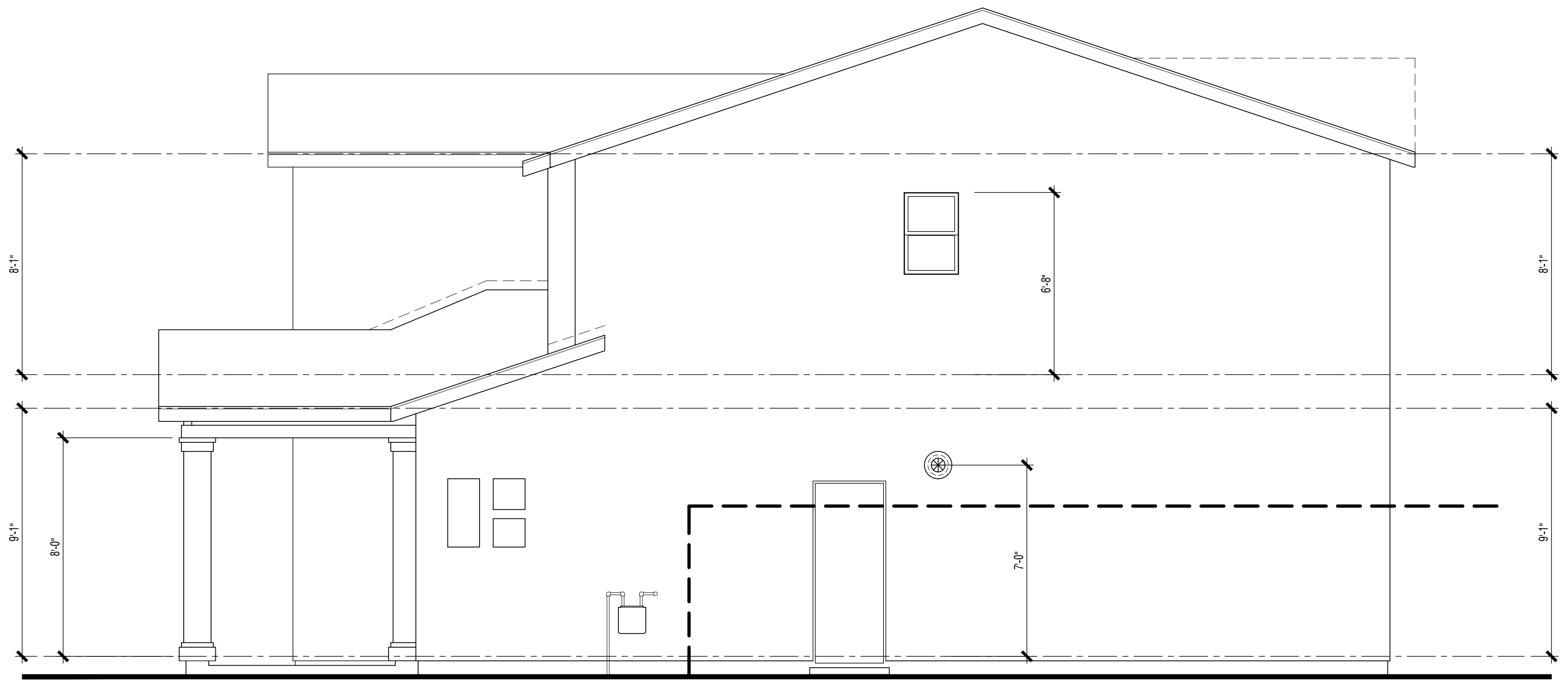
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

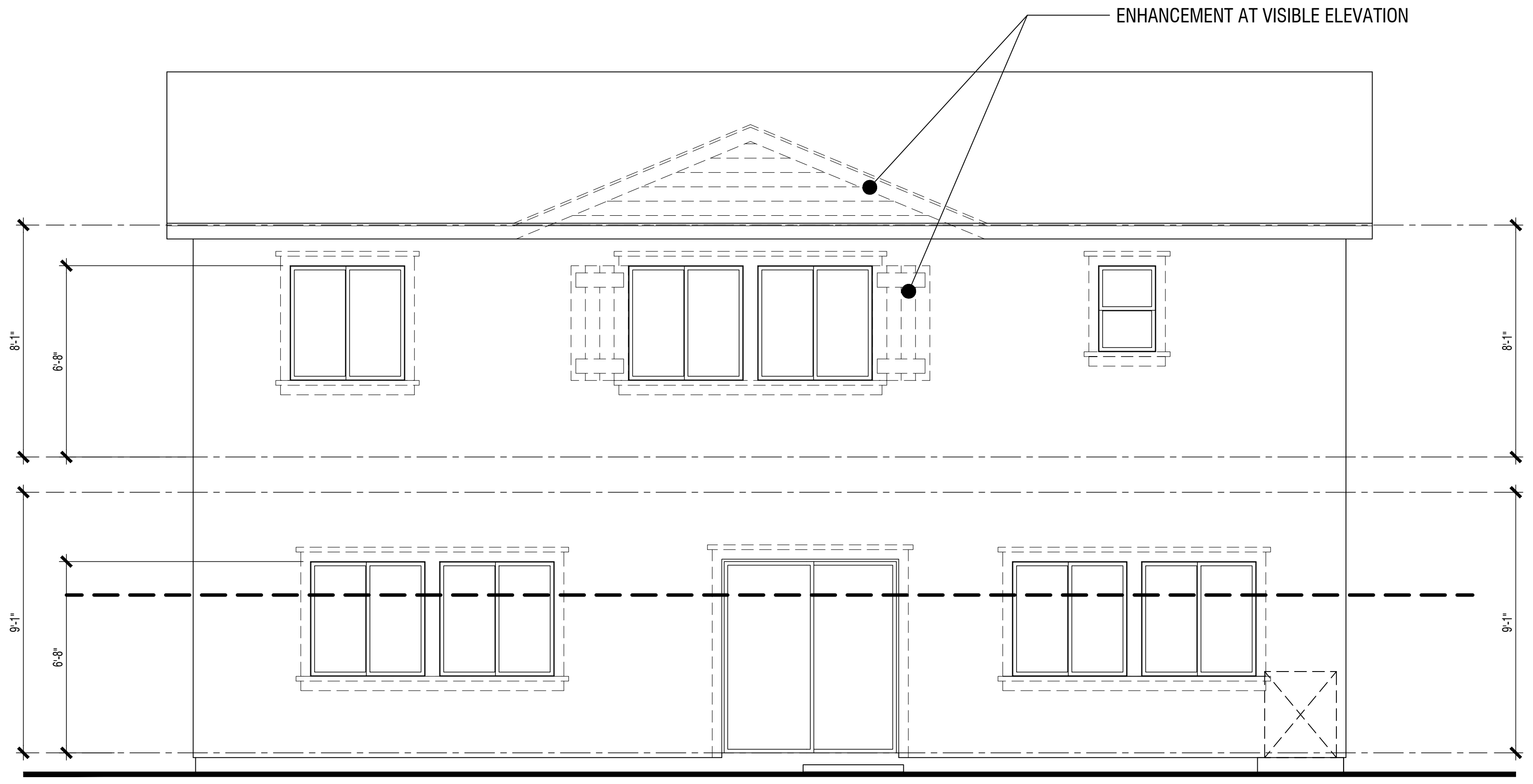


Left

Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 2B | TRADITIONAL

Building Elevations

WINDSONG- 5000

D·R·HORTON® DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

2.5

0 2 4 8

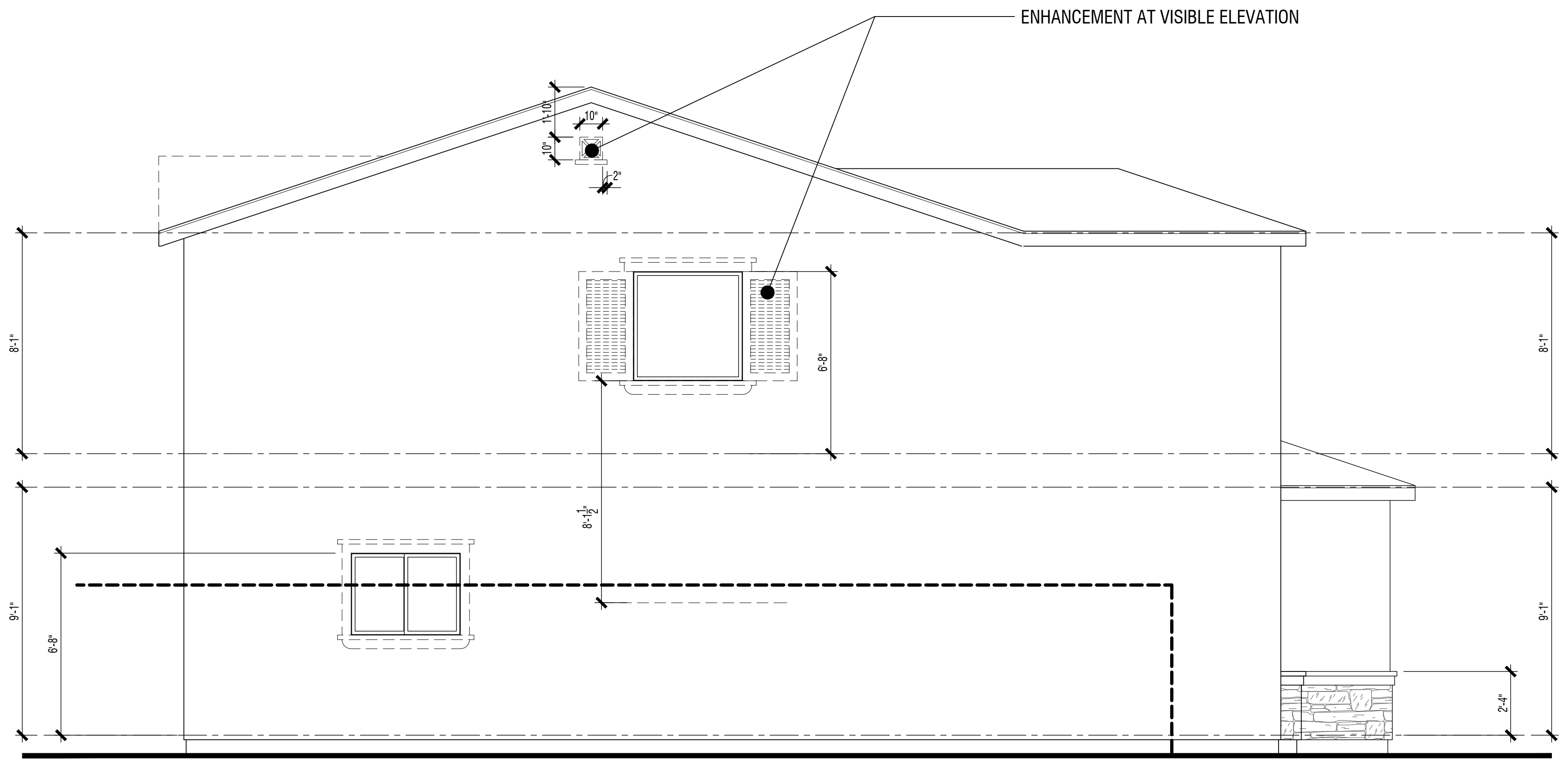
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

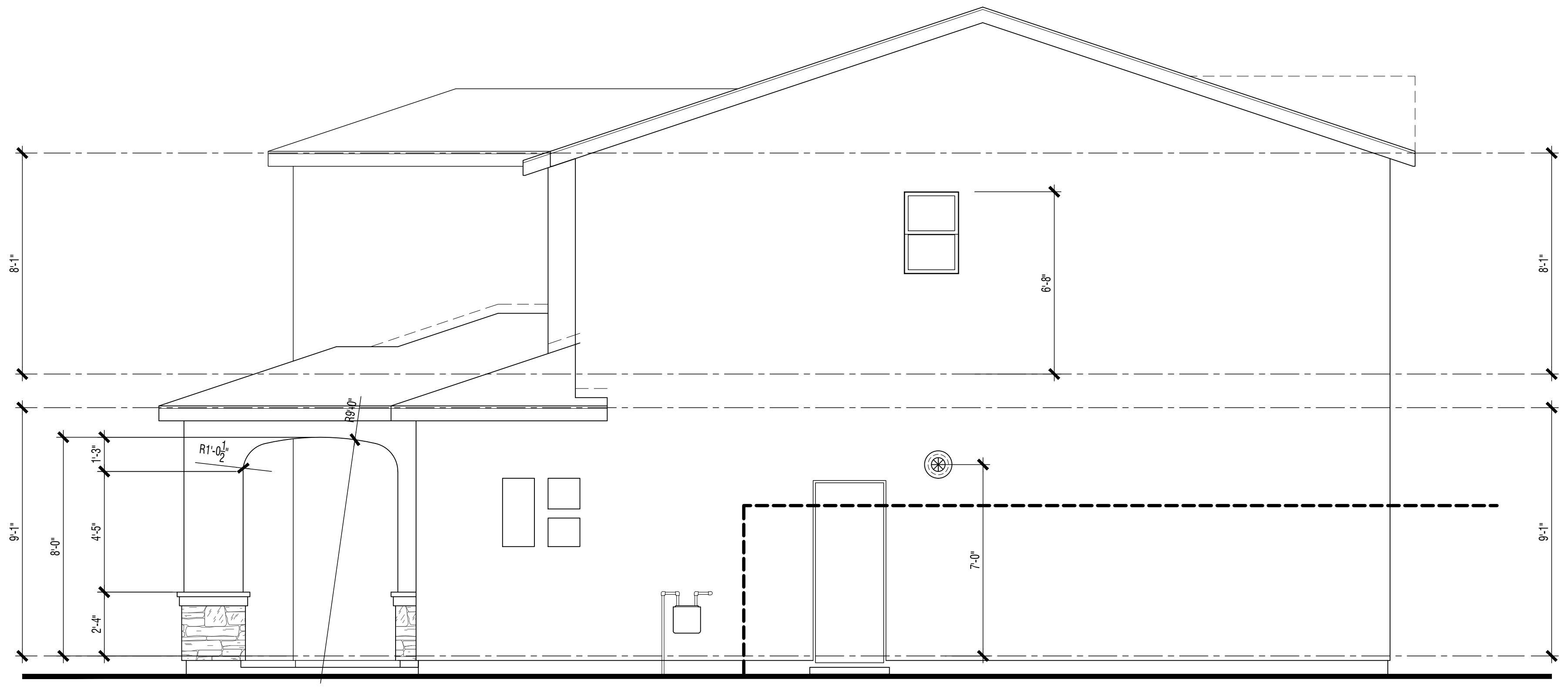
WHA.

ORANGE COUNTY . LOS ANGELES . BAY AREA

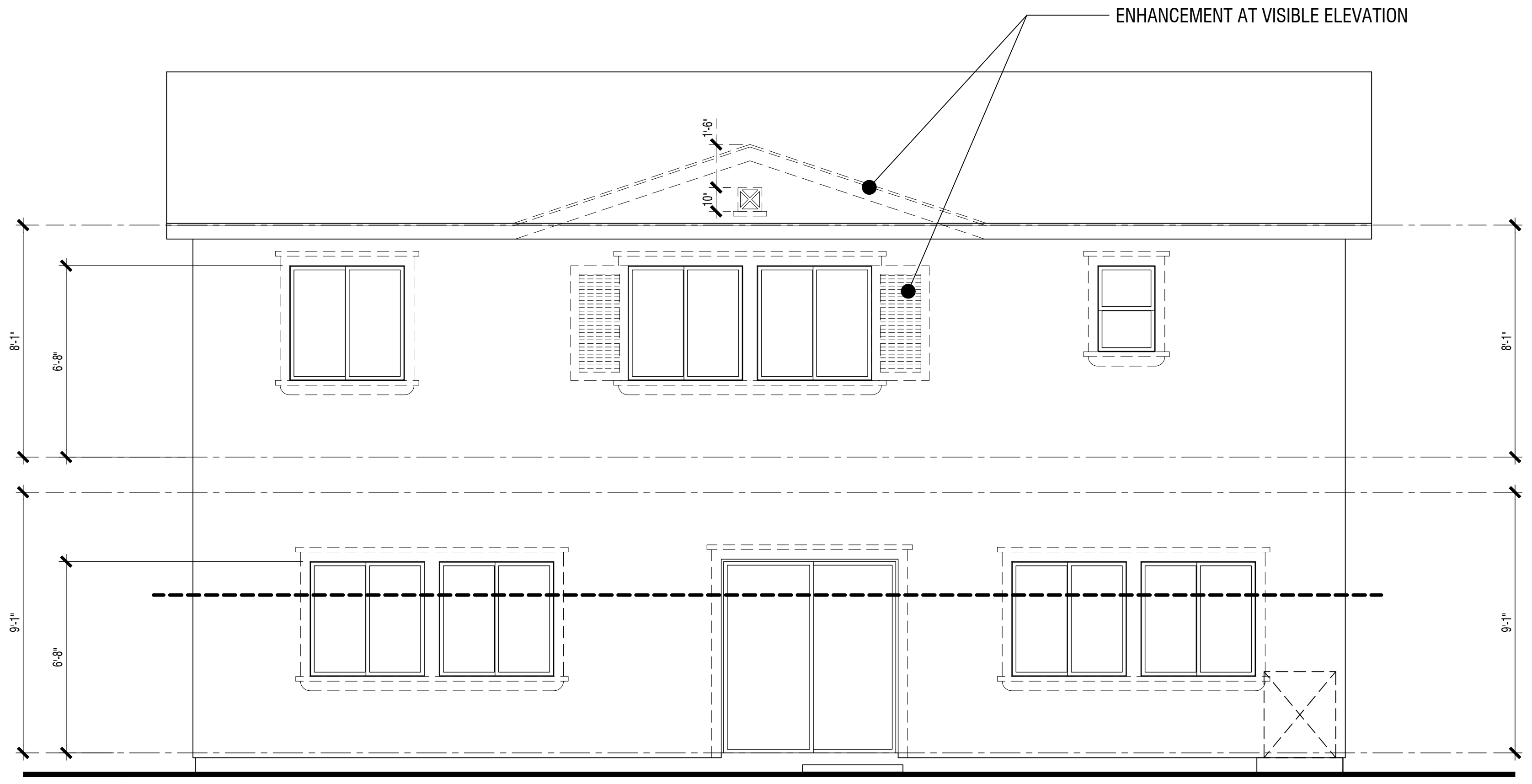


Left

Front



Right



Rear

PLAN 2D | TUSCAN

Building Elevations

WINDSONG - 5000

D·R·HORTON® DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

2.6

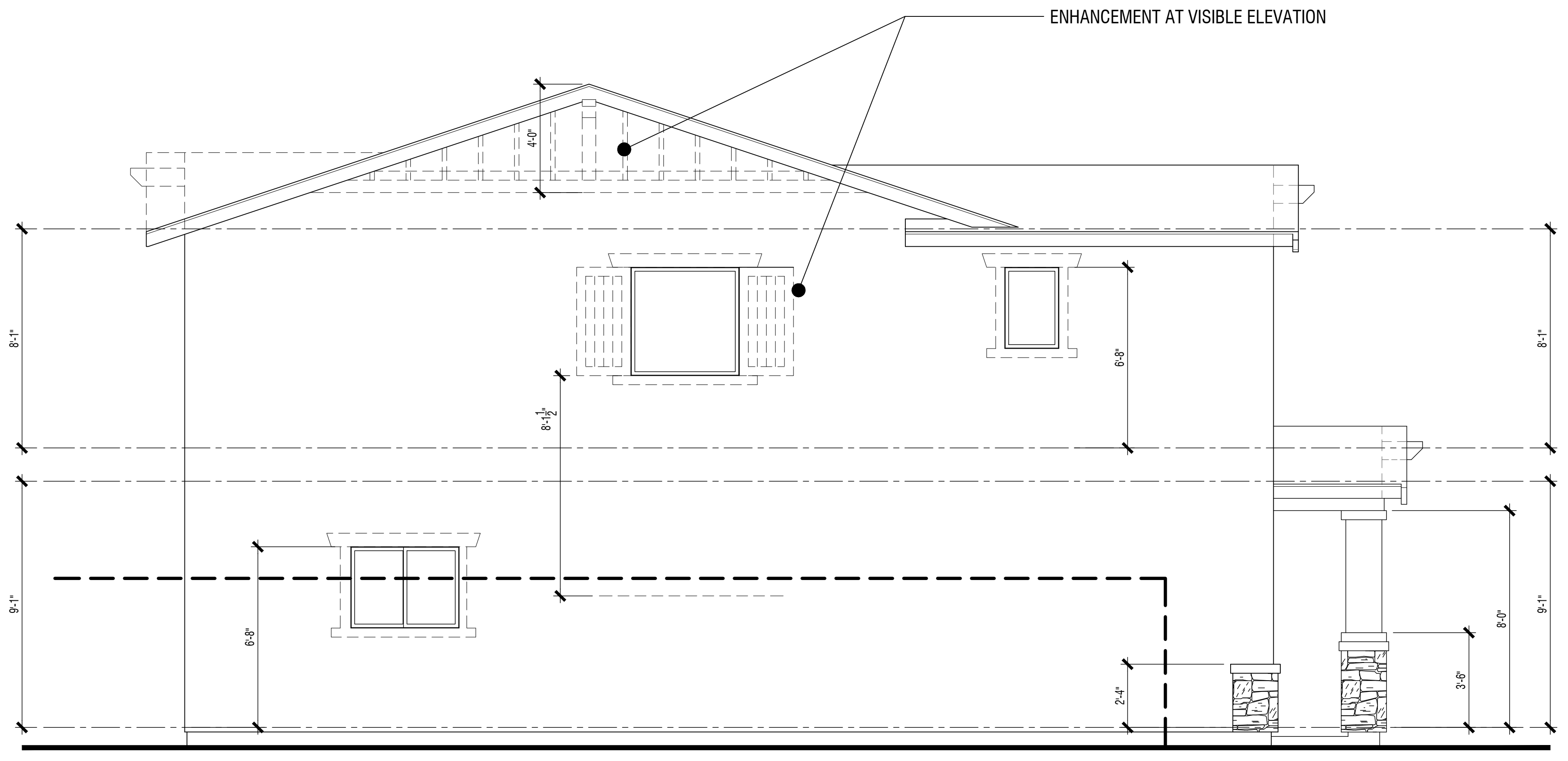
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

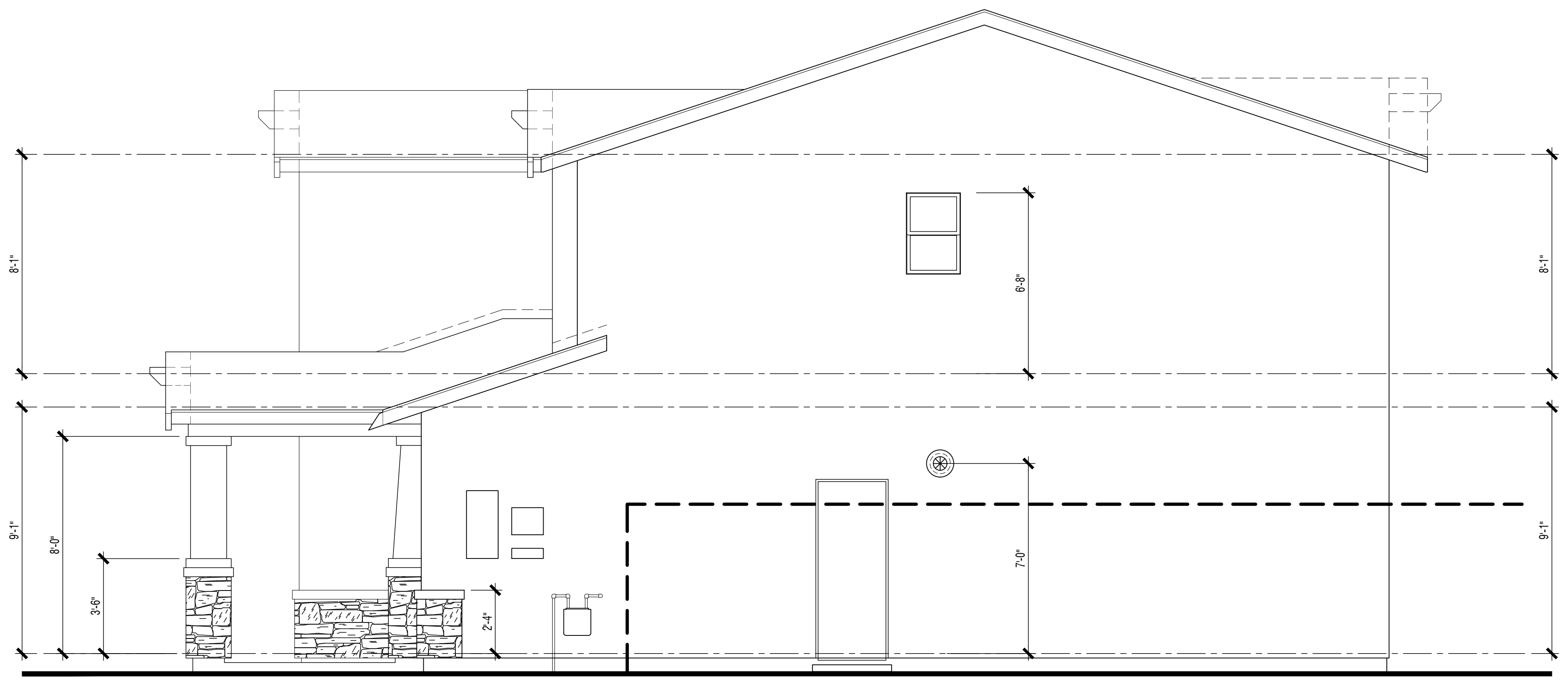
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

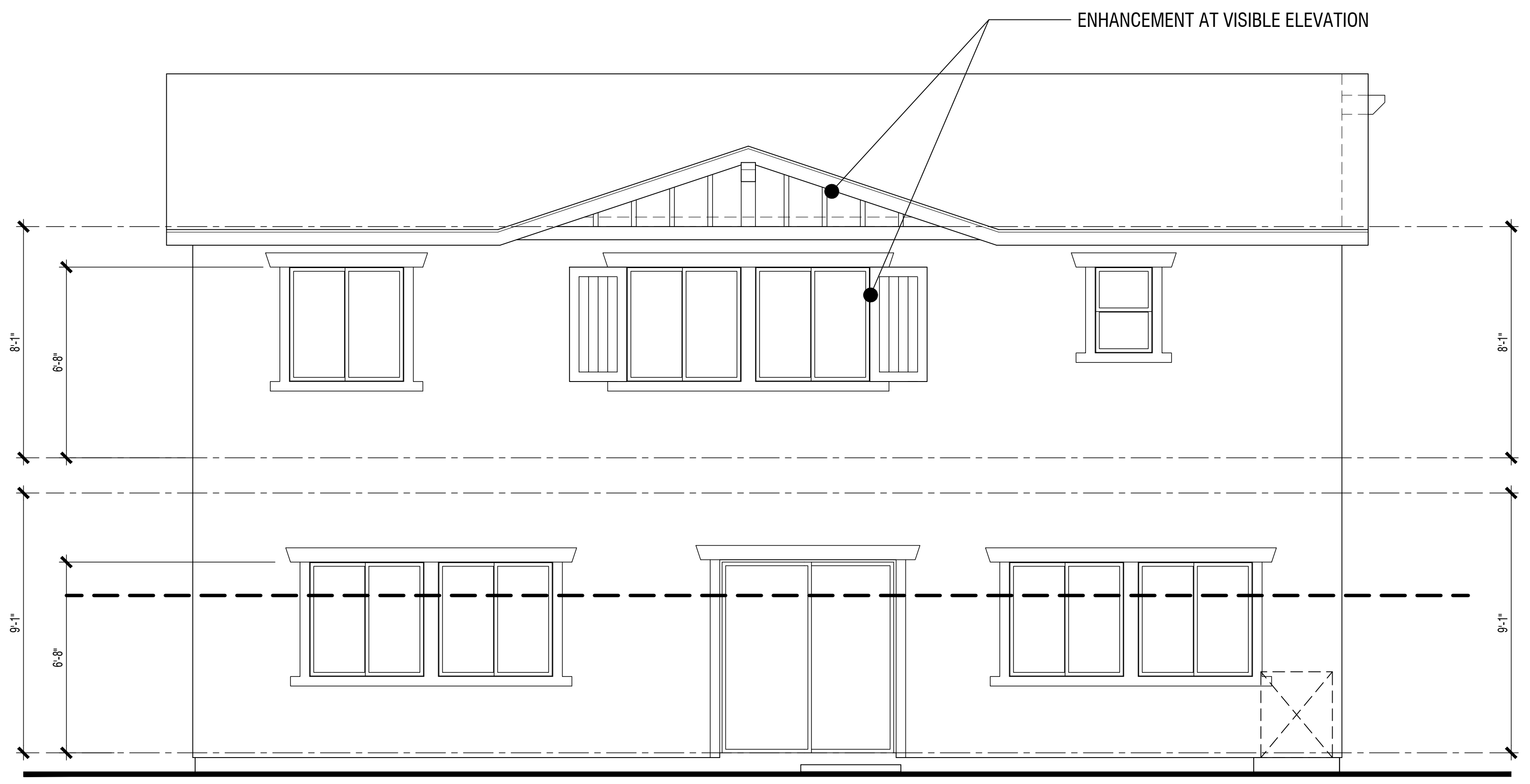


Left

Front



Right



Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 2C | CRAFTSMAN

Building Elevations

WINDSONG - 5000

D·R·HORTON® DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

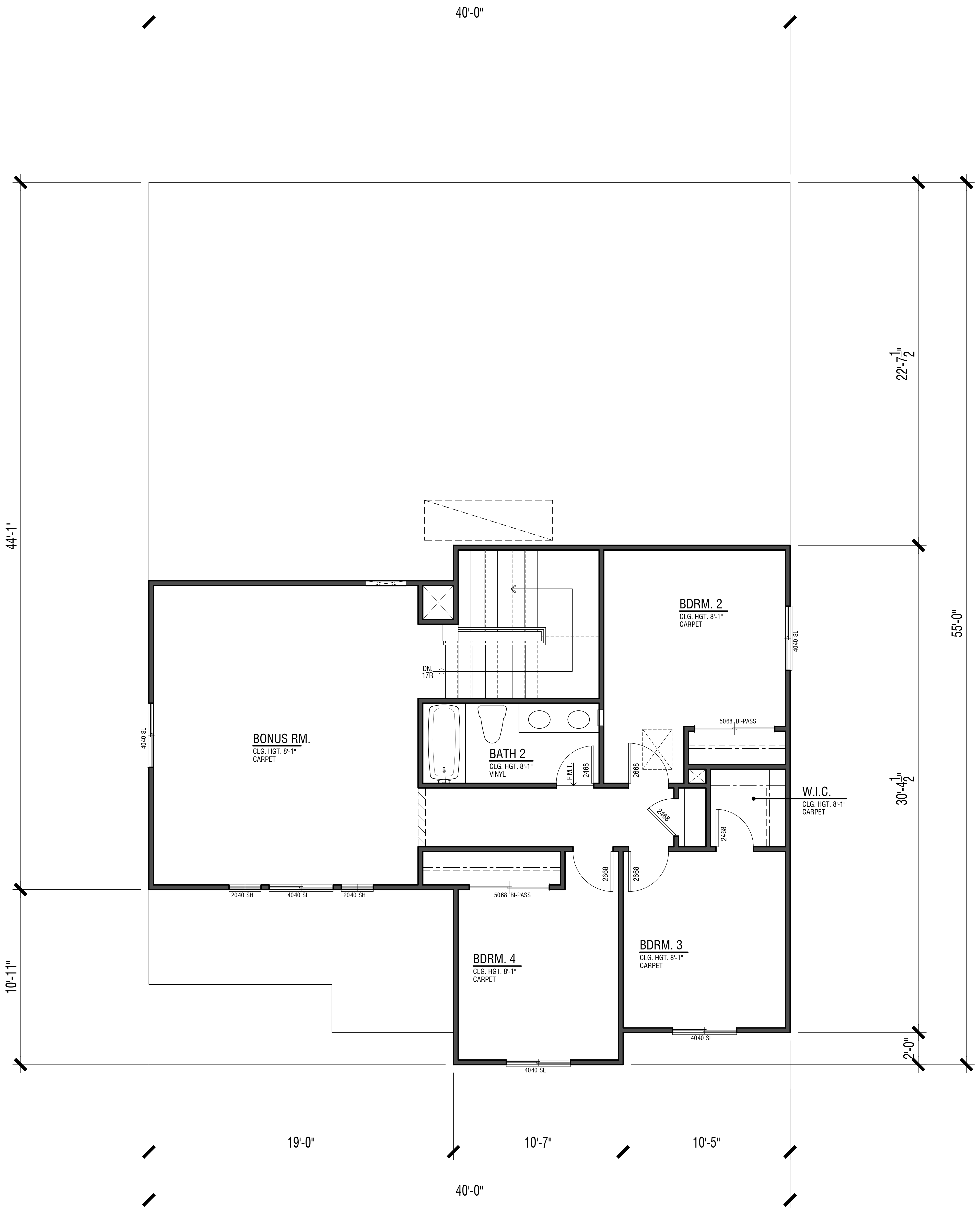
2.7

0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

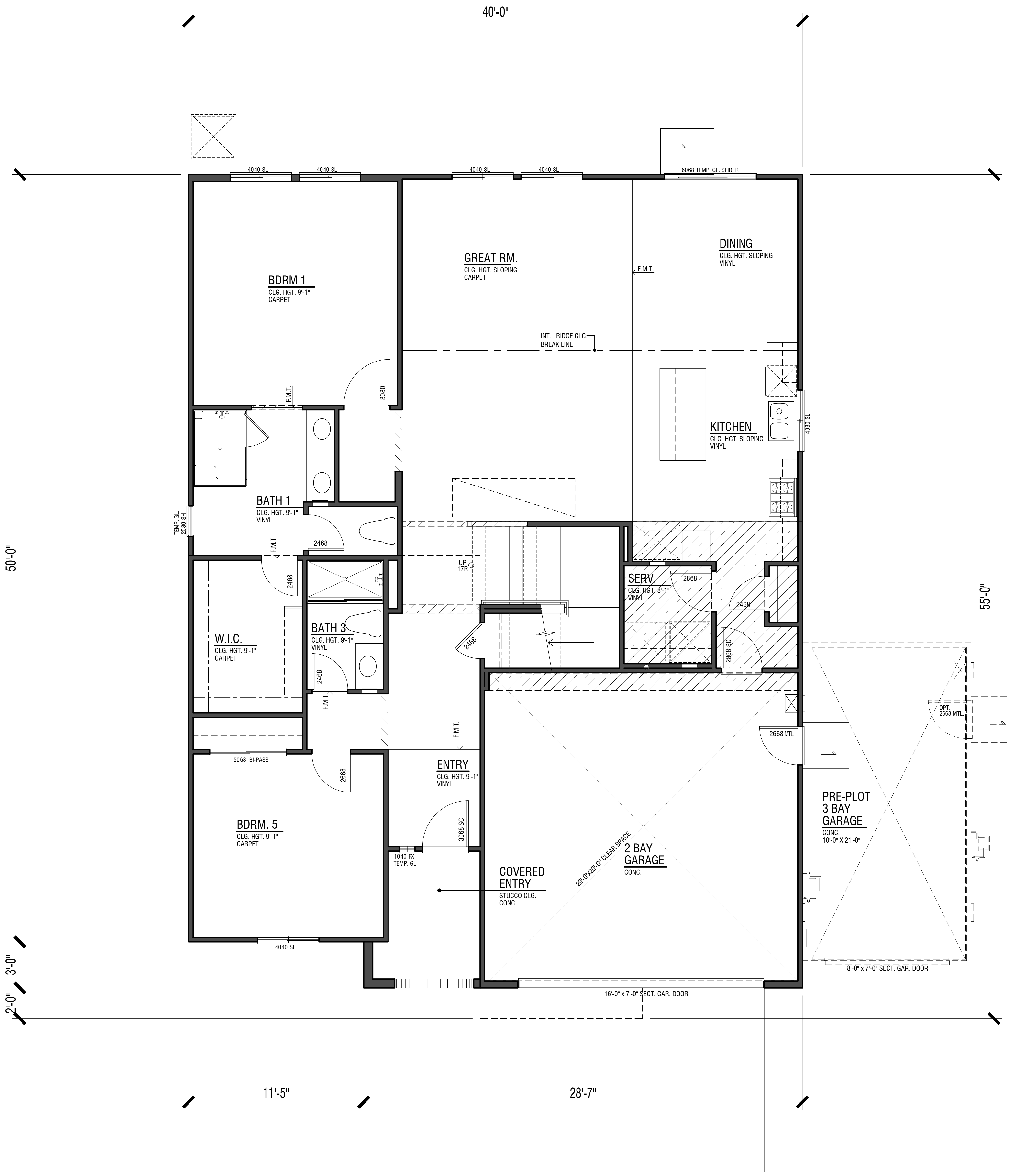
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



Upper Floor - 950 SF

PLAN 3.2537

2,537 SF
5 Bdrm | 3 Bath | Bonus Rm
2 Bay Garage
8' | 9' Plates



Lower Floor - 1,587 SF

3A |SPANISH

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

WINDSONG- 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

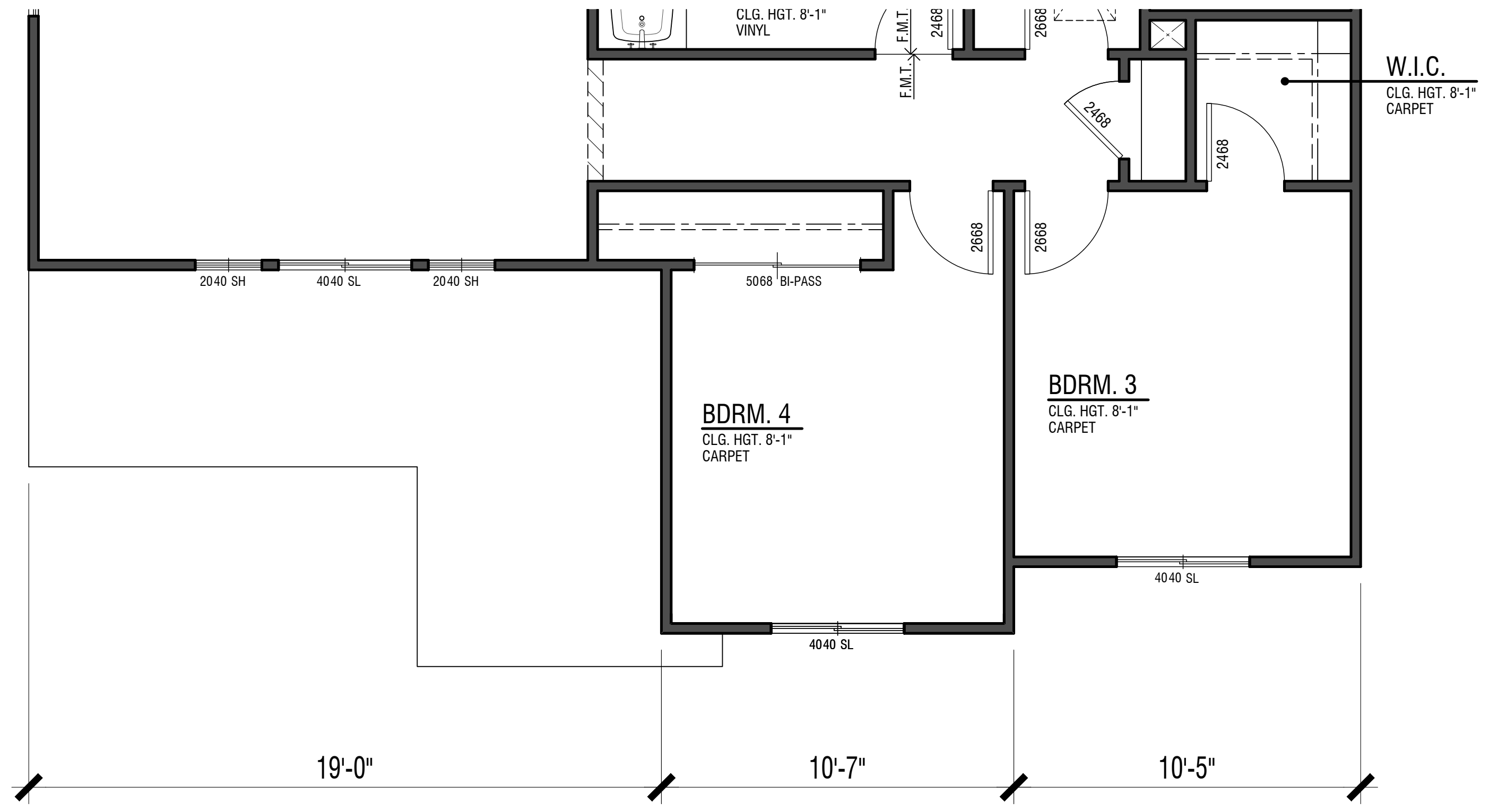
3.0

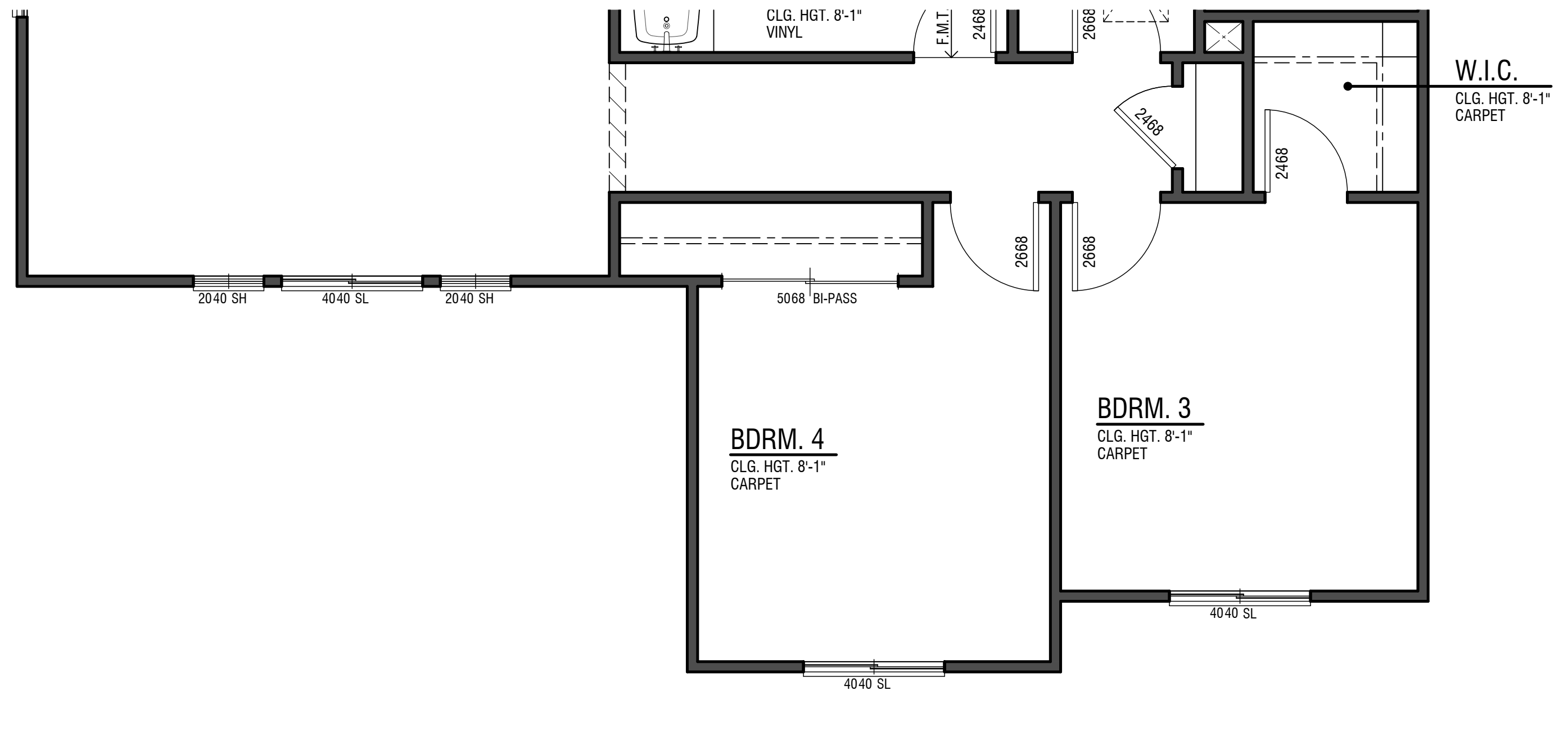
0 2 4 8

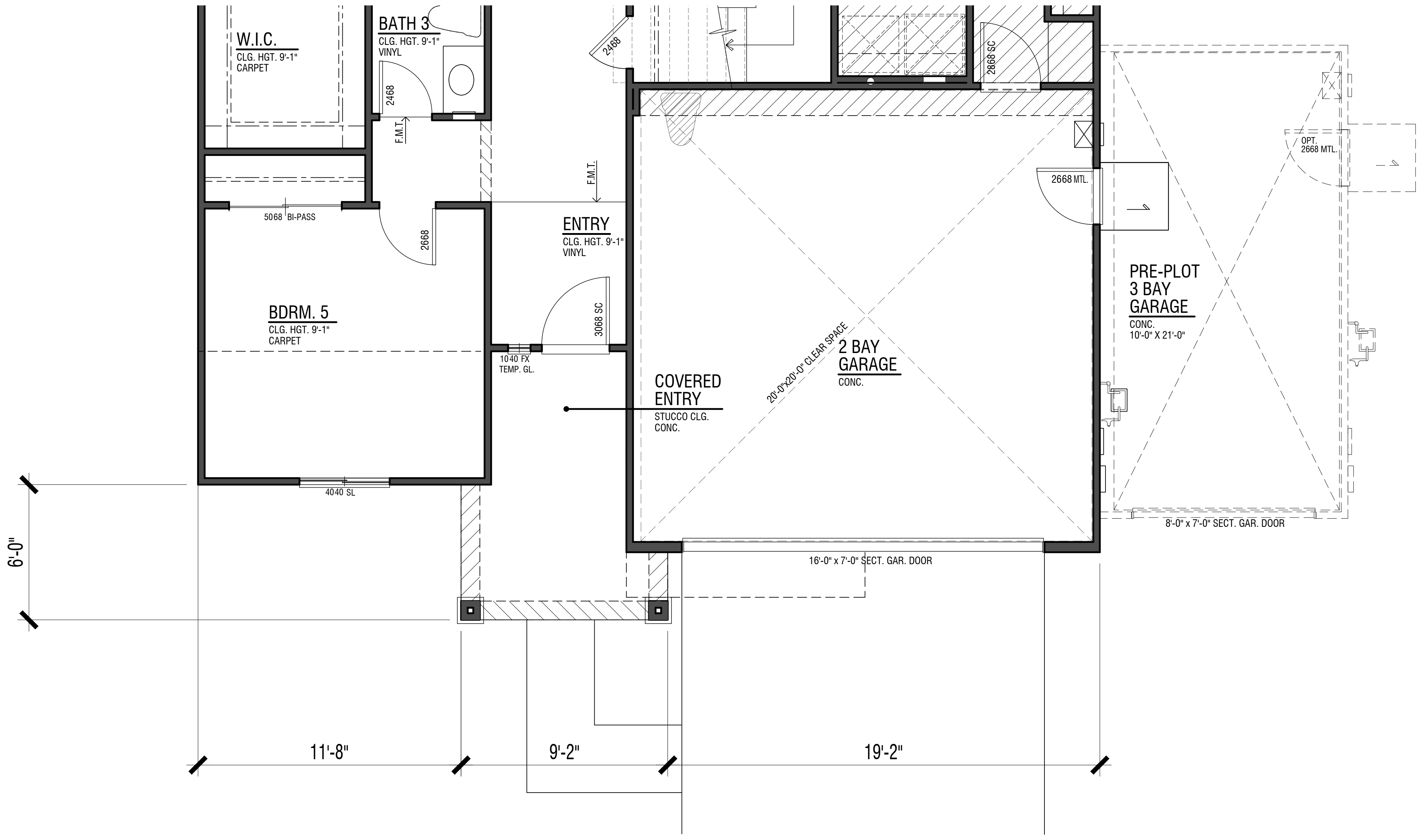
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



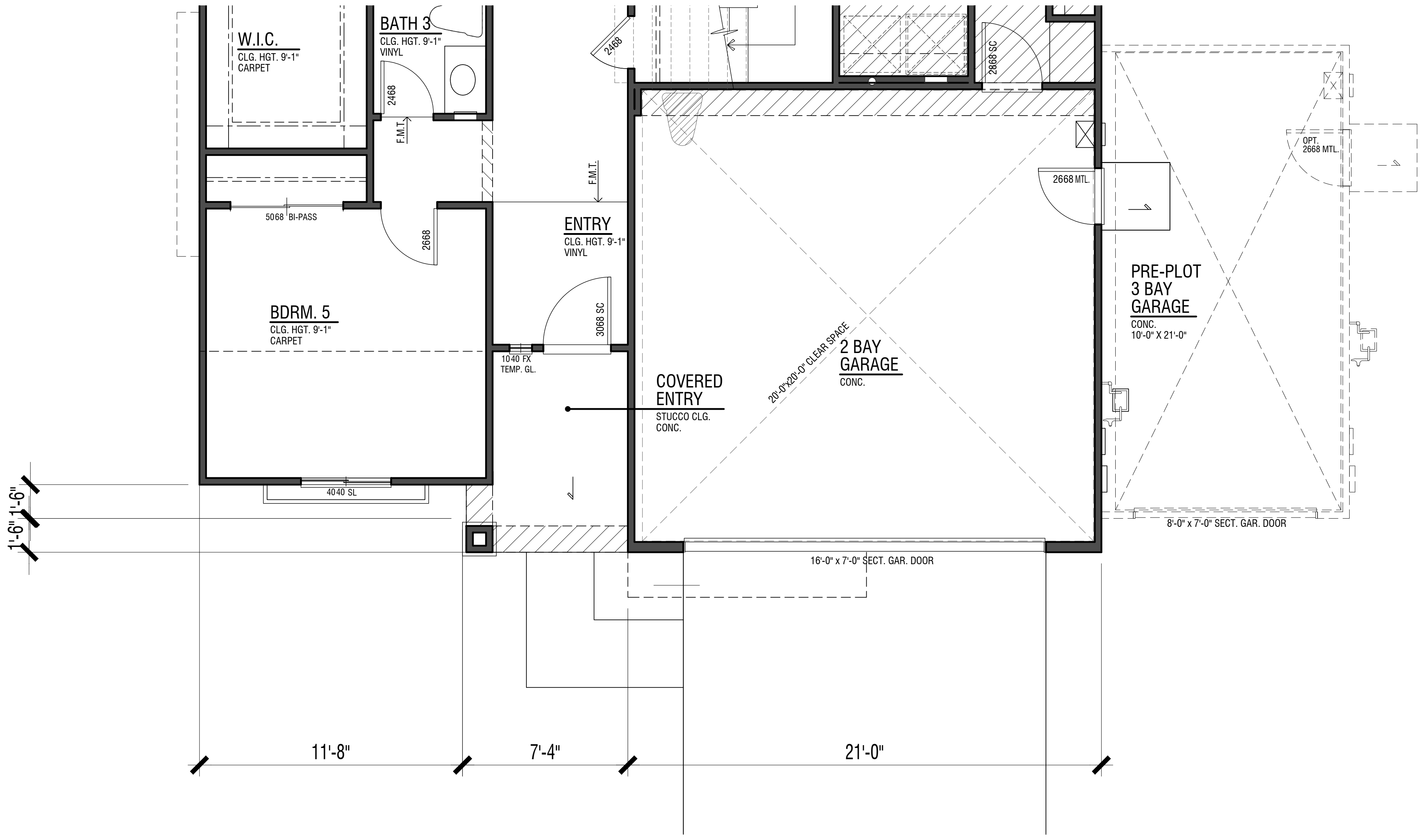




PLAN 3.2537

2,537 SF
5 Bdrm | 3 Bath | Bonus Rm
2 Bay Garage
8' | 9' Plates

3B |TRADITIONAL



3C |CRAFTSMAN

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

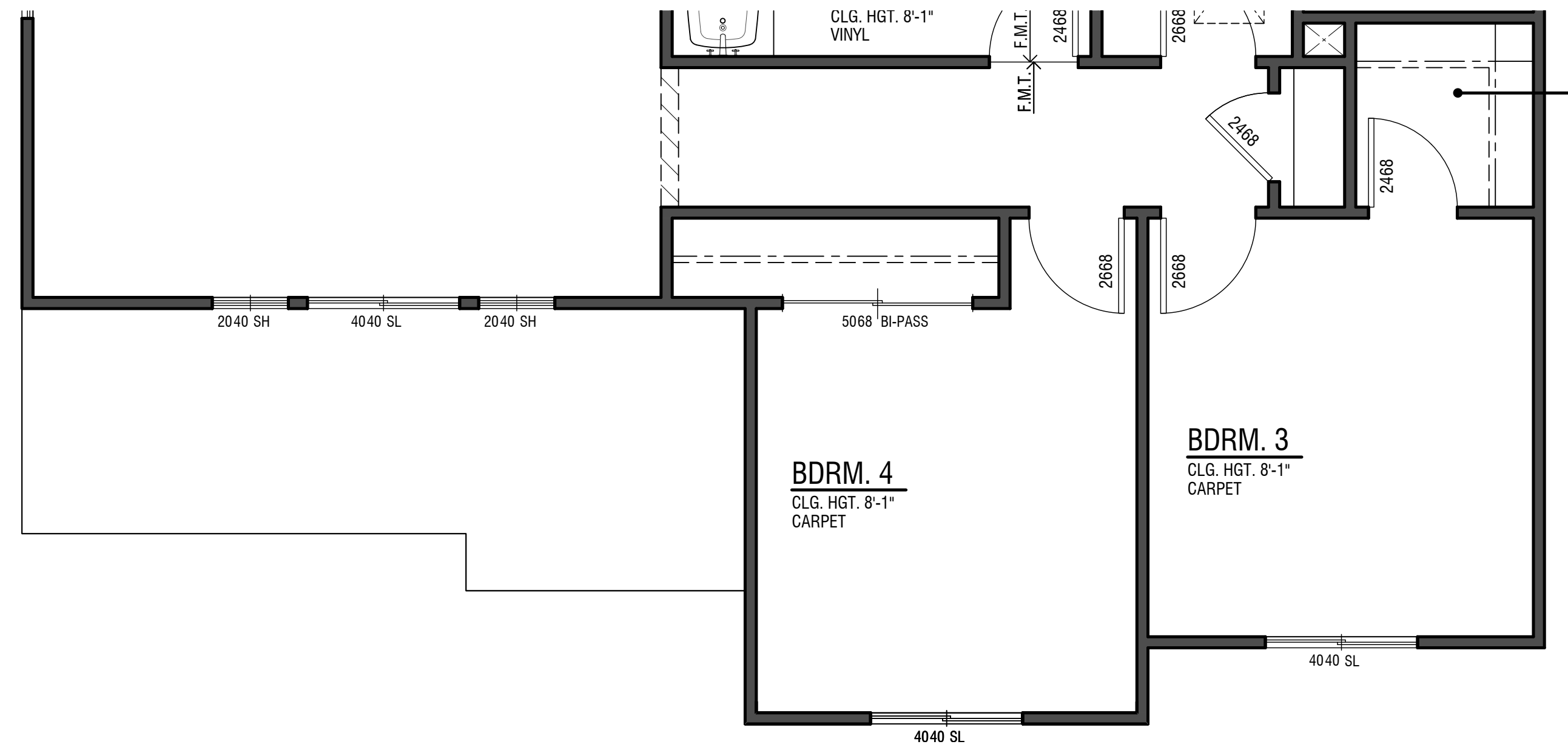
3.1

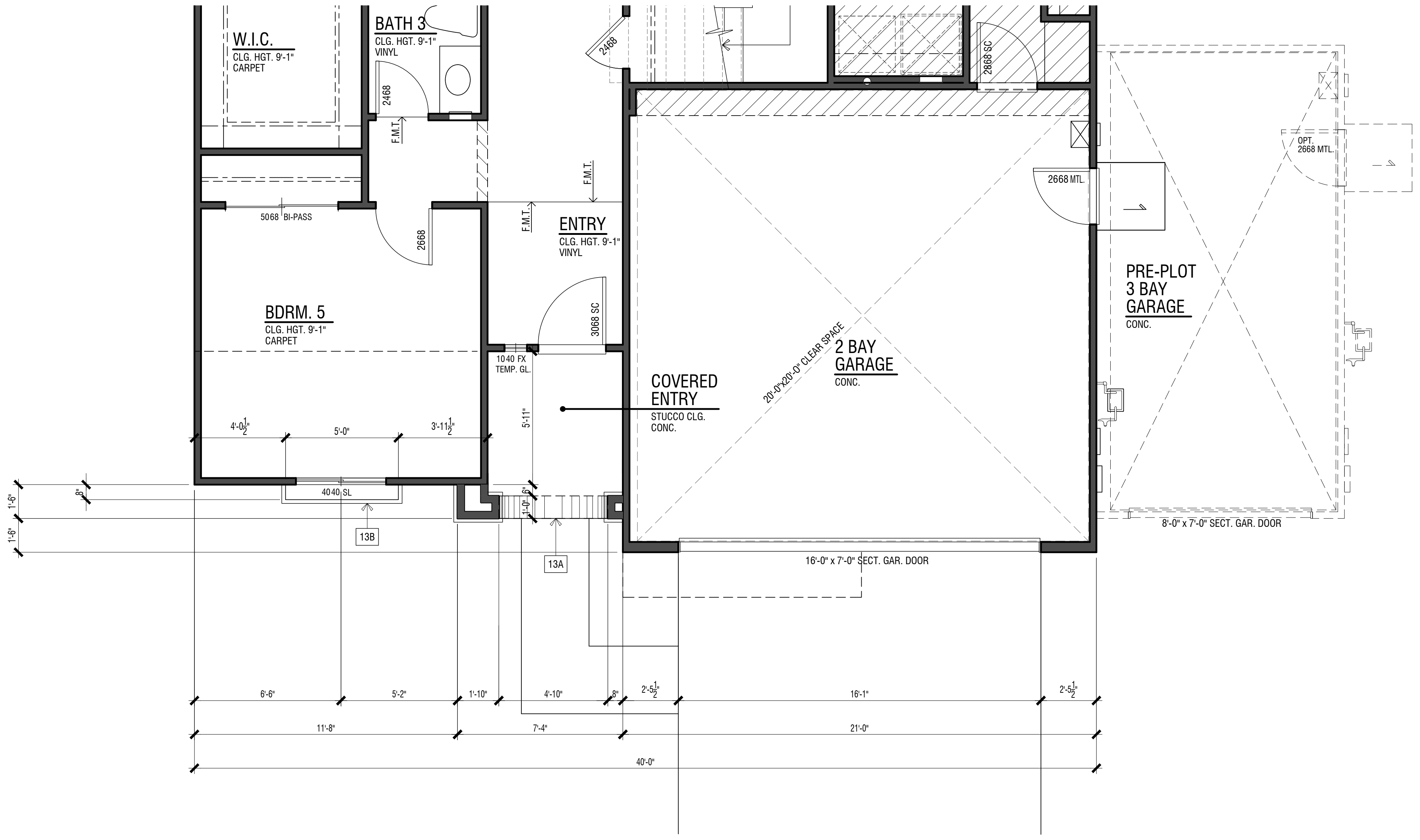
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA





PLAN 3.2537

2,537 SF
5 Bdrm | 3 Bath | Bonus Rm
2 Bay Garage
8' | 9' Plates

3D |Tuscan

WINDSONG- 5000

D·R·HORTON® DHI NYSE
America's Builder

HORTON E

MORENO VALLEY, CA

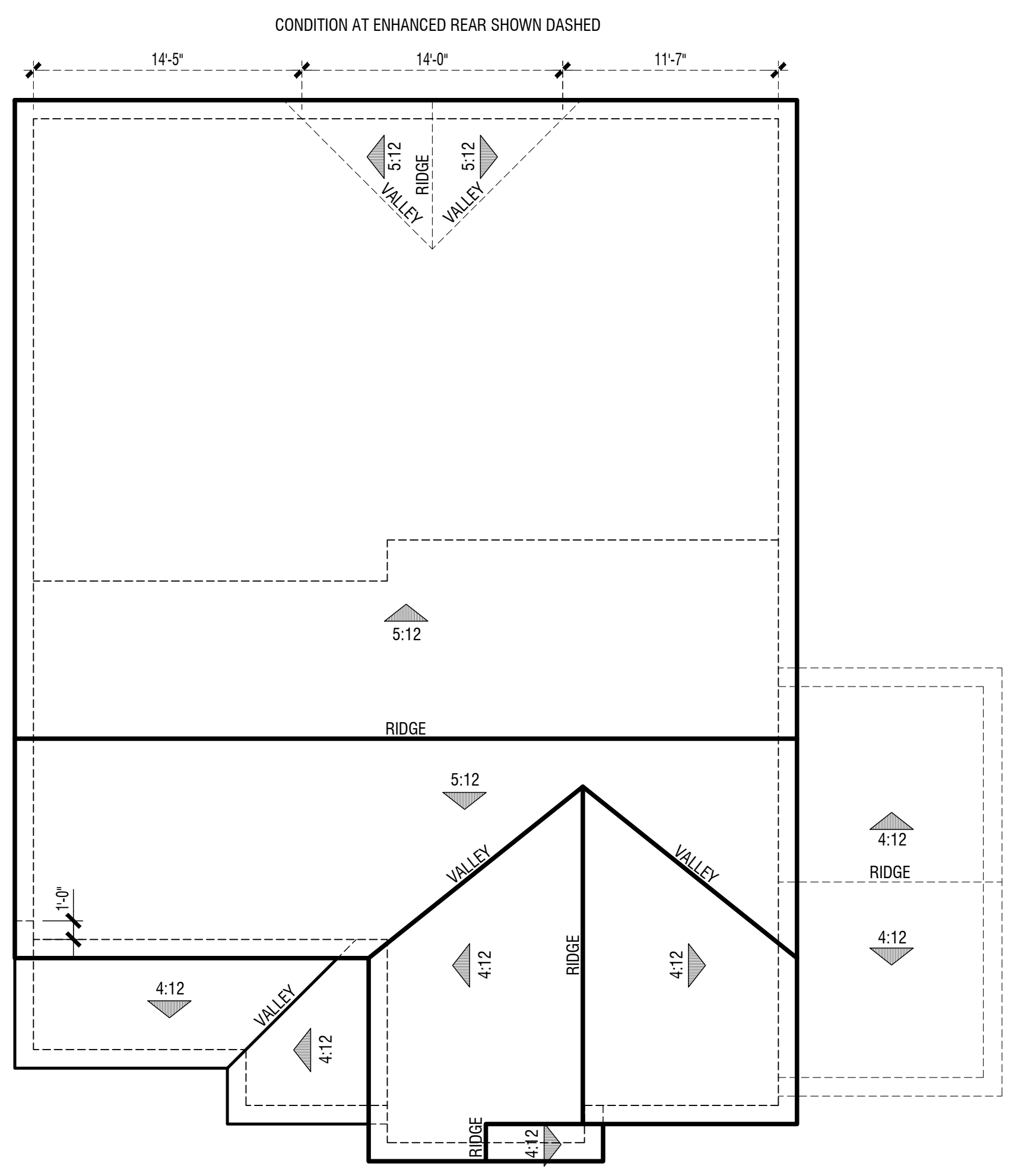
3.1

0 2 4 8

DESIGN REVIEW

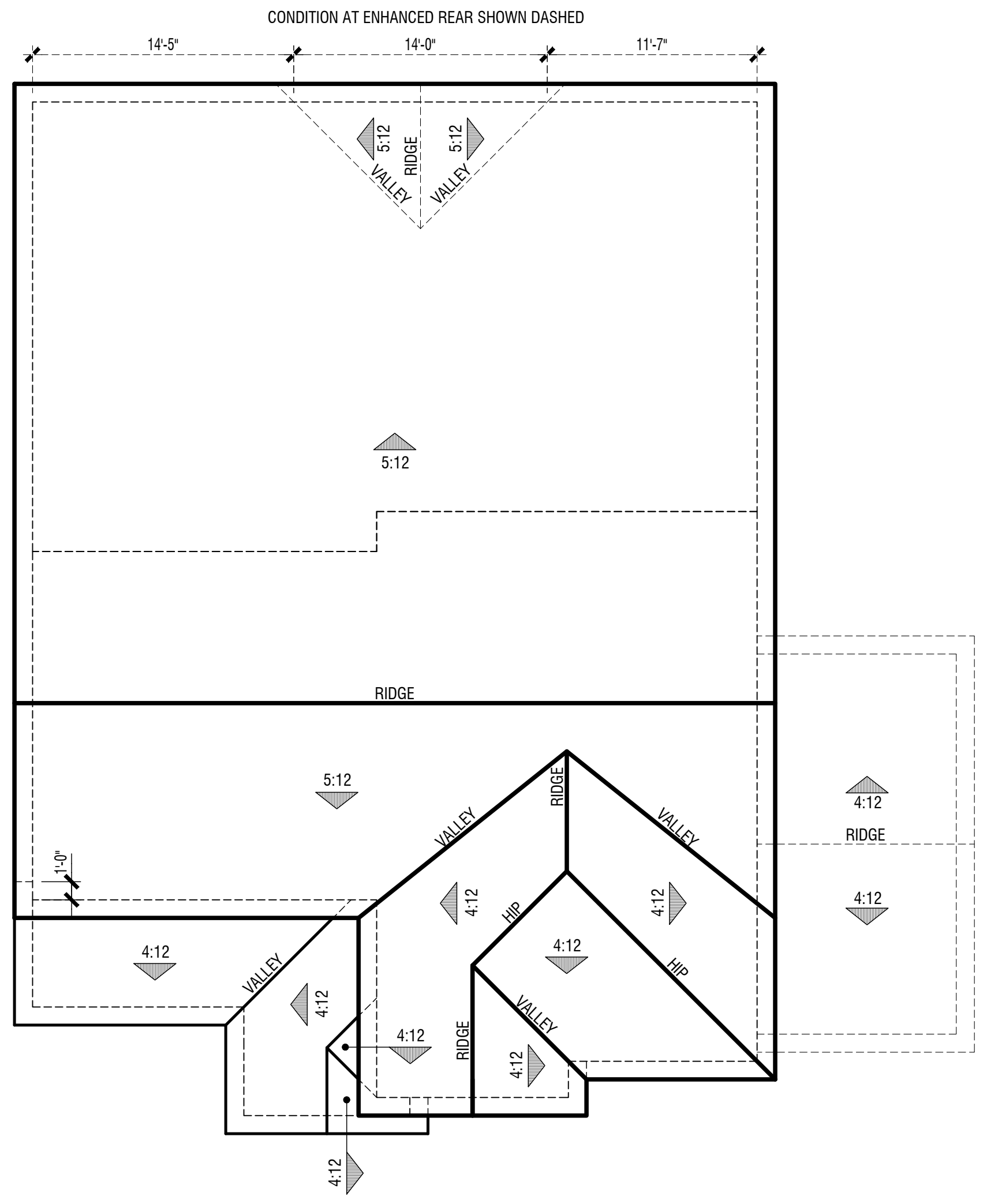
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



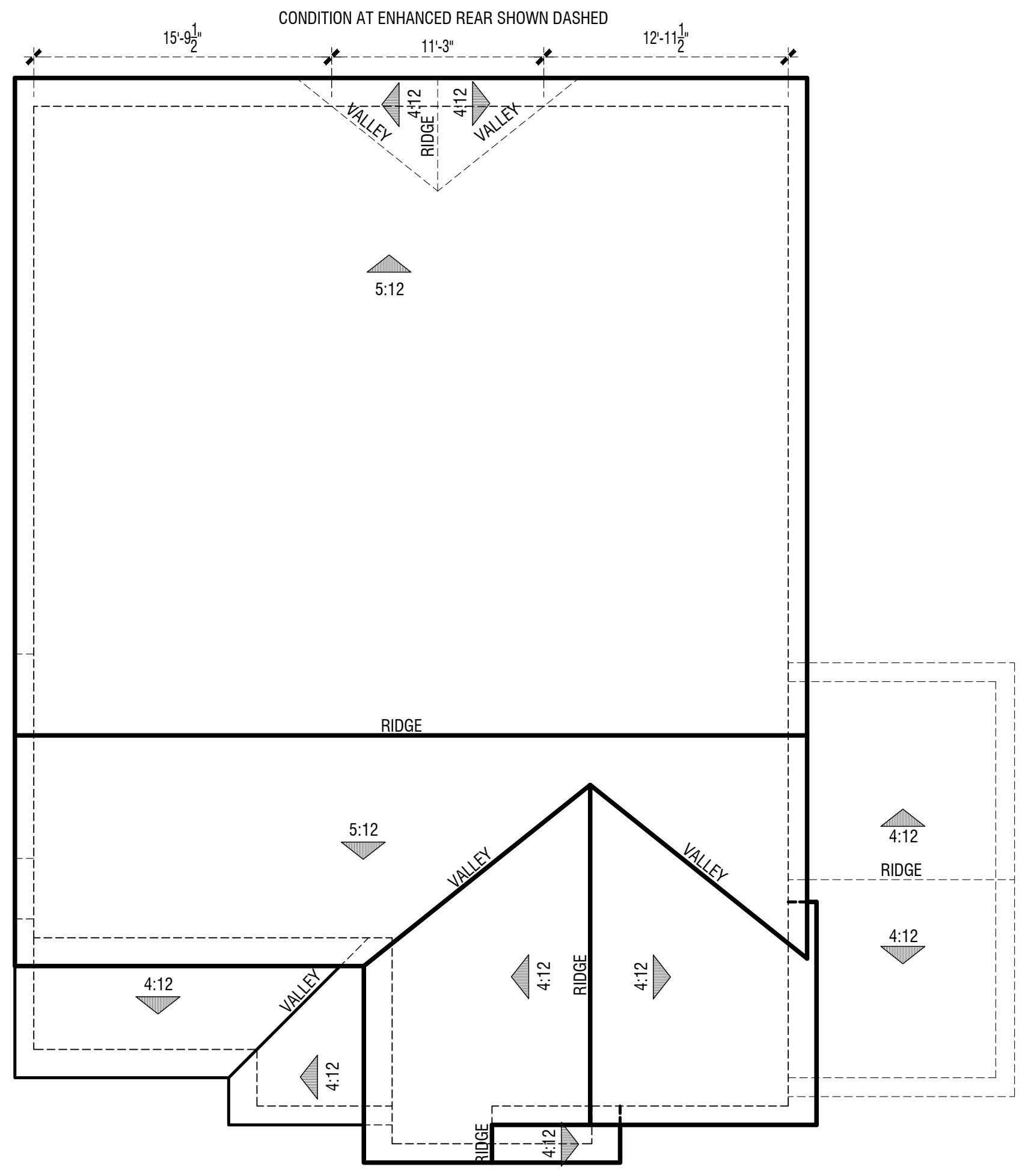
3A | SPANISH

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile



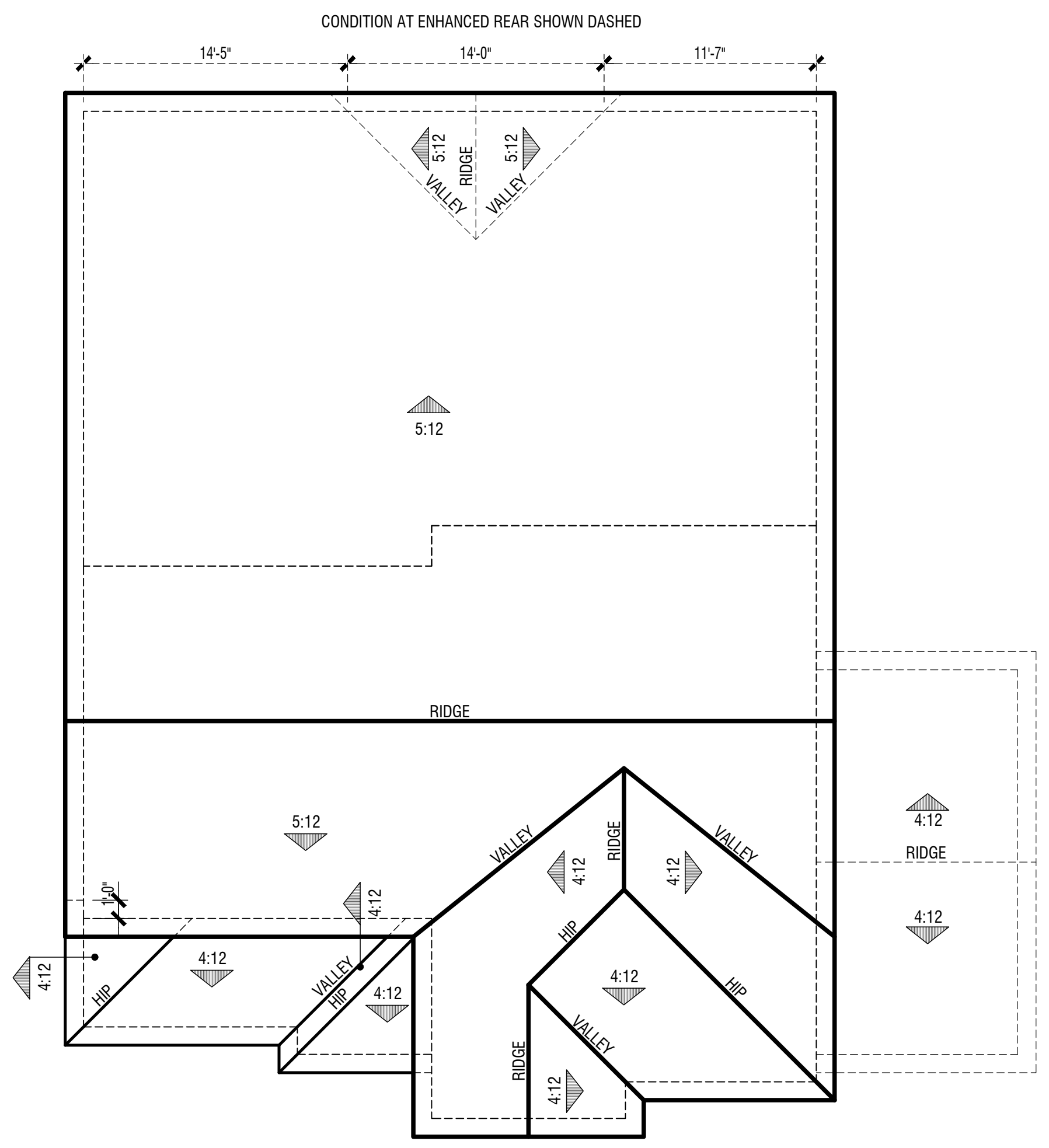
3B | TRADITIONAL

Eave 12" / Rake 12"
Concrete Flat Tile



3C | CRAFTSMAN

Eave 12" / Rake 12"
Concrete Flat Tile



3D | Tuscan

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile

PLAN 3.2537

Roof Plans

WINDSONG - 5000

HORTON E

MORENO VALLEY, CA

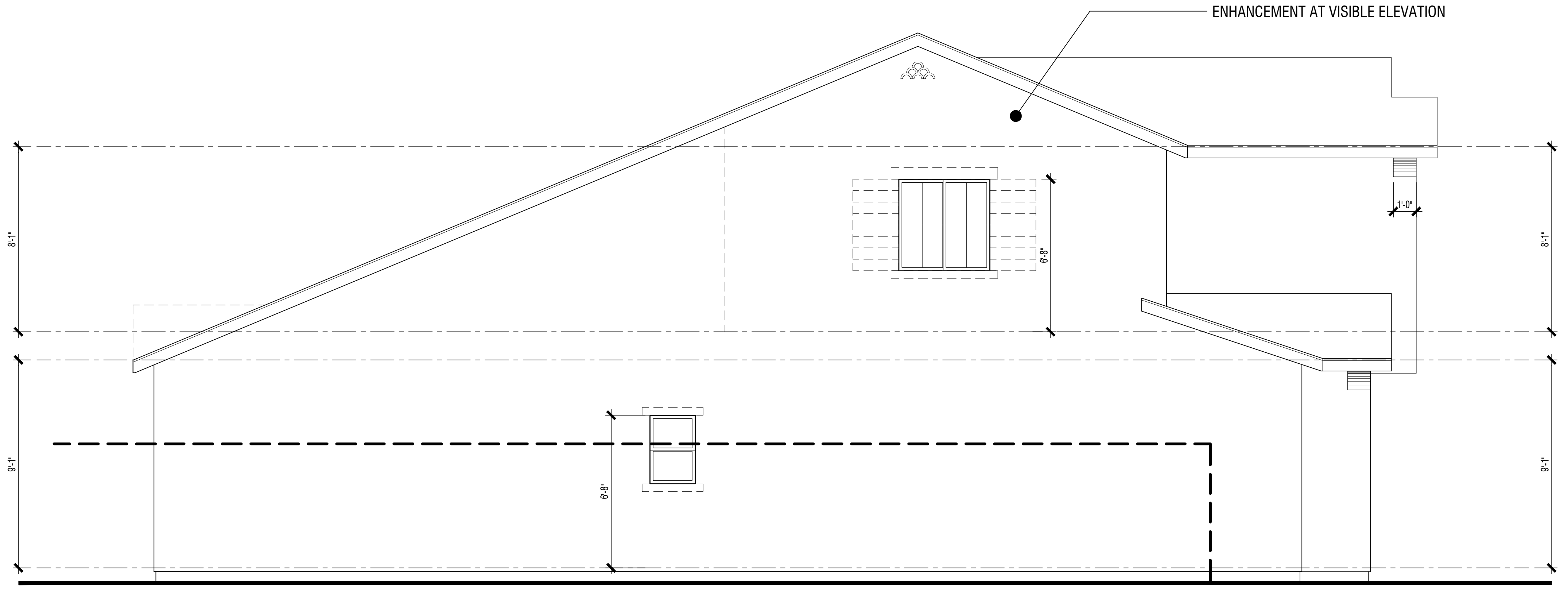
0 4 8 16

3.2

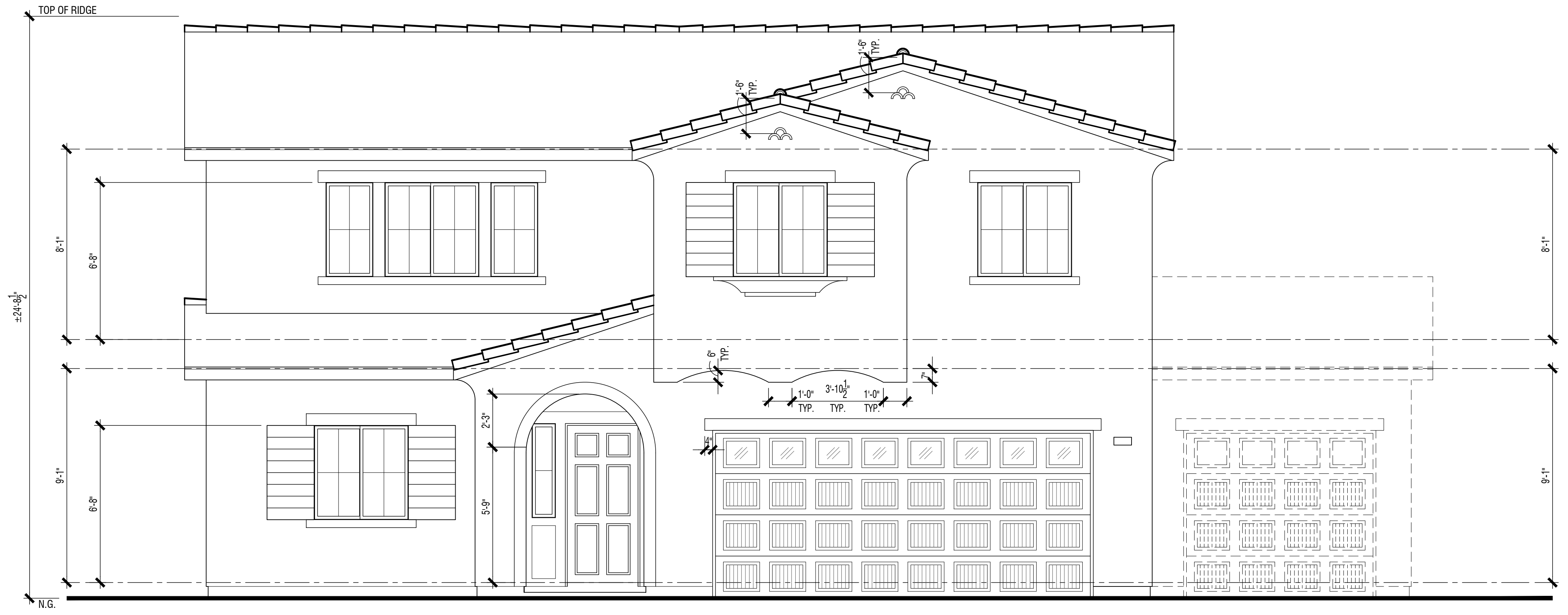
DESIGN REVIEW

| 2021272 | 09-09-21

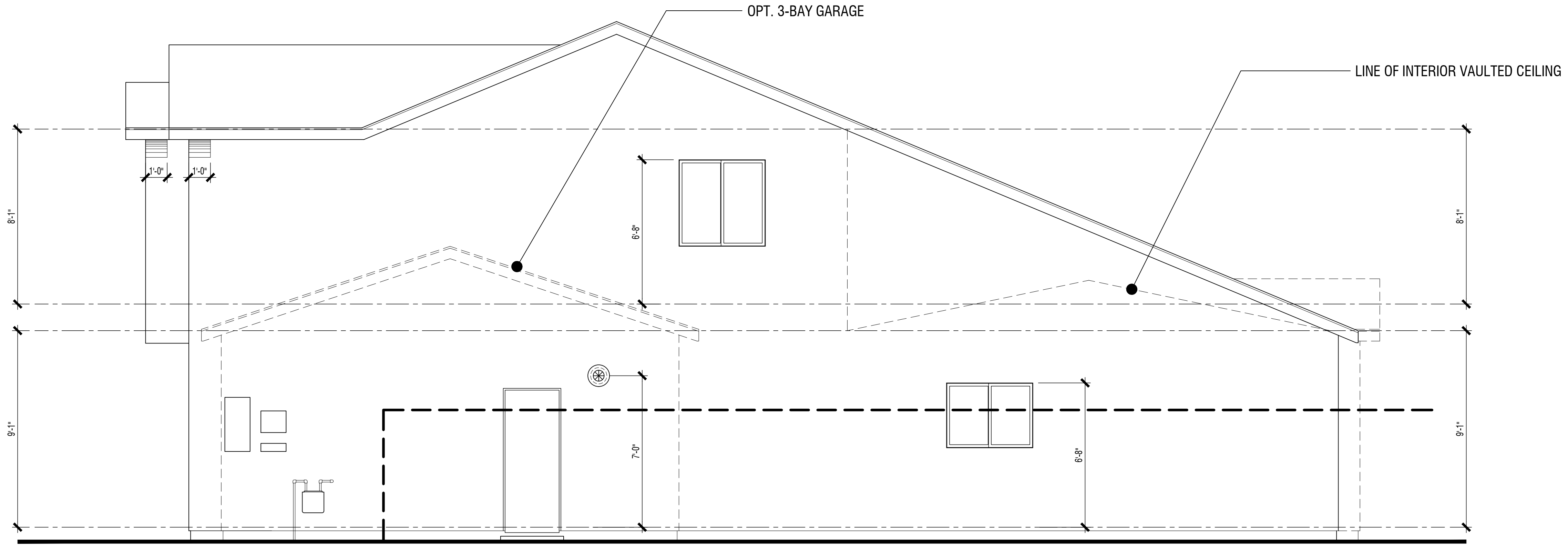
ARCHITECTS . PLANNERS . DESIGNERS
ORANGE COUNTY . LOS ANGELES . BAY AREA



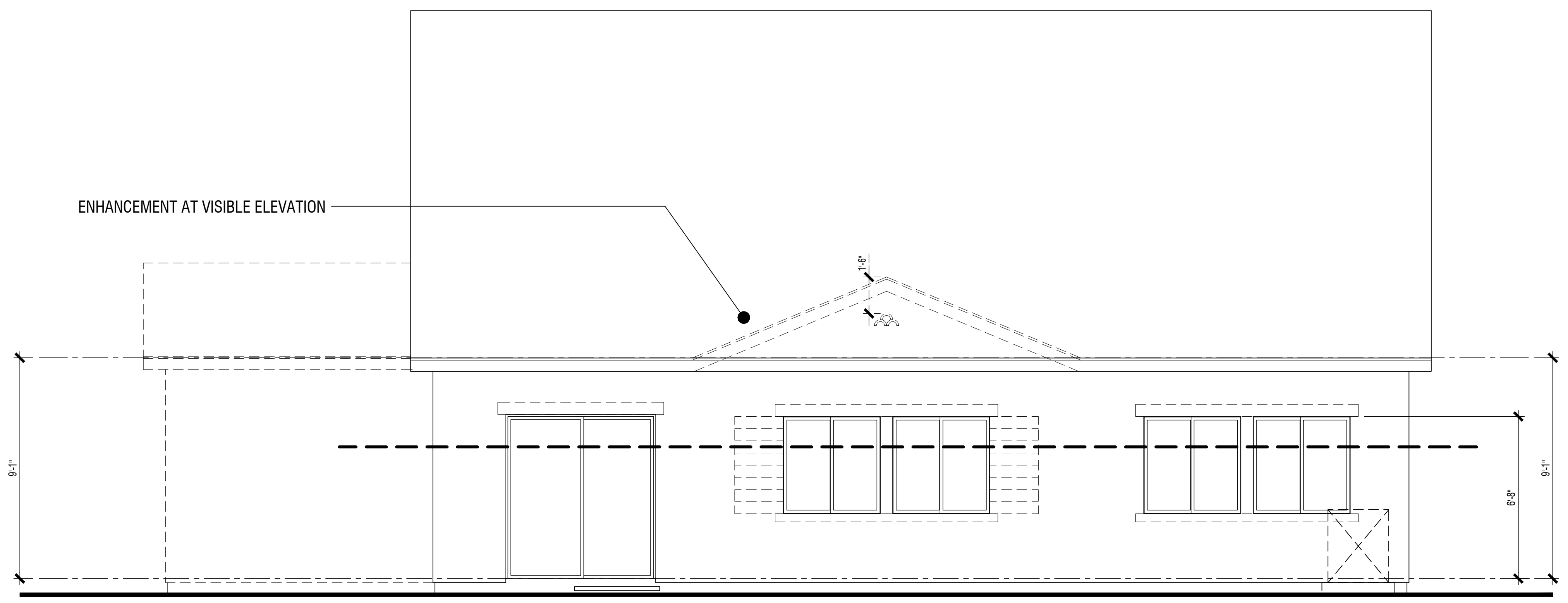
Left



Front



Right



Rear

PLAN 3A | SPANISH

Building Elevations

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

3.4

0 2 4 8

DESIGN REVIEW

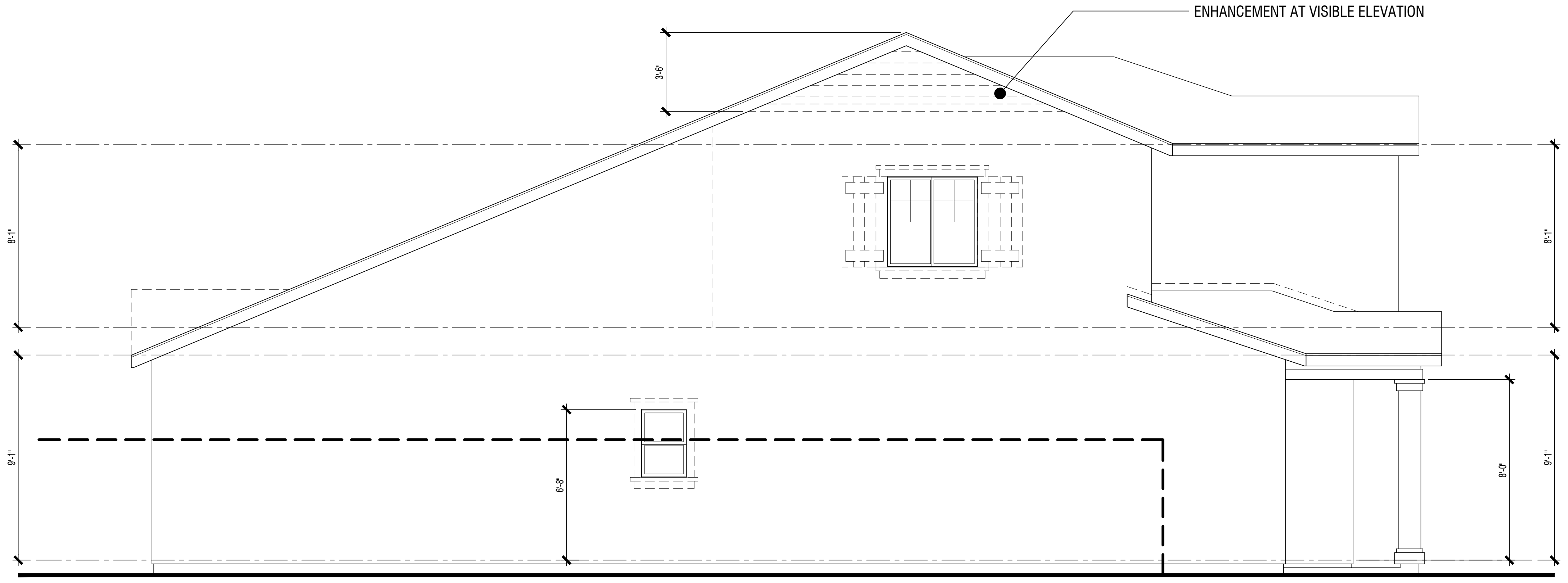
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

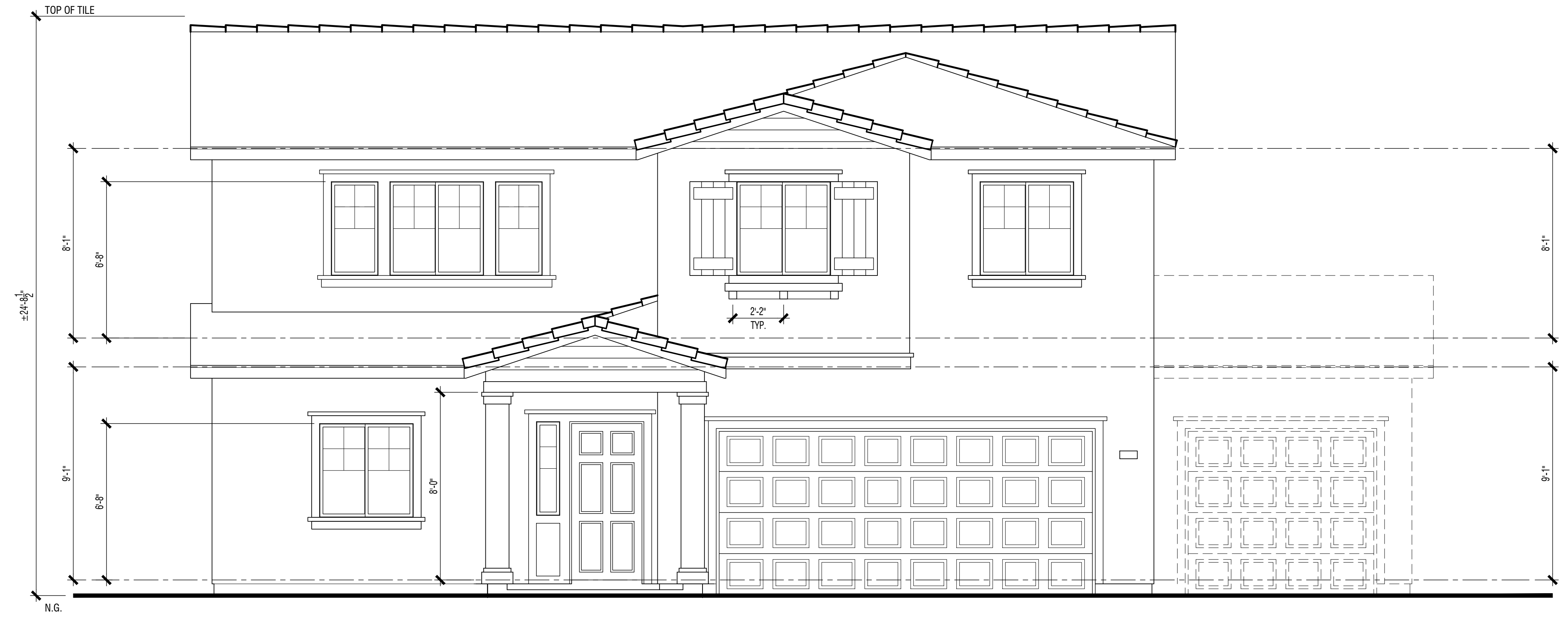
WHA.

ORANGE COUNTY . LOS ANGELES . BAY AREA

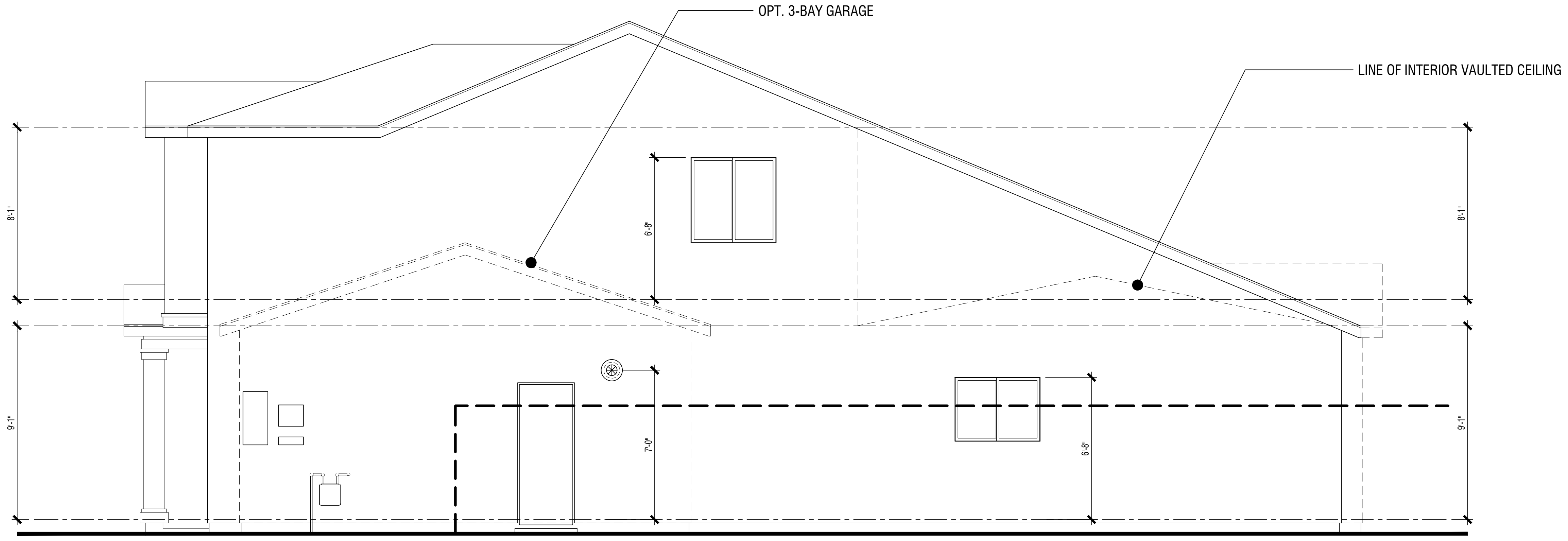
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



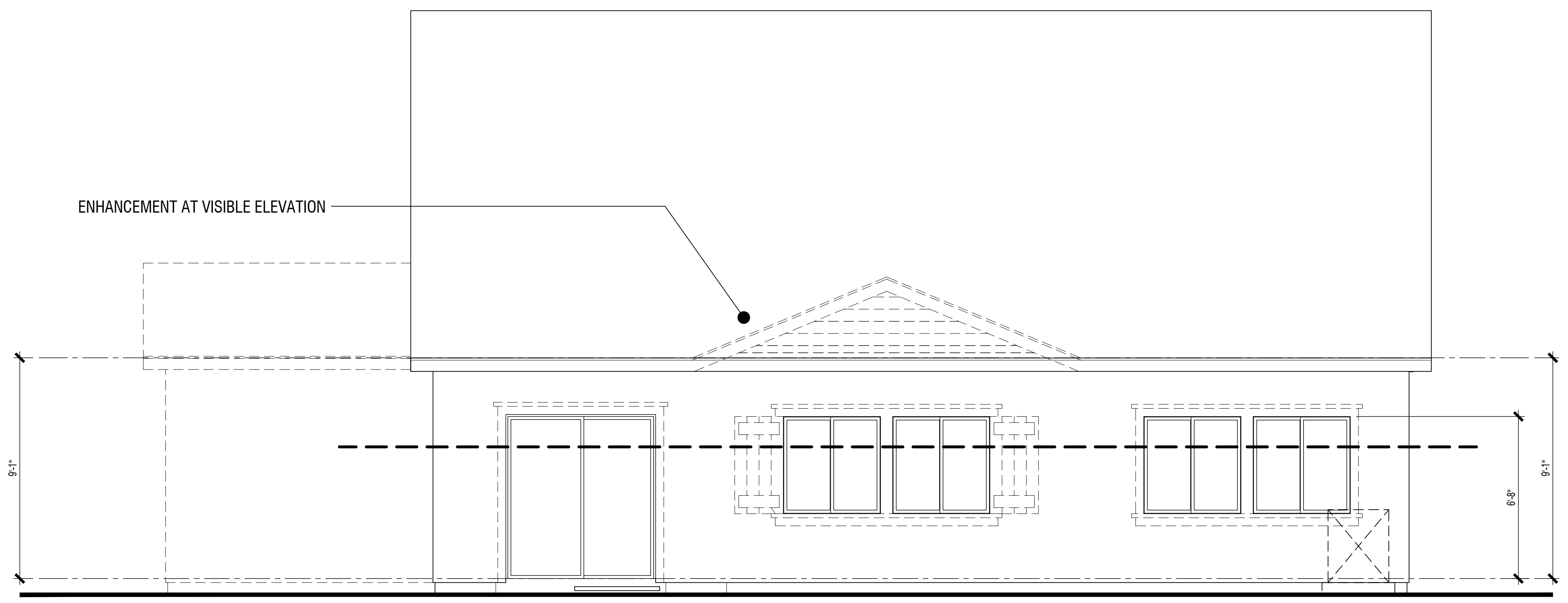
Left



Front



Right



Rear

PLAN 3B | TRADITIONAL

Building Elevations

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

3.5

0 2 4 8

DESIGN REVIEW

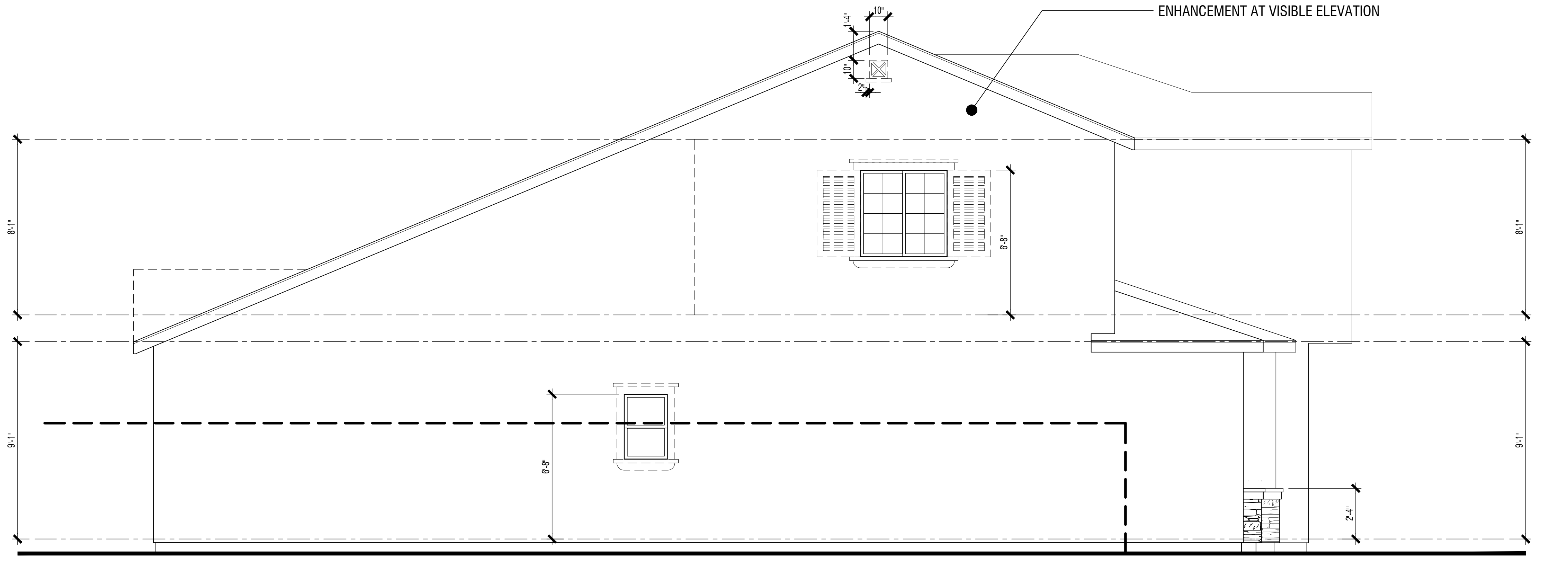
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

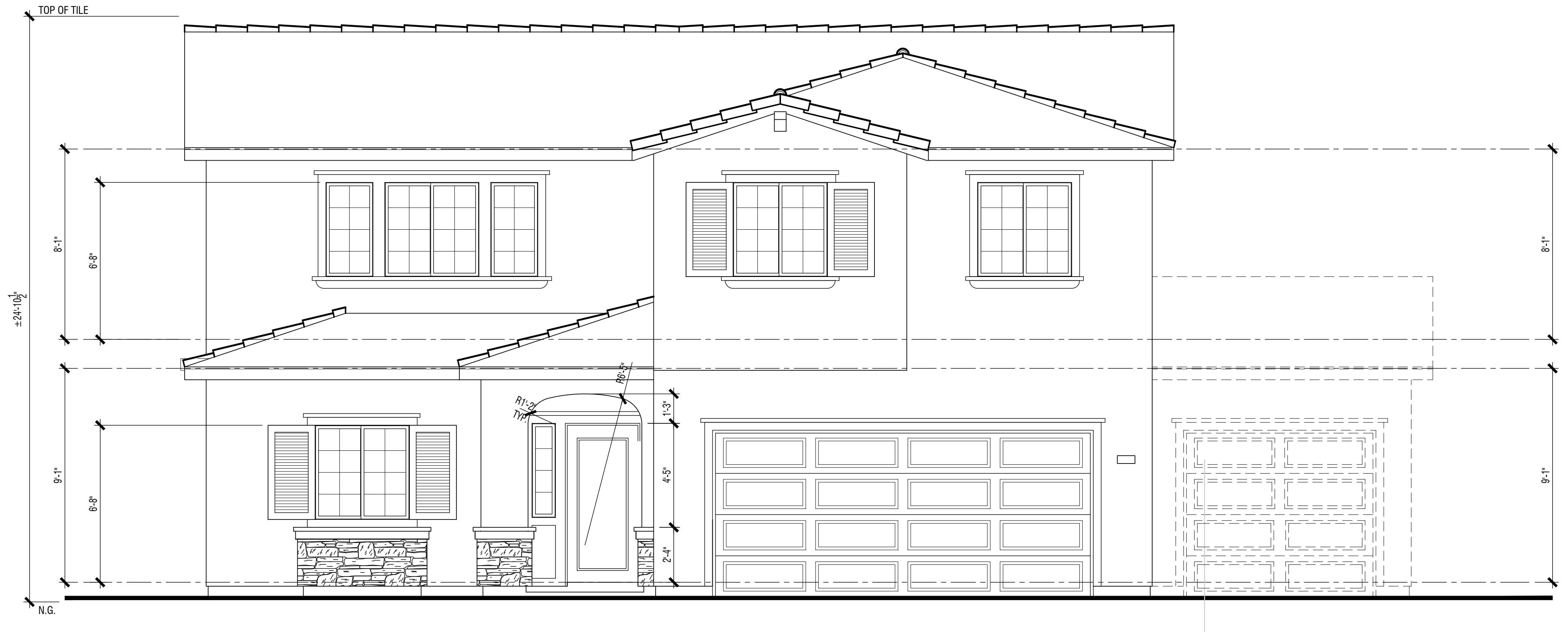
WHA.

ORANGE COUNTY . LOS ANGELES . BAY AREA

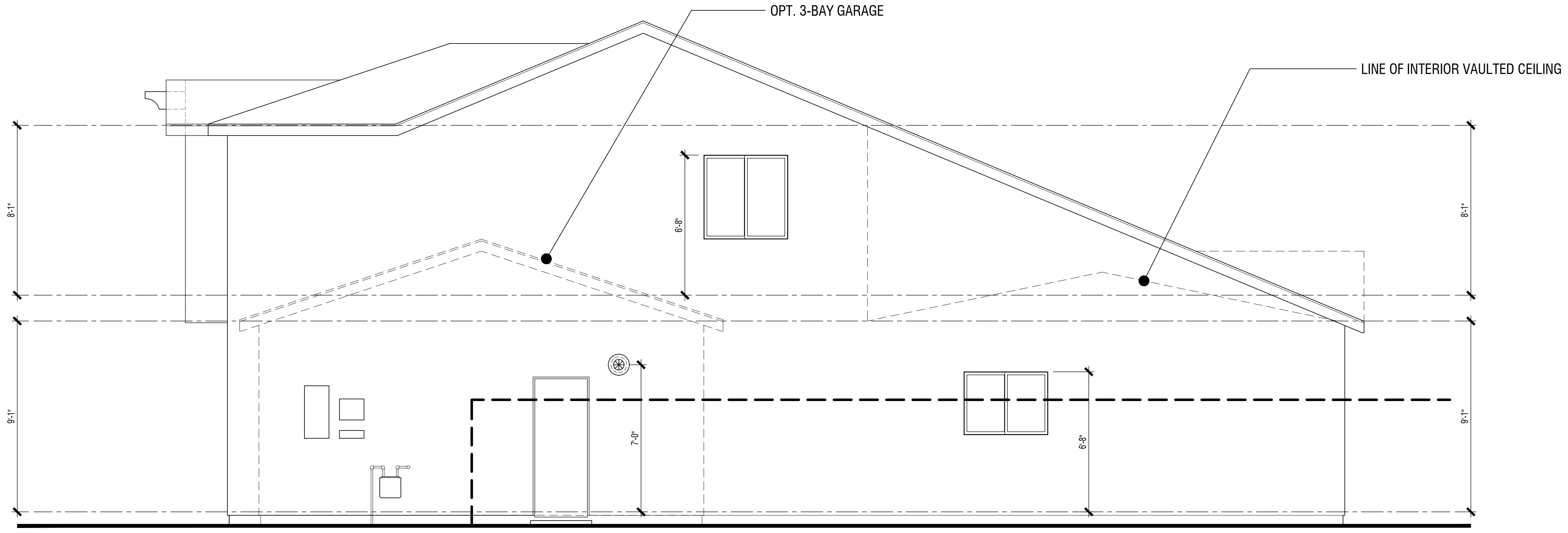
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



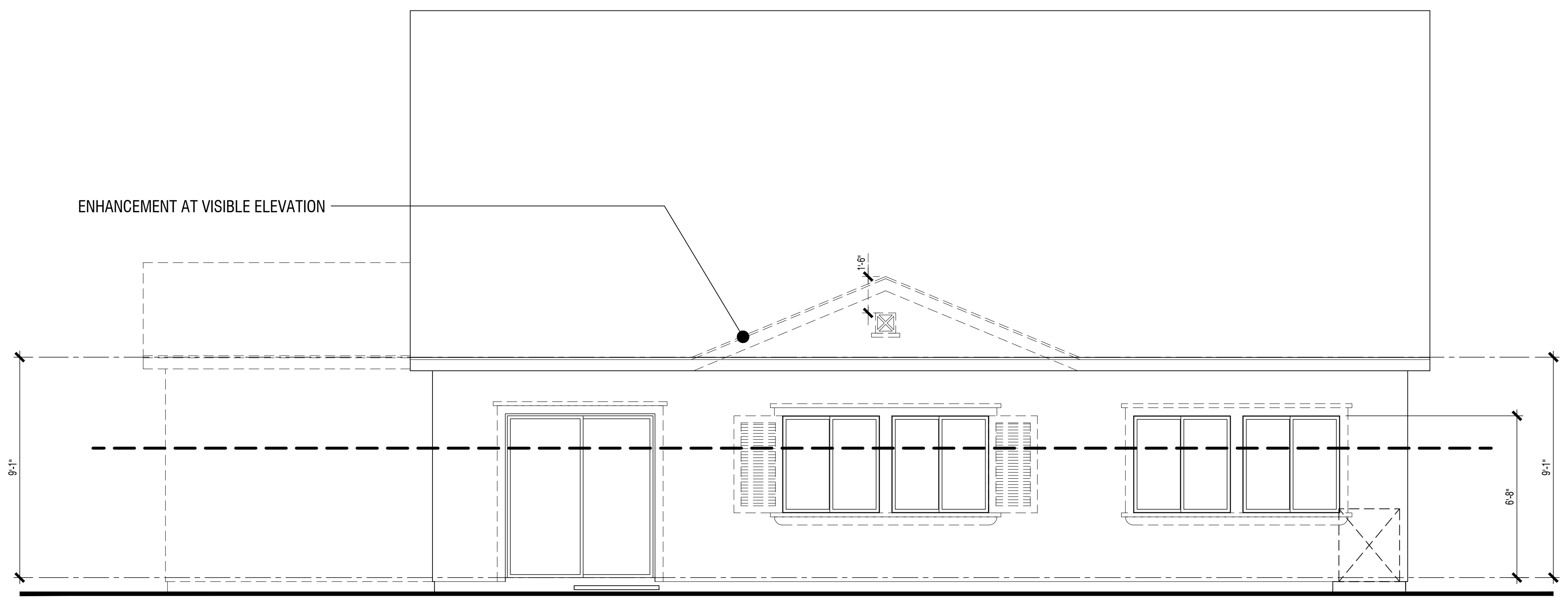
Left



Front



Right



Rear

PLAN 3D | TUSCAN

Building Elevations

WINDSONG- 5000

D·R·HORTON® America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

3.6

0 2 4 8

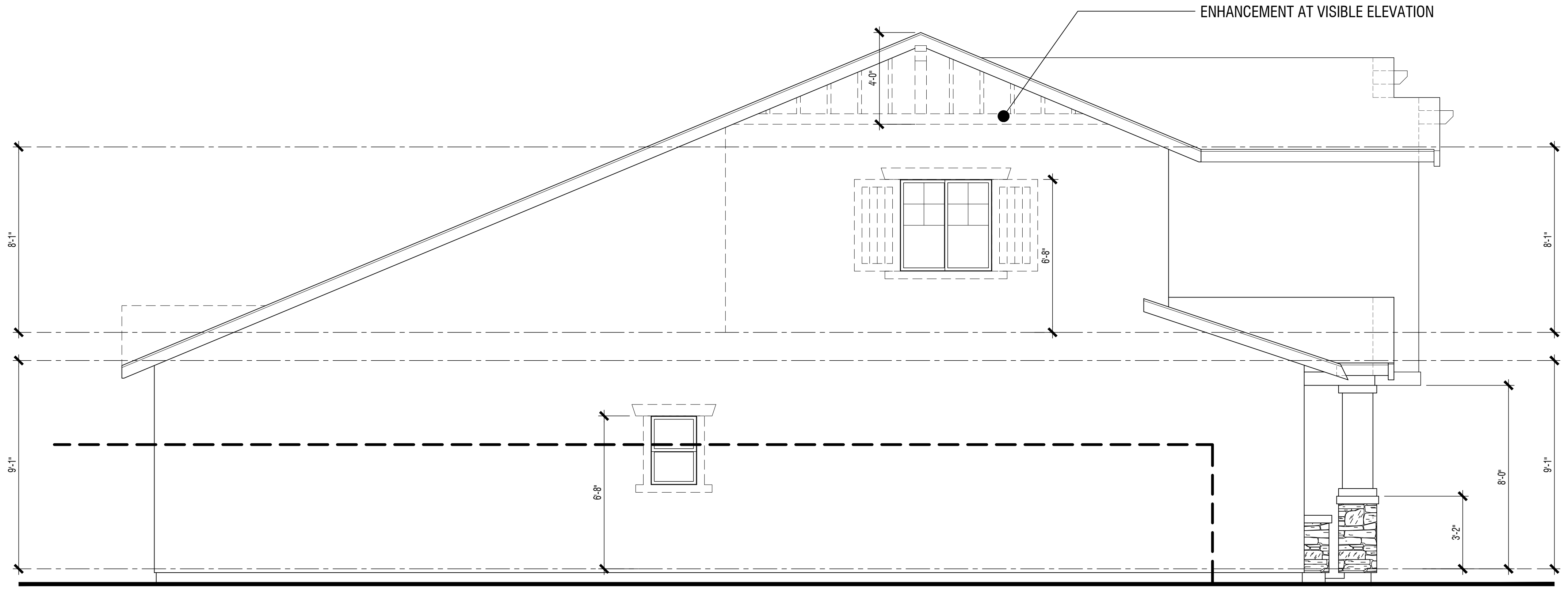
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

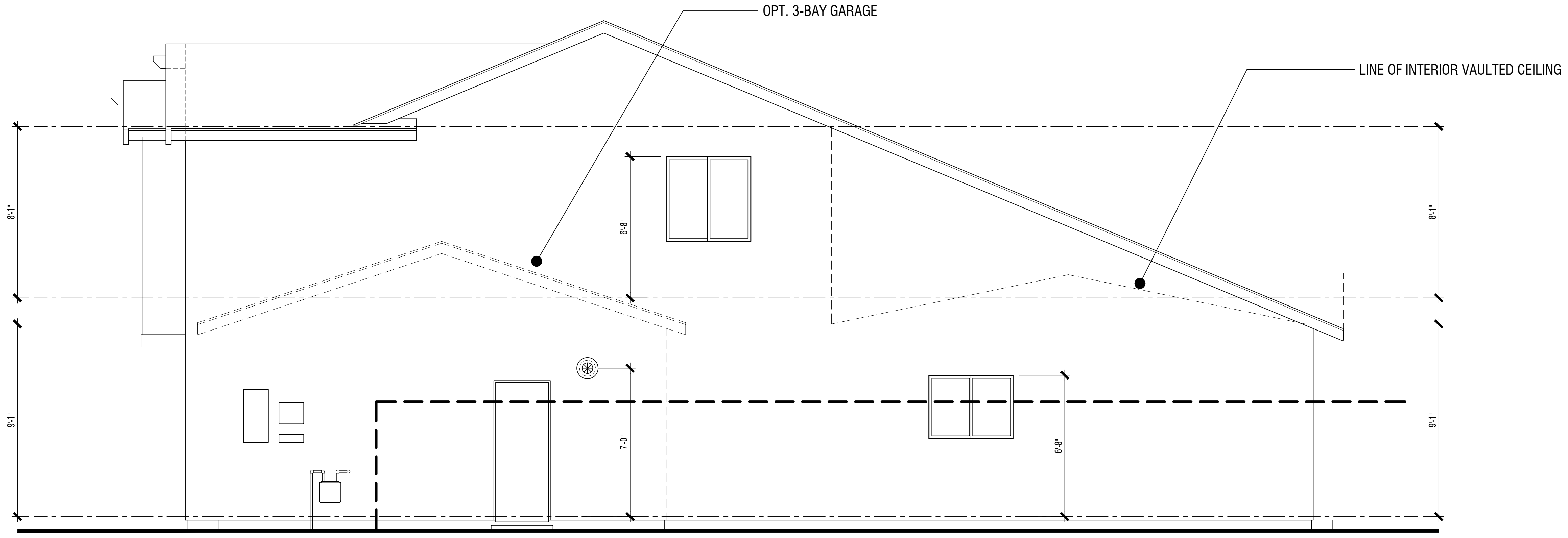
WHA.

ORANGE COUNTY . LOS ANGELES . BAY AREA

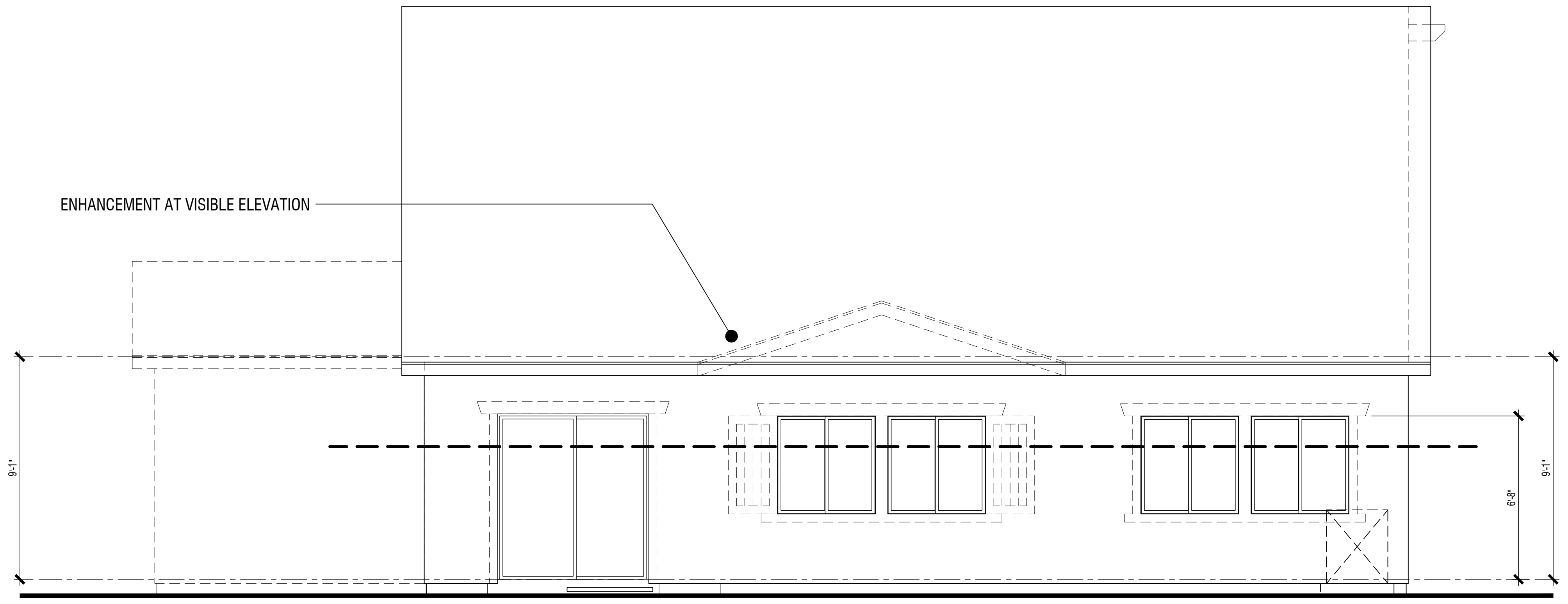


Left

Front



Right



Rear

PLAN 3C |CRAFTSMAN

Building Elevations

WINDSONG - 5000

HORTON E

MORENO VALLEY, CA

3.7

0 2 4 8

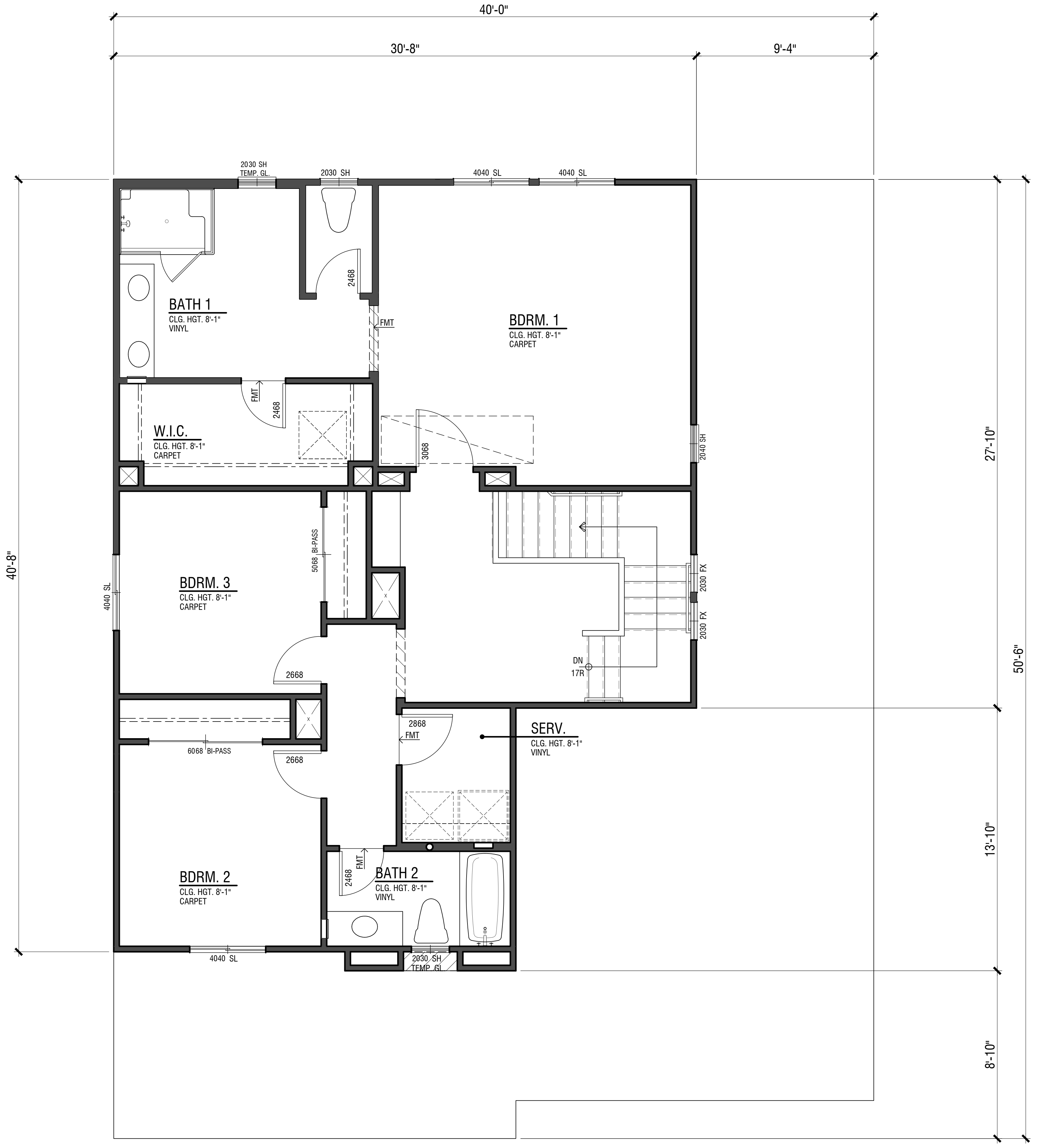
DESIGN REVIEW

| 2021272 | 09-09-21

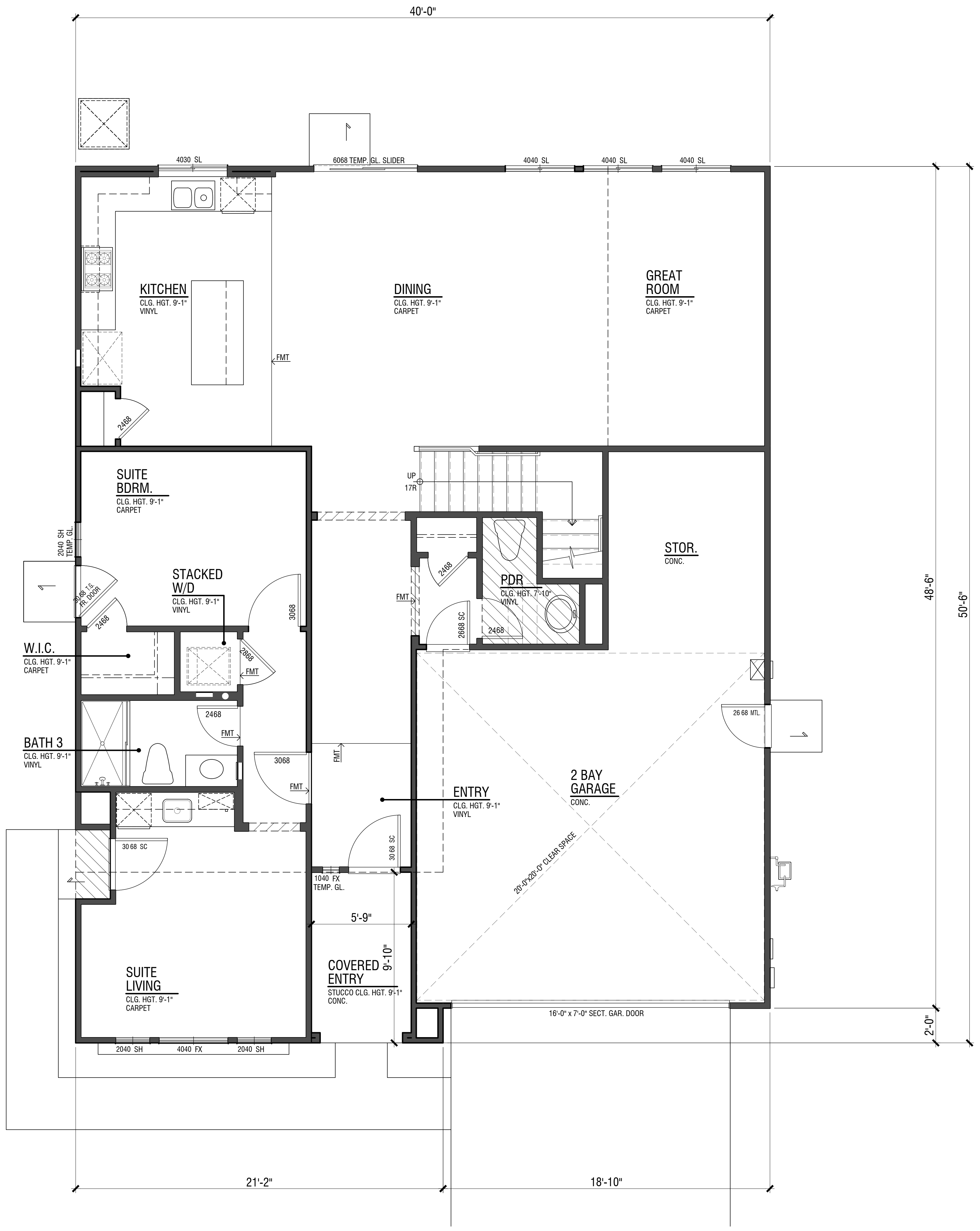
ARCHITECTS . PLANNERS . DESIGNERS

ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



Upper Floor - 1,051 SF



Lower Floor - 1,384 SF

PLAN 4.2435

2,435 SF
4 Bdrm | 3.5 Bath |
MultiGen/Junior ADU
2 Bay Garage
8' | 9' Plates

4A | SPANISH

WINDSONG - 5000

HORTON E

MORENO VALLEY, CA

4.0

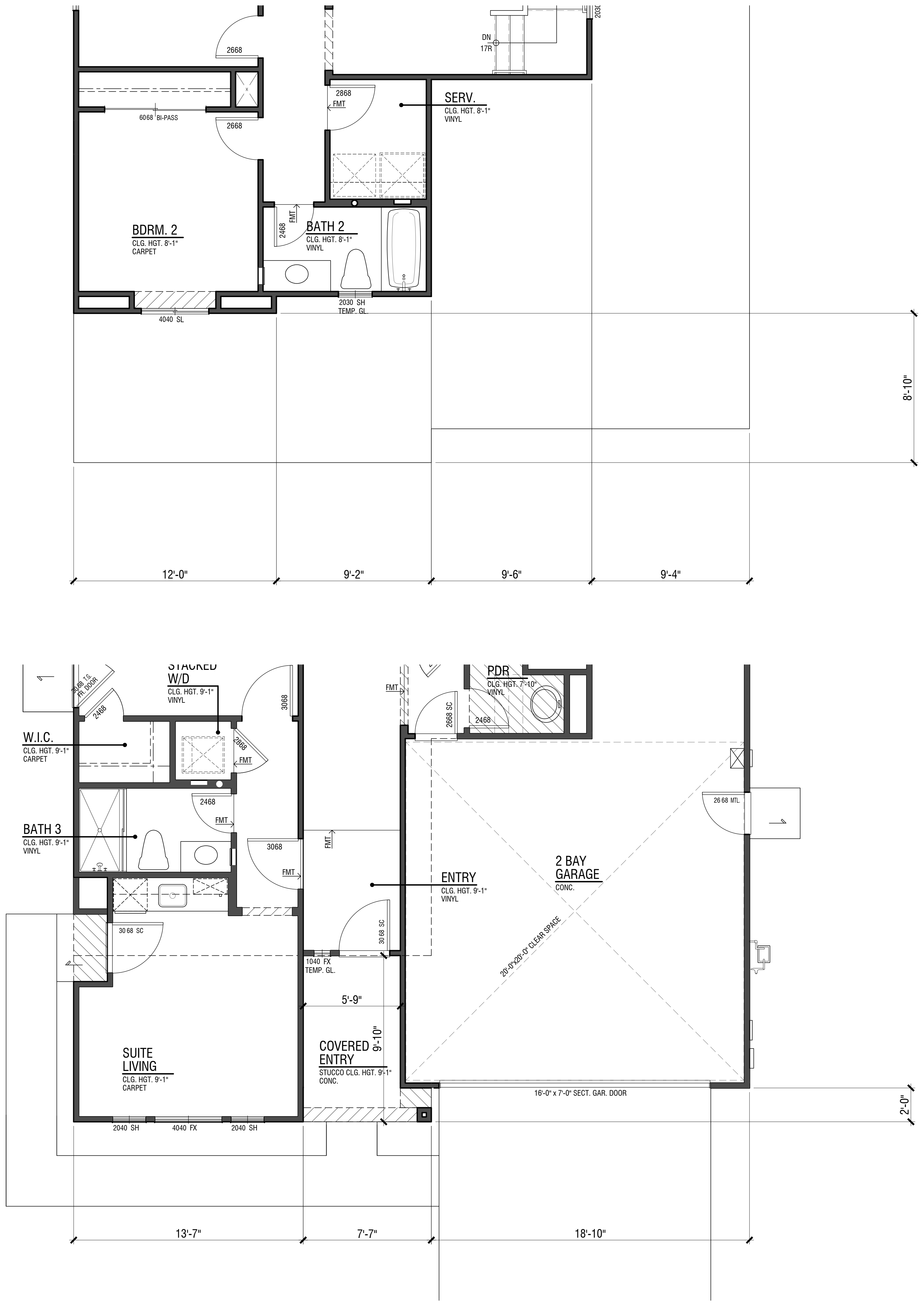
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
ORANGE COUNTY . LOS ANGELES . BAY AREA

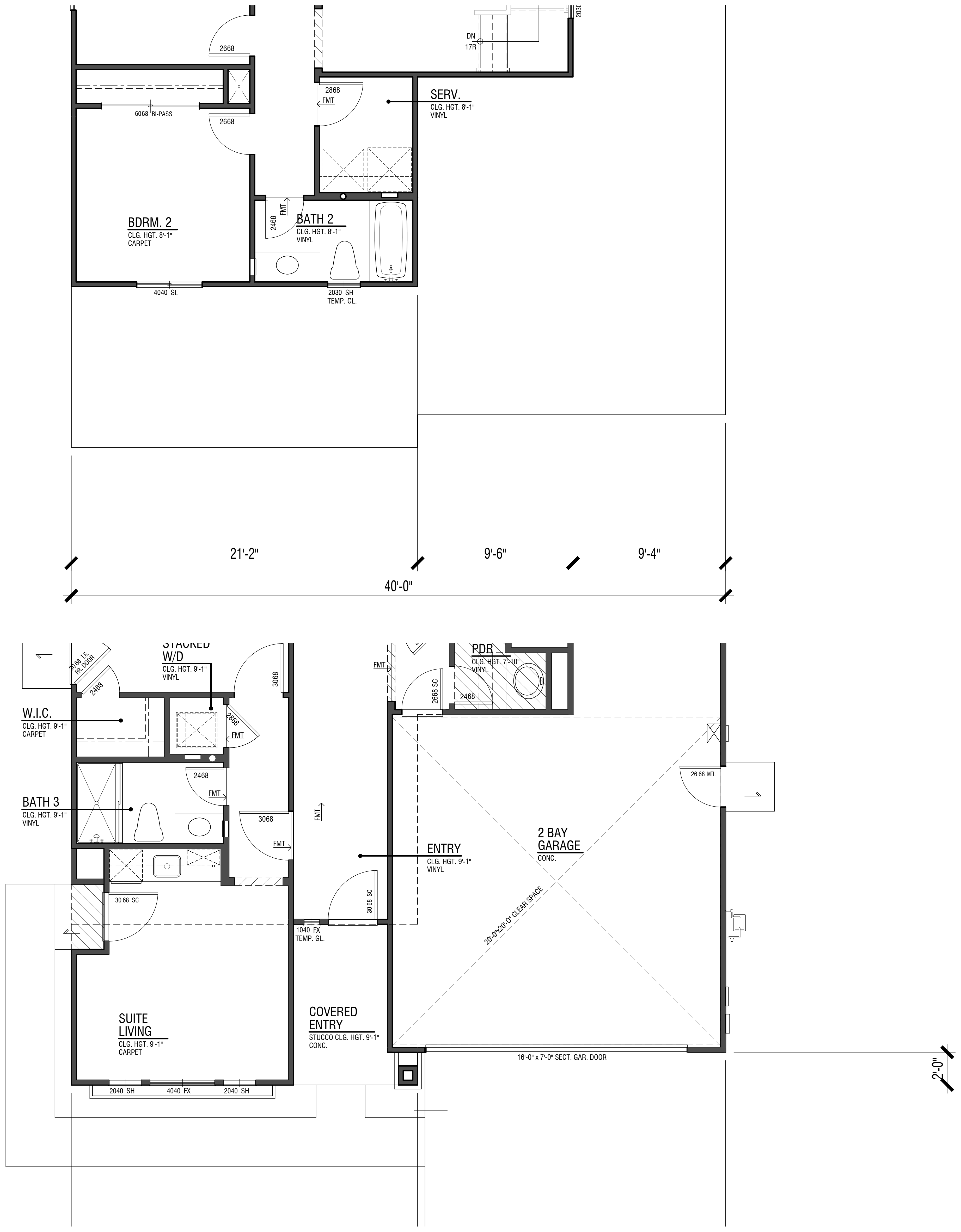
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)



4B | TRADITIONAL

PLAN 4.2435

2,435 SF
4 Bdrm | 3.5 Bath |
MultiGen/Junior ADU
2 Bay Garage
8' | 9' Plates



4C | CRAFTSMAN

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

4.1

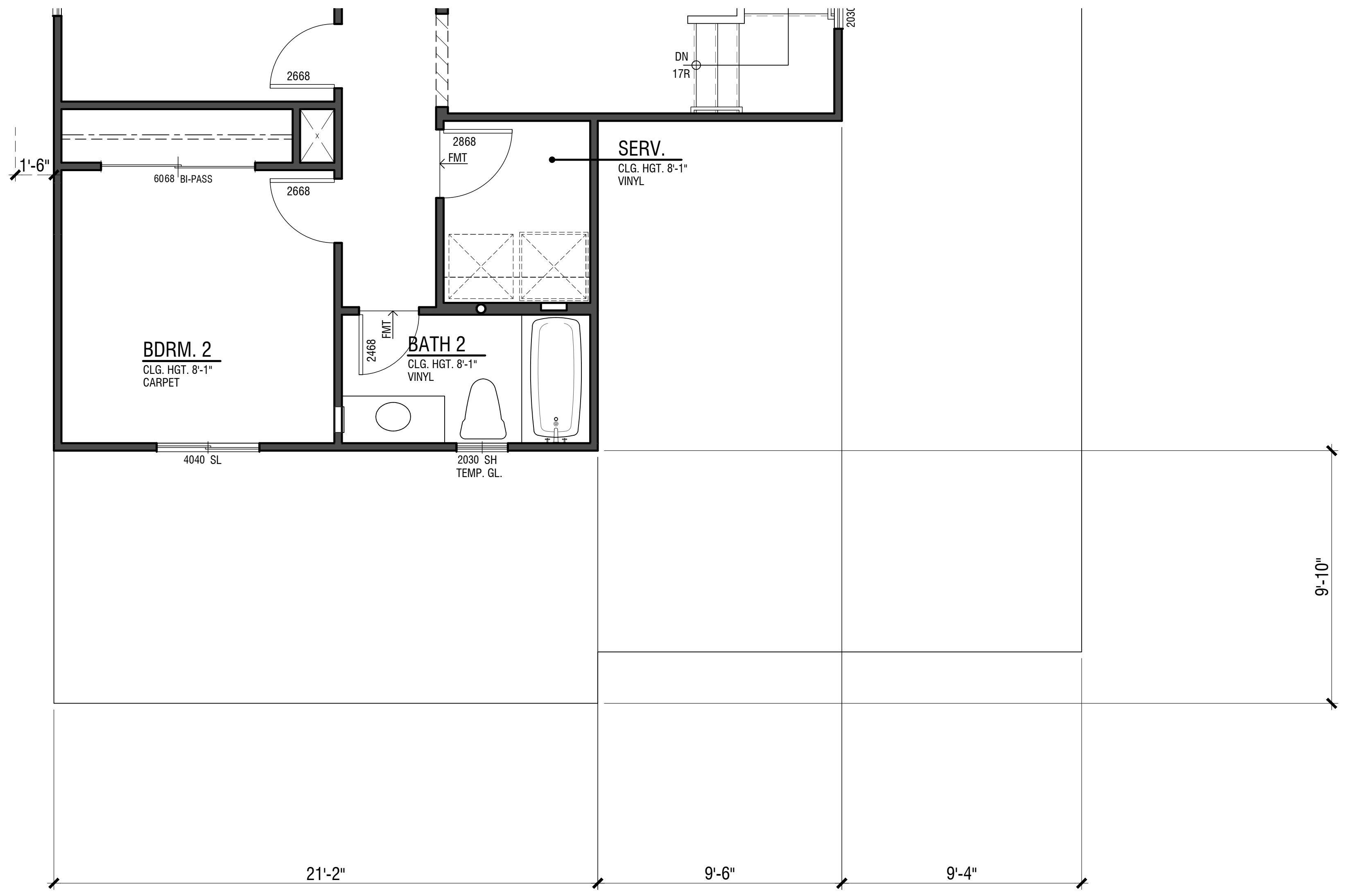
0 2 4 8

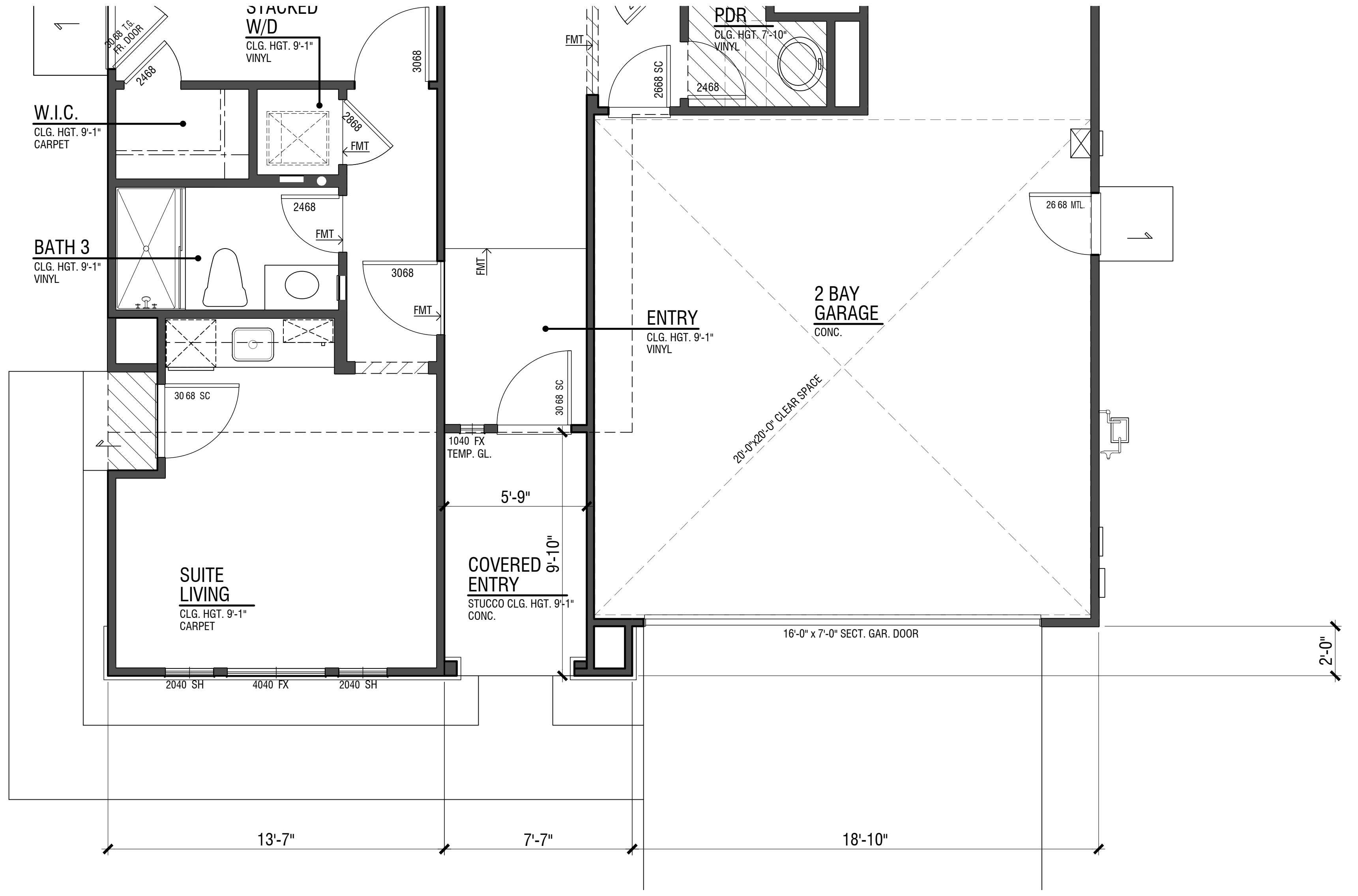
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)





PLAN 4.2435

2,435 SF
4 Bdrm | 3.5 Bath |
MultiGen/Junior ADU
2 Bay Garage
8' | 9' Plates

4D | TUSCAN

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

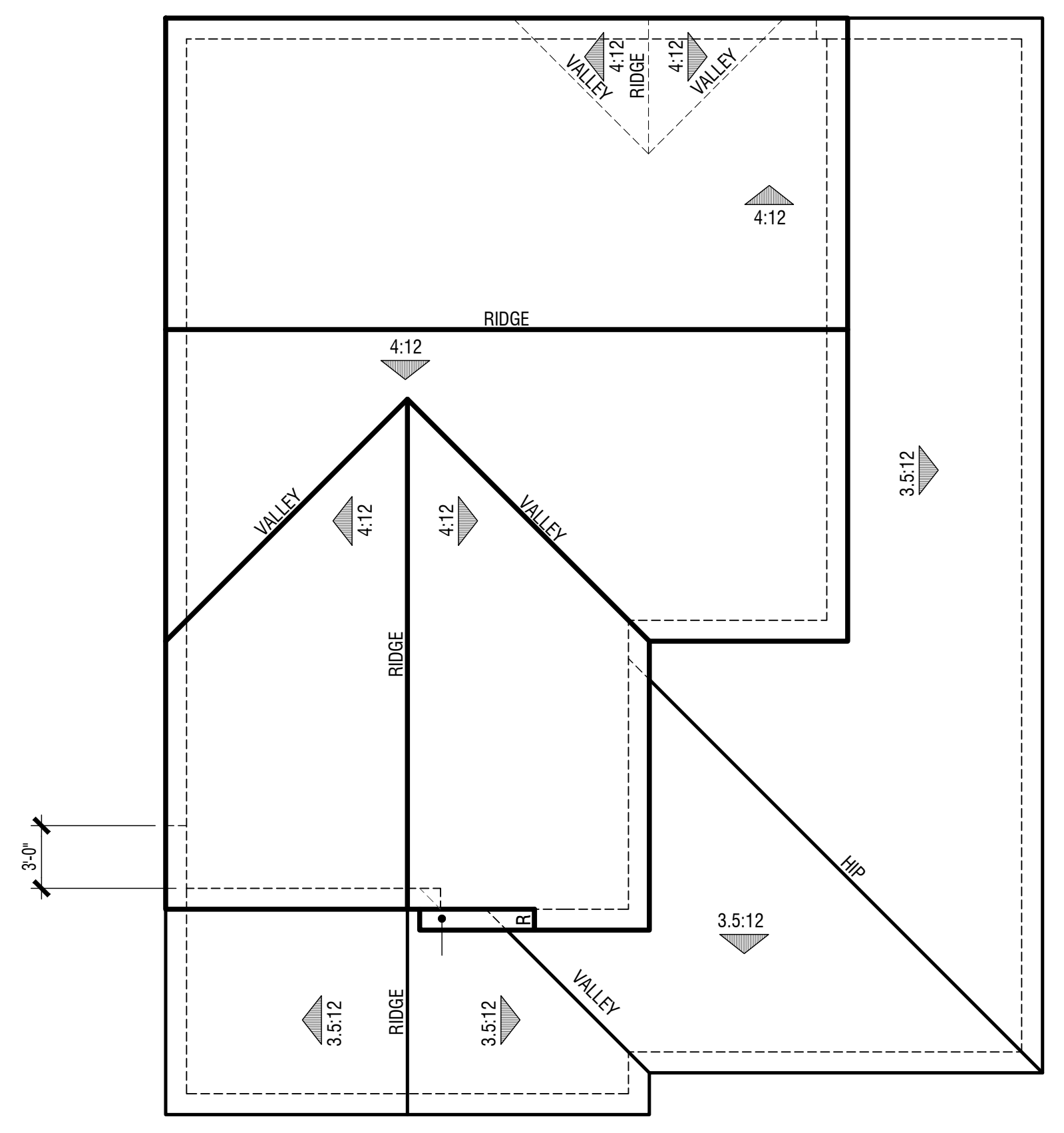
4.2

0 2 4 8

DESIGN REVIEW

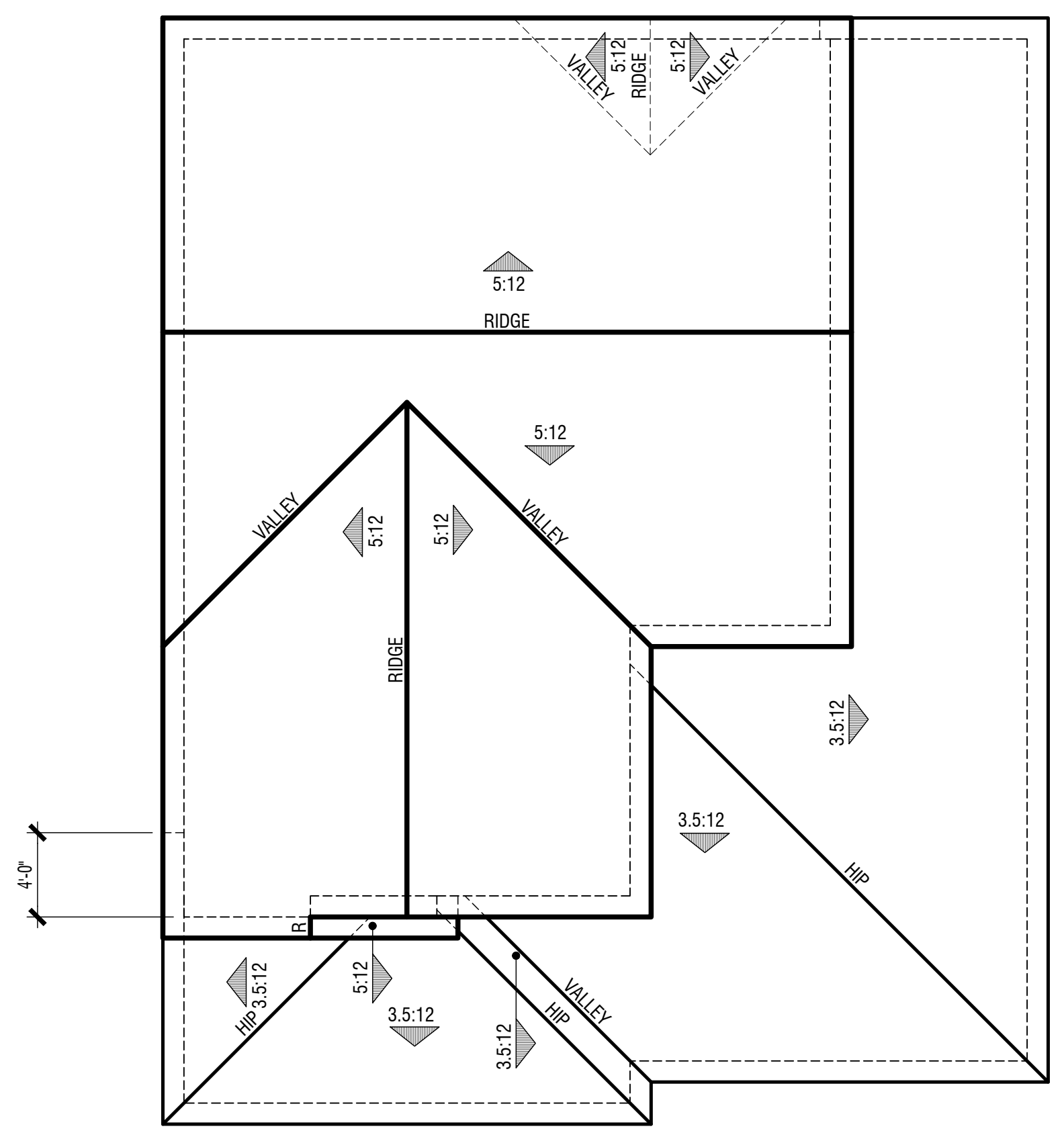
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA



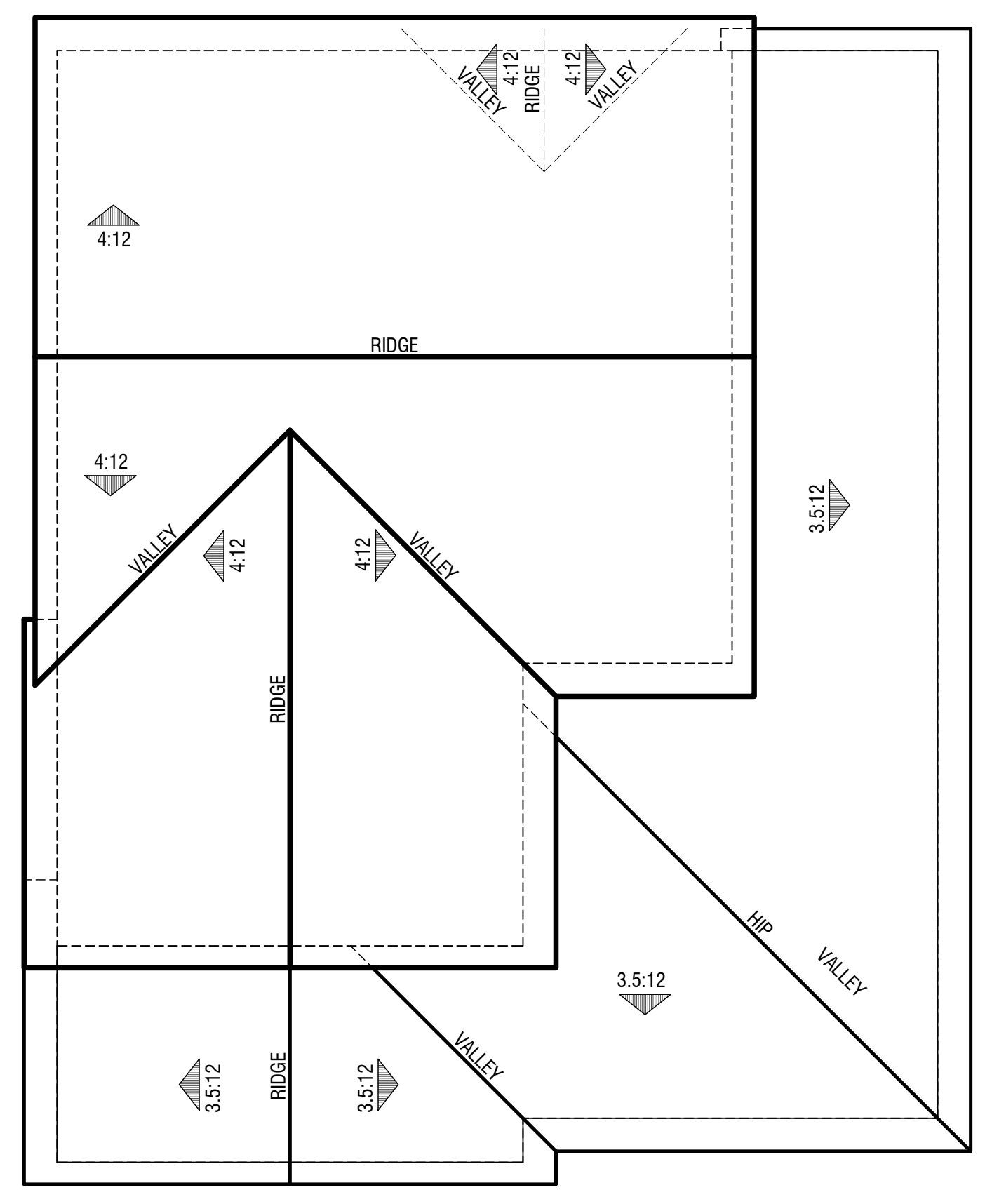
4A | SPANISH

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile



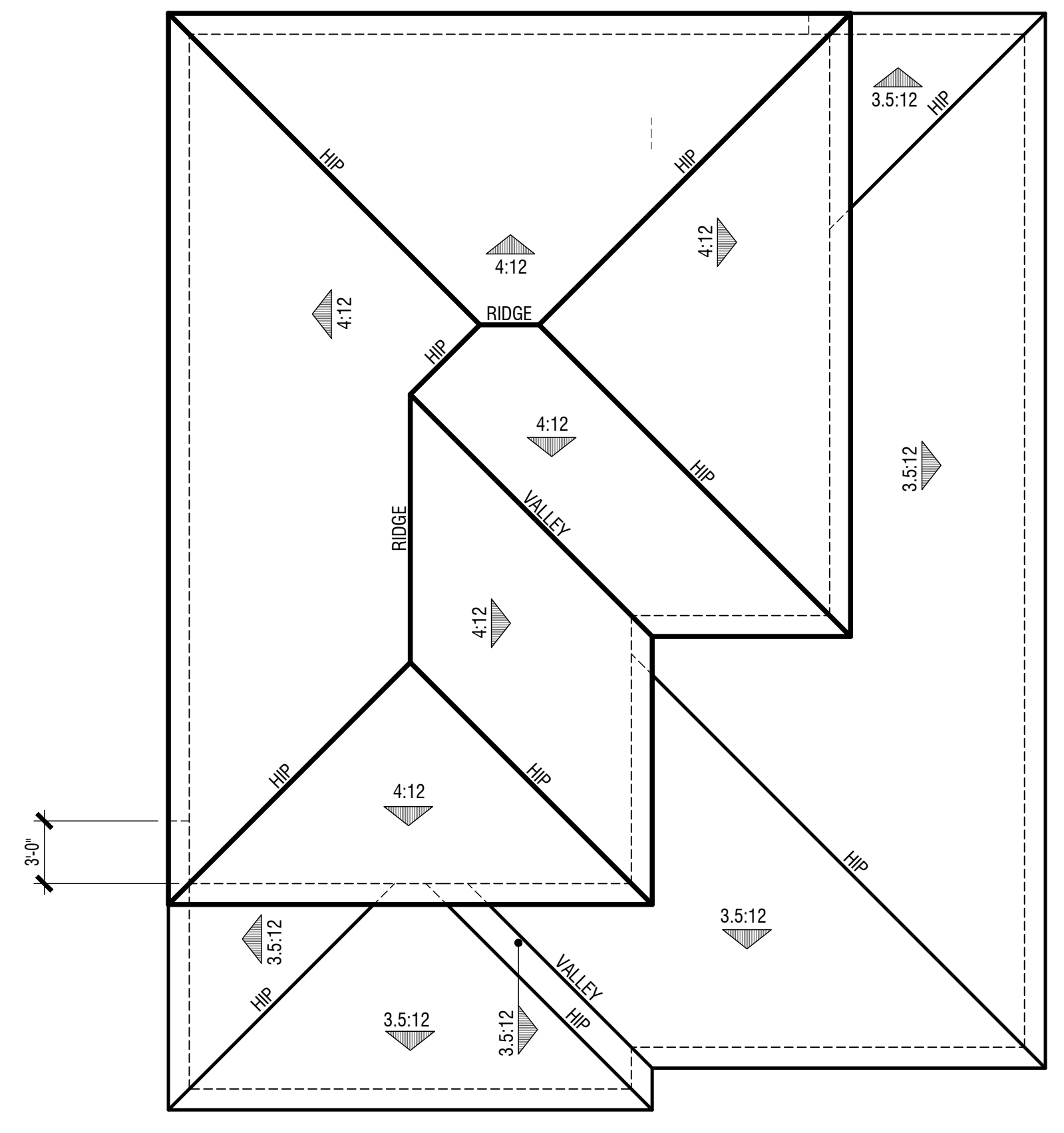
4B | TRADITIONAL

Eave 12" / Rake 12"
Concrete Flat Tile



4C | CRAFTSMAN

Eave 12" / Rake 12"
Concrete Flat Tile



4D | Tuscan

Eave 12" / Rake 12"
Low Profile Concrete "S" Tile

PLAN 4.2435

Roof Plans

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

4.2

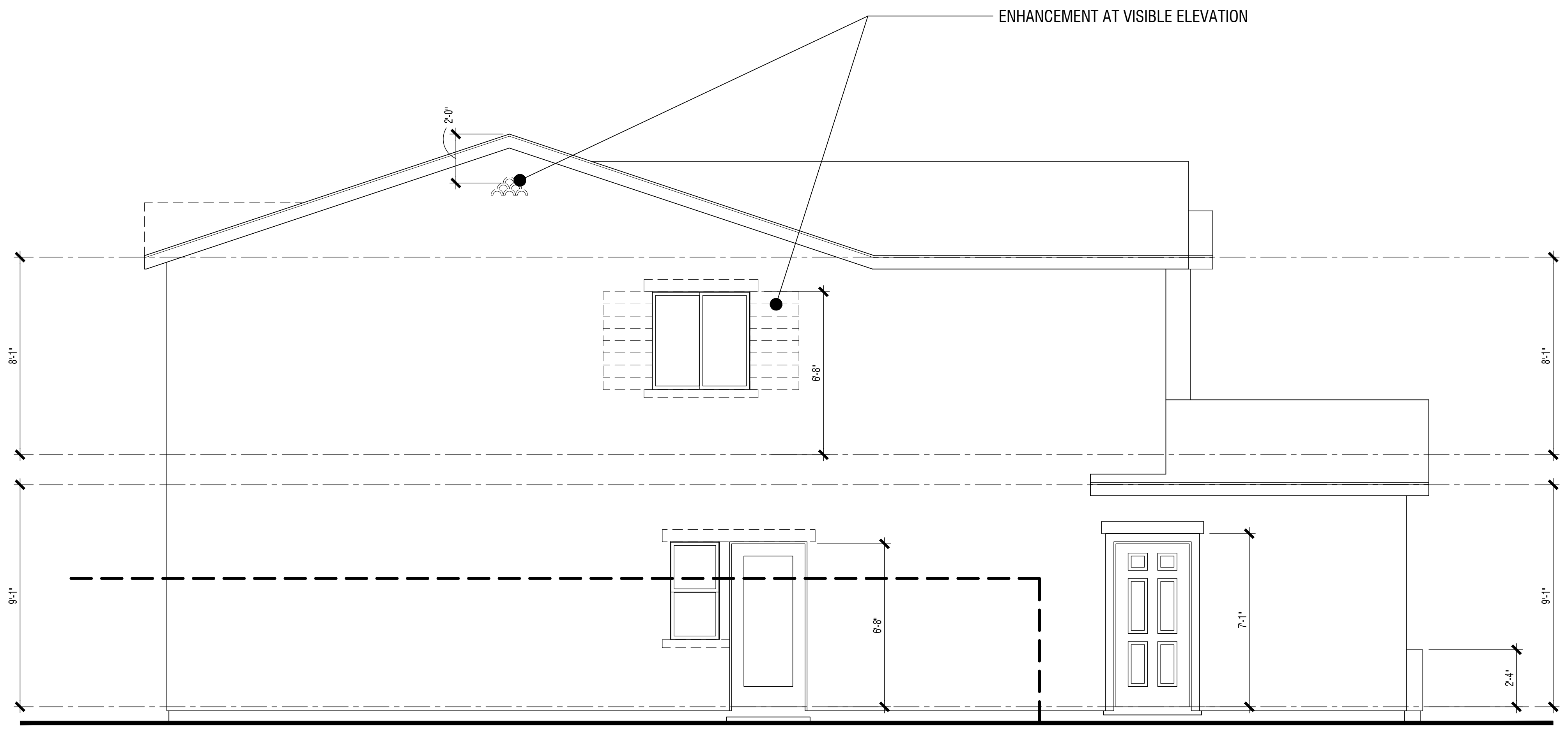
0 4 8 16

DESIGN REVIEW

| 2021272 | 09-09-21

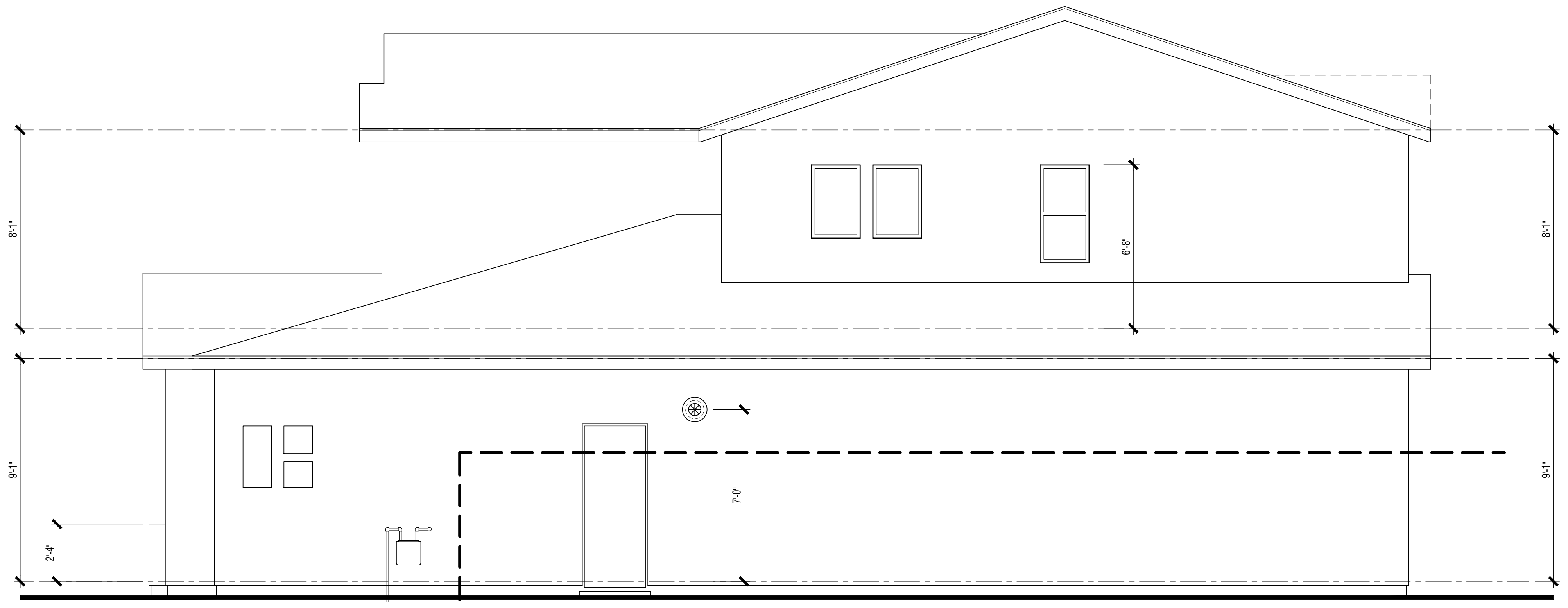
ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

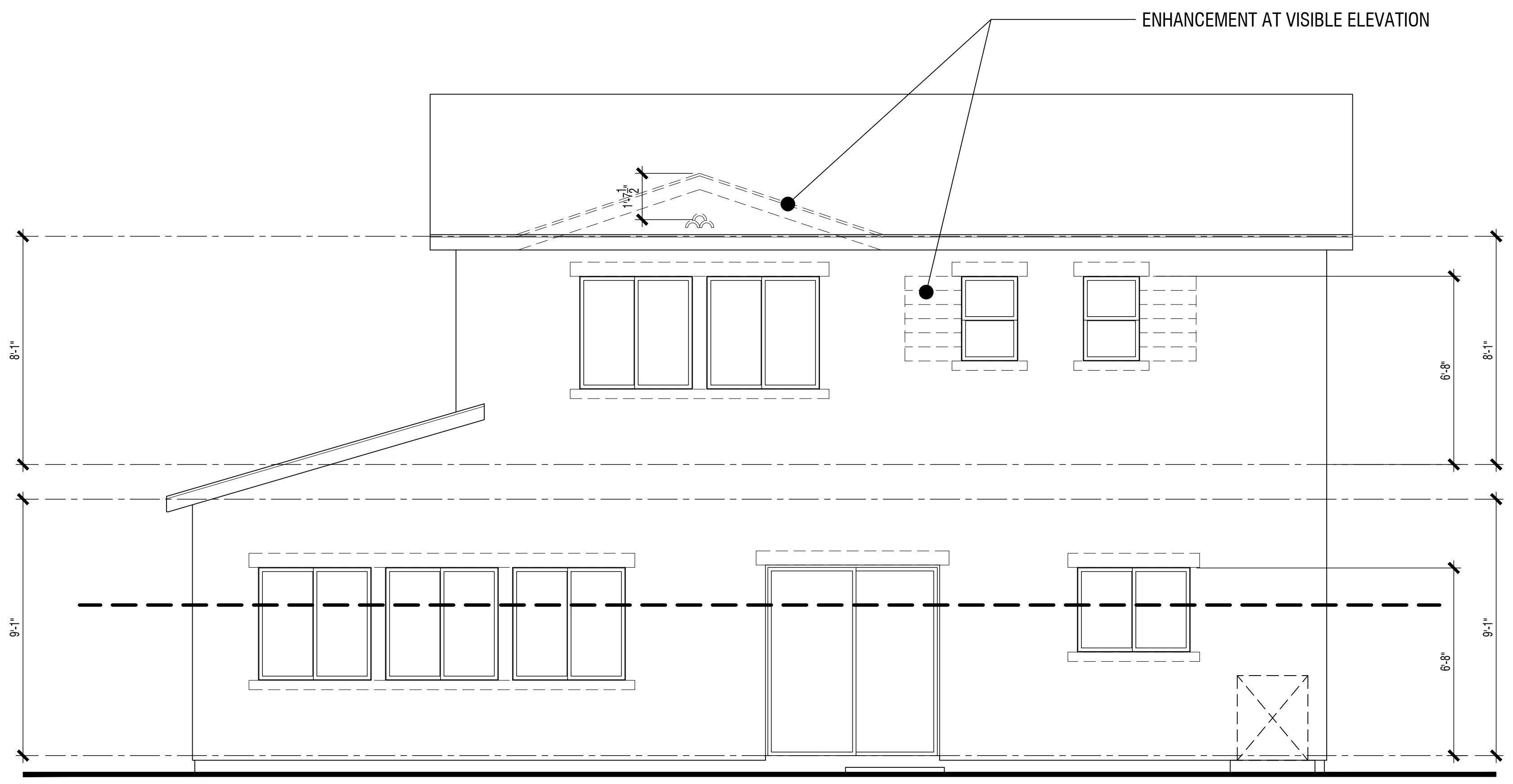


Left

Front



Right



Rear

PLAN 4A | SPANISH

Building Elevations

WINDSONG - 5000

HORTON E

MORENO VALLEY, CA

4.4

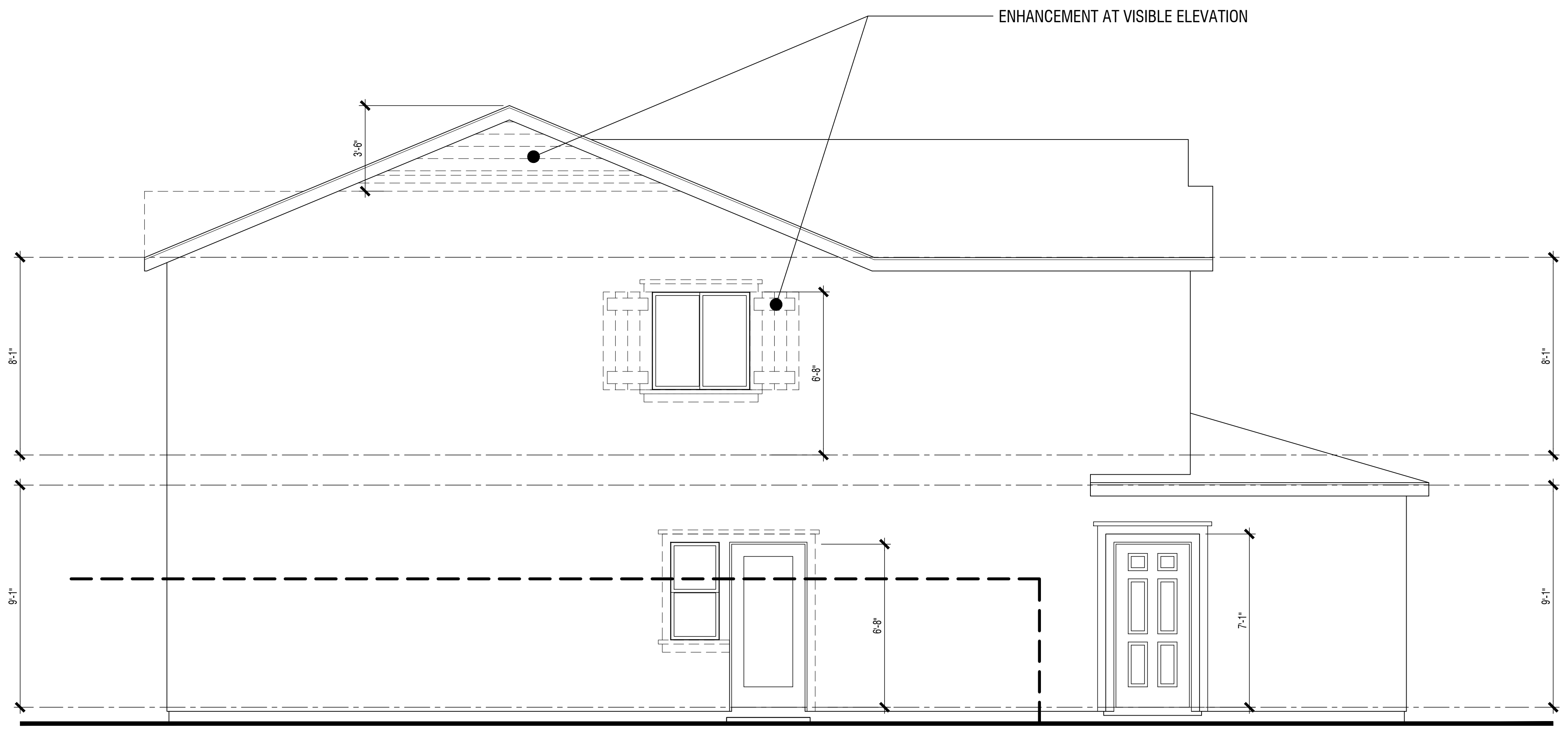
0 2 4 8

DESIGN REVIEW

| 2021272 | 09-09-21

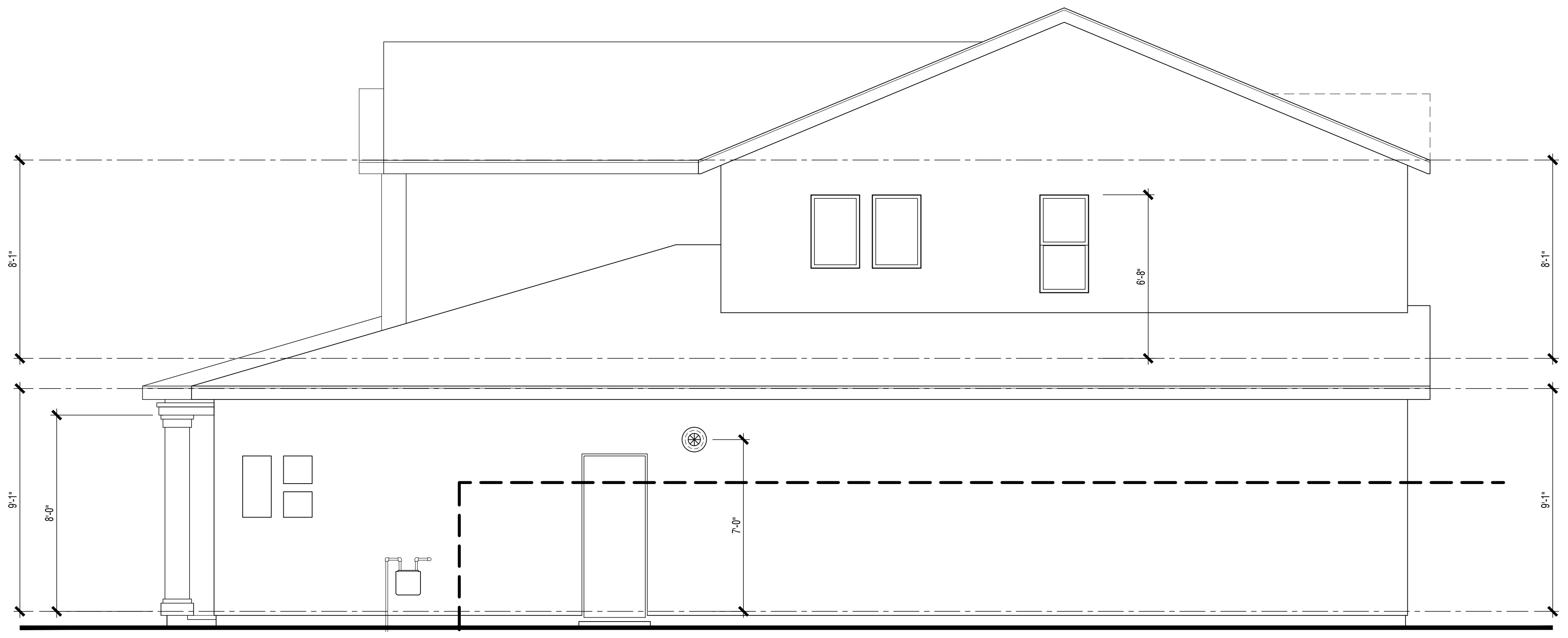
ARCHITECTS . PLANNERS . DESIGNERS

ORANGE COUNTY . LOS ANGELES . BAY AREA



Left

Front



Right

Rear

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

PLAN 4B | TRADITIONAL

Building Elevations

WINDSONG - 5000

D·R·HORTON America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

4.5

0 2 4 8

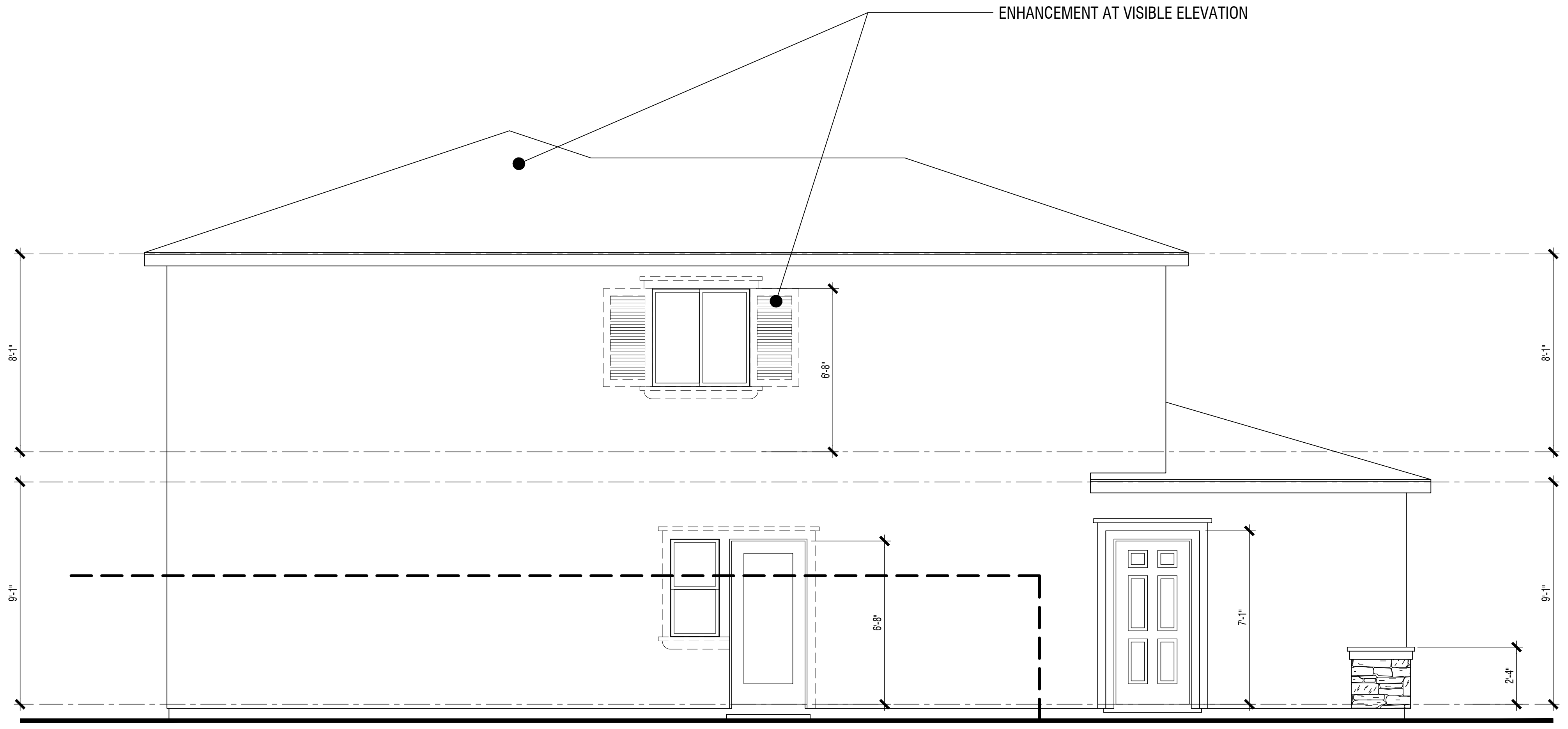
DESIGN REVIEW

| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

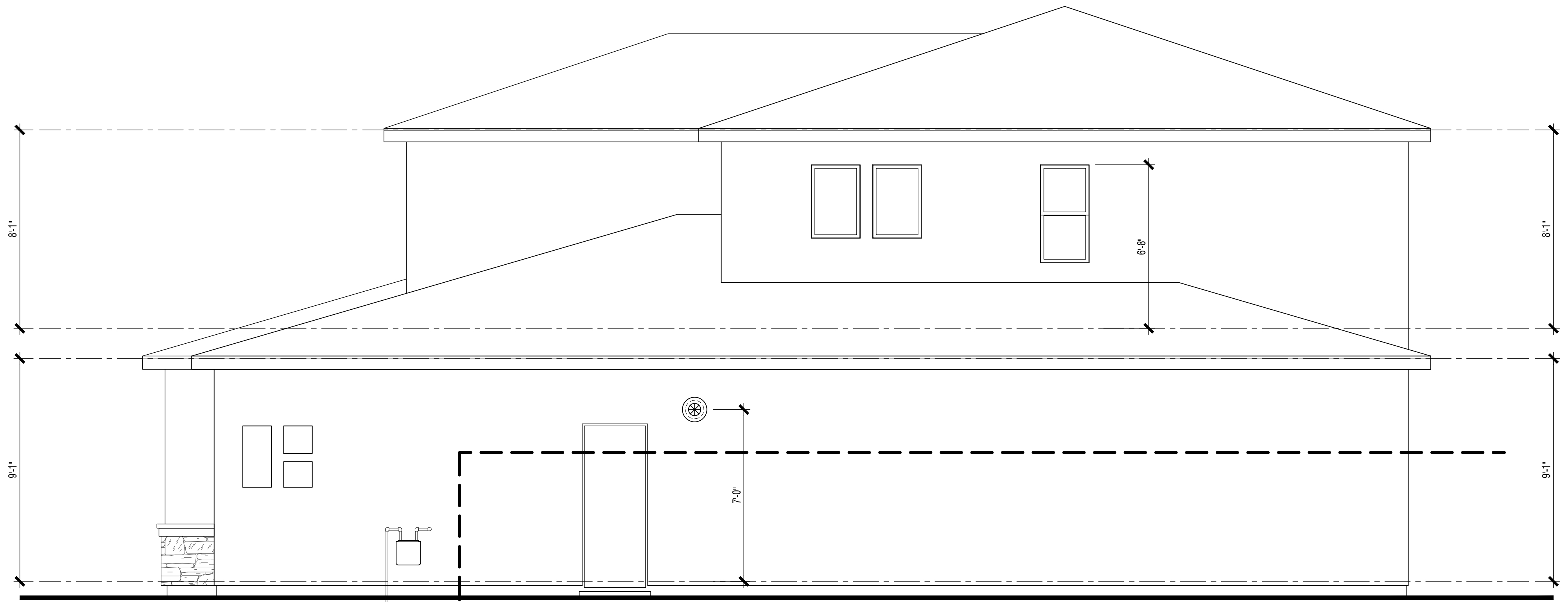
WHA.

ORANGE COUNTY . LOS ANGELES . BAY AREA

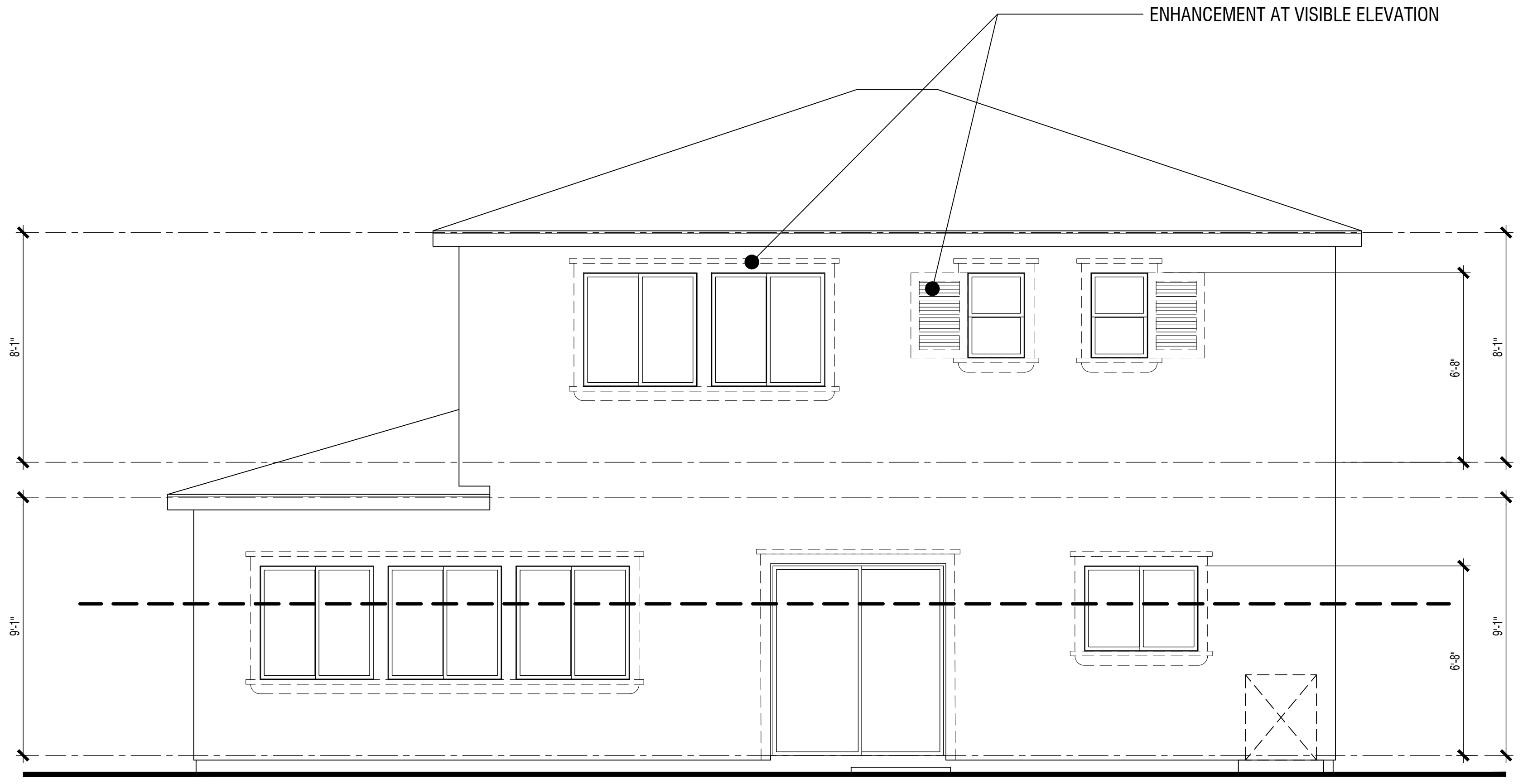


Left

Front



Right



Rear

PLAN 4D | TUSCAN

Building Elevations

WINDSONG - 5000

D·R·HORTON® America's Builder DHI NYSE

HORTON E

MORENO VALLEY, CA

4.6

0 2 4 8

DESIGN REVIEW

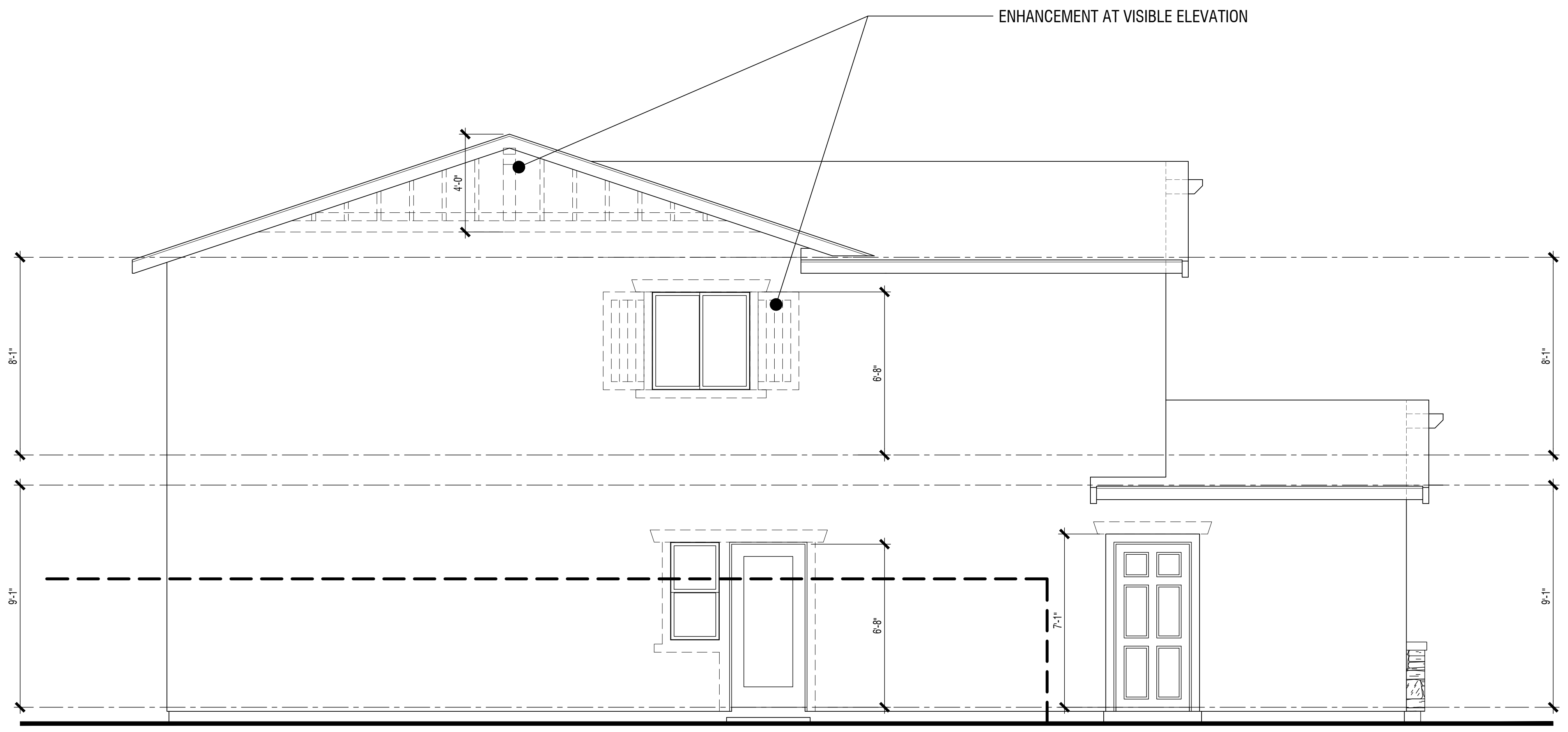
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS

WHA.

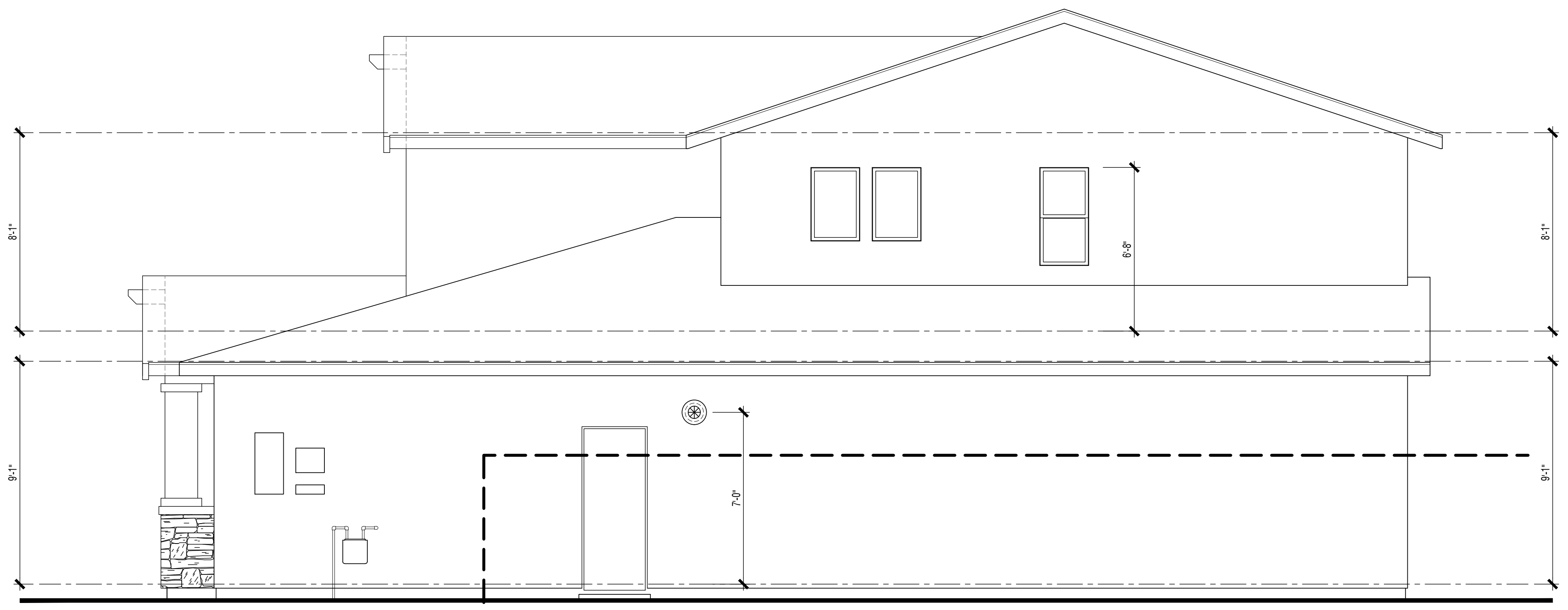
ORANGE COUNTY . LOS ANGELES . BAY AREA

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

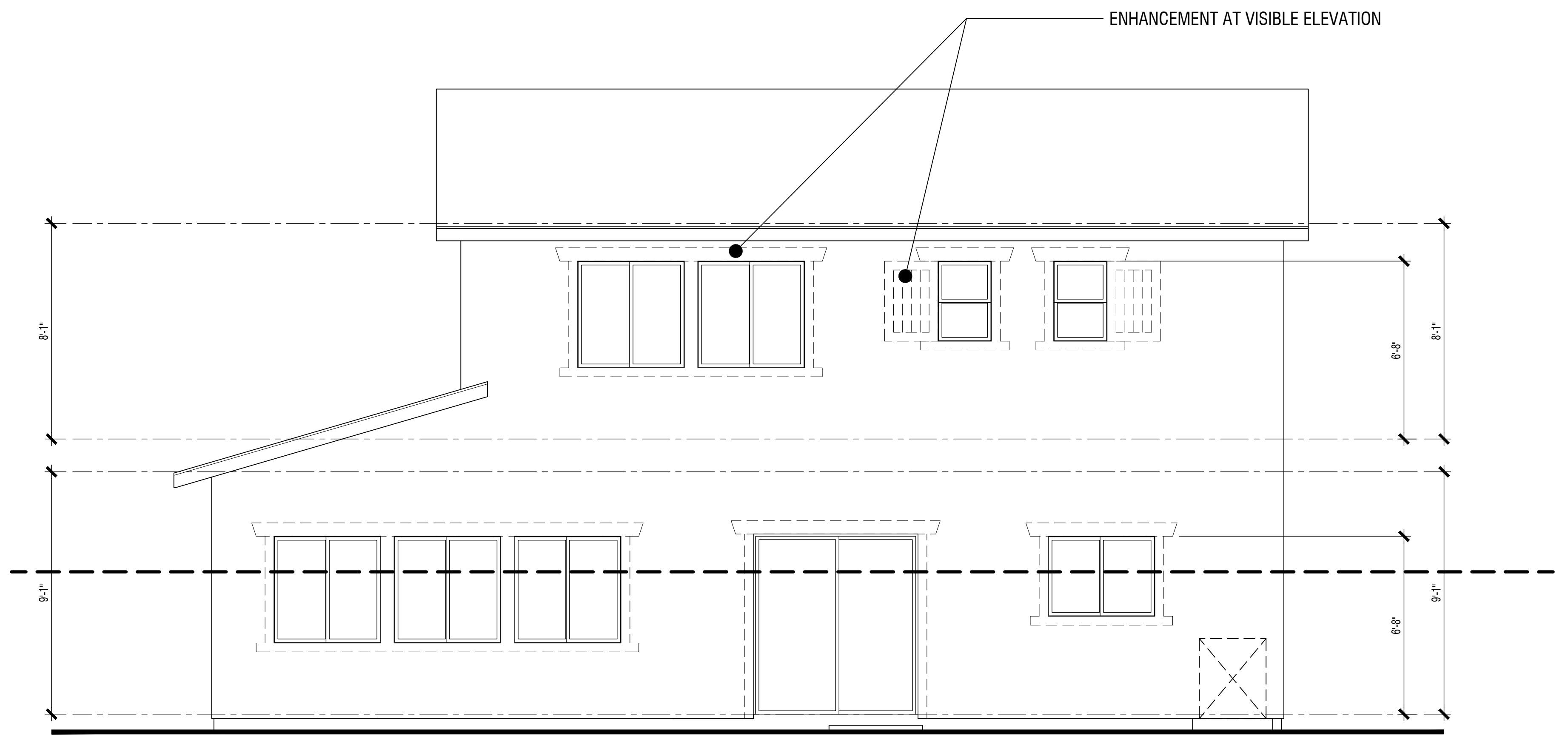


Left

Front



Right



Rear

PLAN 4C | CRAFTSMAN

Building Elevations

WINDSONG - 5000

D·R·HORTON America's Builder

HORTON E

MORENO VALLEY, CA

4.7

0 2 4 8

DESIGN REVIEW

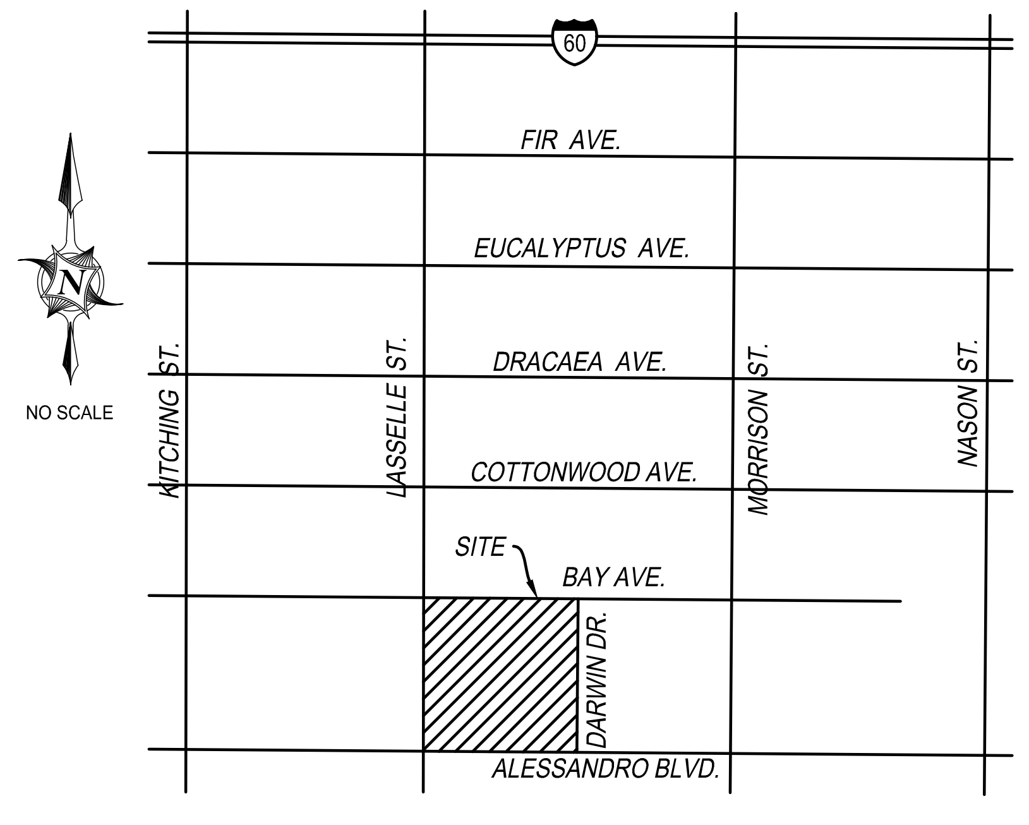
| 2021272 | 09-09-21

ARCHITECTS . PLANNERS . DESIGNERS
WHA.
ORANGE COUNTY . LOS ANGELES . BAY AREA

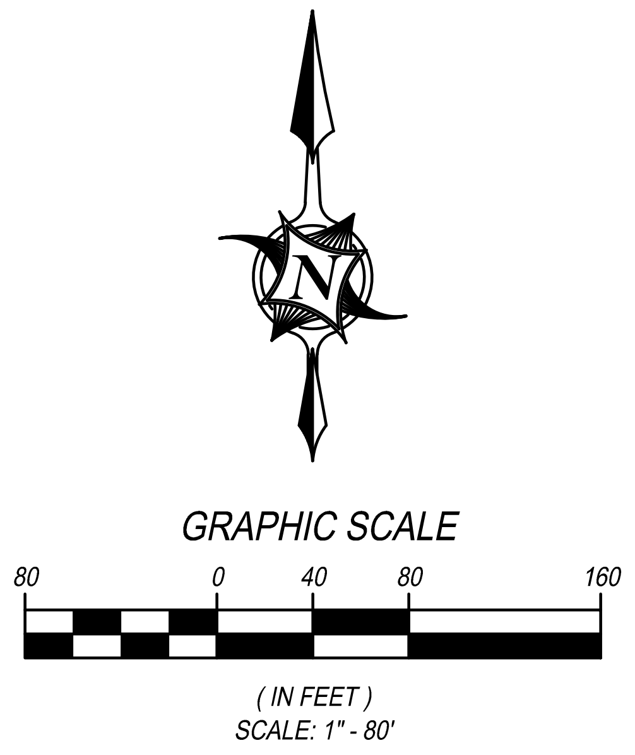
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

CONCEPTUAL HOUSE PLOT PLAN TR. 38123

THE CITY OF MORENO VALLEY, IN THE COUNTY OF RIVERSIDE, CALIFORNIA



VICINITY MAP



(IN FEET)
SCALE: 1" - 80'

APPLICANT/OWNER/DEVELOPER

D·R·HORTON® DHI
America's Builder

2280 WARDLOW CIR.
CORONA, CA. 92880
(951) 272-9000

ASSESSOR'S PARCEL NUMBER

487-470-028, 487-470-025, 487-574-001, 487-574-002

DATE OF MAP

SEPTEMBER 2, 2021

ENGINEER/CONTACT PERSON

THIS MAP WAS PREPARED UNDER THE DIRECTION OF DRU J. MAYERS, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA.

DRU J. MAYERS
RCE 38474

DATE

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

CONCEPTUAL HOUSE PLOT PLAN
TRACT 38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA
PEN21-0136

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for 177 Single Family Lots)

Dwg. Revision Date: **09/07/2021** BY: **J.C.** PLOT DATE: **09/07/2021**

P:\20-0300-06 Moreno Valley Tentative Tract Map\Planning\Exhibits\Conceptual Ho

WINDSONG MORENO VALLEY - TRACT 38123

PLANT SCHEDULE

TREES	BOTANICAL / COMMON NAME	SIZE	
●	CERCIS OCCIDENTALIS WESTERN REDBUD MULTI-TRUNK	15 GAL	L
●	KOELREUTERIA PANICULATA GOLDEN RAIN TREE	24"BOX	L
●	LAGERSTROEMIA INDICA X FAURIEI 'NATCHEZ' NATCHEZ CRAPE MYRTLE - STANDARD	24"BOX	M
●	LAGERSTROEMIA INDICA X FAURIEI 'TUSCARORA' TUSCARORA CRAPE MYRTLE - STANDARD	24"BOX	M
●	MAGNOLIA GRANDIFLORA 'D.D. BLANCHARD' D.D BLANCHARD SOUTHERN MAGNOLIA	24"BOX	M
●	PLATANUS RACEMOSA CALIFORNIA SYCAMORE - STANDARD	15 GAL	M
●	PLATANUS X ACERIFOLIA 'BLOODGOOD' BLOODGOOD LONDON PLANE TREE - STANDARD	36"BOX	M
●	PODOCARPUS GRACILIOR FERN PINE	24"BOX	M
●	QUERCUS ILEX HOLLY OAK	24"BOX	L
●	RHUS LANCEA AFRICAN SUMAC	24"BOX	L

NOTE: LANDSCAPING SHALL MEET CODE REQUIREMENTS INCLUDING STREET TREES AND DISTANCES.

SHRUB PALETTE

SCIENTIFIC NAME	COMMON NAME
-AGAVE SP.	-AGAVE
-ALOE SP.	-ALOE
-CALLISTEMON 'LIL JOHN'	-DWARF BOTTLE BRUSH
-DIETES BICOLOR	-FORTNIGHT LILY
-HESPERALOE PARVIFLORA	-RED YUCCA
-LEUCOPHYLLUM SP.	-TEXAS RANGER
-MUHLENBERGIA CAPILLARIS 'LENCA'	-PINK MUHLY
-ROSMARINUS SP.	-ROSEMARY
-SALVIA SP.	-SAGE
-WESTRINGIA FRUTICOSA 'BLUE GEM'	-COAST ROSEMARY

GROUNDCOVER PALETTE

SCIENTIFIC NAME	COMMON NAME
-BACCHARIS PILULARIS 'PIGEON POINT'	-DWARF COYOTE BRUSH
-BOUTELOUA 'BLONDE AMBITION'	-BLUE GRAMA GRASS
-CAREX DIVULSA	-BERKELEY SEDGE
-DIANELLA 'LITTLE REV'	-LITTLE REV FLAX LILY
-JUNCUS PATENS	-CALIFORNIA GRAY RUSH
-JUNIPERUS HORIZONTALIS 'BLUE CHIP'	-BLUE CHIP JUNIPER
-MYOPORUM P. 'PINK'	-PINK MYOPORUM

🟩 CITY MAINTAINED PARK, BASIN, & STREETSCAPE

🟩 PRIVATE FRONT YARD LANDSCAPE

🟩 PRIVATE SLOPES

NORTH

0' 200' 40

OVERALL CONCEPTUAL LANDSCAPE PLAN
PREPARED FOR DR HORTON

bmla
LANDSCAPE ARCHITECTURE
310 NORTH JOY STREET | CORONA, CA 92879
T: 951.737.1124 | F: 951.737.6551

Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for

PLANT SCHEDULE

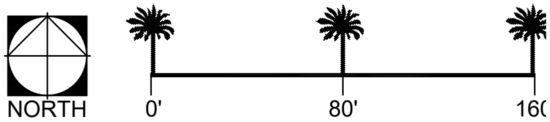
TREES	BOTANICAL / COMMON NAME	SIZE	
	CERCIS OCCIDENTALIS WESTERN REDBUD MULTI-TRUNK	15 GAL	L
	KOELREUTERIA PANICULATA GOLDEN RAIN TREE	24"BOX	L
	LAGERSTROEMIA INDICA X FAURIEI 'NATCHEZ' NATCHEZ CRAPE MYRTLE - STANDARD	24"BOX	M
	LAGERSTROEMIA INDICA X FAURIEI 'TUSCARORA' TUSCARORA CRAPE MYRTLE - STANDARD	24"BOX	M
	MAGNOLIA GRANDIFLORA 'D.D. BLANCHARD' D.D BLANCHARD SOUTHERN MAGNOLIA	24"BOX	M
	PLATANUS RACEMOSA CALIFORNIA SYCAMORE - STANDARD	15 GAL	M
	PLATANUS X ACERIFOLIA 'BLOODGOOD' BLOODGOOD LONDON PLANE TREE - STANDARD	36"BOX	M
	PODOCARPUS GRACILIOR FERN PINE	24"BOX	M
	QUERCUS ILEX HOLLY OAK	24"BOX	L
	RHUS LANCEA AFRICAN SUMAC	24"BOX	L

REFER TO OVERALL CONCEPTUAL LANDSCAPE PLAN FOR SHRUB AN
GROUNDCOVER LEGEND

PARK LEGEND

1. TURF
2. SHADE STRUCTURE W/PICNIC SEATING
3. DRINKING FOUNTAIN STATION
4. BENCH SEATING W/COMPANION SPACES
5. SMALL DOG PARK W/TURF, DECOMPOSED GRANITE, & BOULI
6. LARGE DOG PARK W/TURF, DECOMPOSED GRANITE, & BOULI
7. 6'H TUBULAR STEEL FENCE (REFER TO CONCEPTUAL WALL A FENCE PLAN)
8. CONCRETE WALKWAY
9. PARKING LOT W/ADA PARKING SPACES

NOTE: DOG PARK FACILITIES ARE SUBJECT TO CITY CODE REQUIREMENTS.



WINDSONG MORENO VALLEY - TRACT 38123

COMMUNITY PARK ENLARGEMENT

PREPARED FOR DR HORTON

bmla
LANDSCAPE
ARCHITECTURE
310 NORTH JOY STREET | CORONA, CA 92879
T: 951.737.1124 | F: 951.737.6551

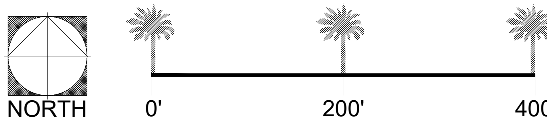
Attachment: Planned Unit Development for Tract Map 38123 [Revision 1] (5660 : TTM and CUP for PUD for

SPLIT FA
WALL WITH CAP AND
SPLIT FACE
PILASTER WITH
PRECAST CAP T
MATCH EXISTIN
ADJACENT
COMMUNITY WA

VINYL FENCE AN
VINYL GATE

TUBULAR STEEL
FENCE

🟩 6'-0" HIGH SPLIT FACE BLOCK WALL W/ C
🟦 SPLIT FACE BLOCK WALL ON RETAINING
🟨 6'-0" TUBULAR STEEL FENCE
🟥 6'-0" HIGH VINYL FENCE
▪ 6'-6" HIGH SPLIT FACE PILASTER
WITH PRECAST CAP



WINDSONG MORENO VALLEY - TRACT 38123

bmla
LANDSCAPE
ARCHITECTURE

310 NORTH JOY STREET | CORONA, CA 92879
T: 951.737.1124 | F: 951.737.6551

CONCEPTUAL WALL AND FENCE PLAN

PREPARED FOR DR HORTON

SHADE STRUCTURE 30' X 30'
POLIGON

6' BENCH
QCP - CALIFORNIA

PICNIC TABLES (STANDARD & ADA)
QCP - LBT

WASTE RECEPTACLE
QCP - CALIFORNIA ROUND

WATER FOUNTAIN - ADA AND DOG ACCESSIBLE
ELKAY

PET STATION
DOG-I-POT

WINDSONG MORENO VALLEY - TRACT 38123

bmla
LANDSCAPE
ARCHITECTURE

310 NORTH JOY STREET | CORONA, CA 92879
T: 951.737.1124 | F: 951.737.6551

SITE FURNISHINGS
PREPARED FOR DR HORTON

TENTATIVE TRACT MAP 38123

THE CITY OF MORENO VALLEY, IN THE COUNTY OF RIVERSIDE, CALIFORNIA

EASEMENTS

① CITY OF MORENO VALLEY ROADS AND P.U.E., 07/12/2005, INST. NO. 2005-0555610, O.R. (TO BE QUITCLAIMED)
② CITY OF MORENO VALLEY ROADS AND P.U.E., 03/22/2012, INST. NO. 2012-0132075, O.R. (TO BE QUITCLAIMED)
③ CITY OF MORENO VALLEY ROADS AND P.U.E., 11/14/2008, INST. NO. 2008-0605277, O.R. (TO BE QUITCLAIMED)

TO BE QUITCLAIMED OR RELOCATED AS FOLLOWS:

PIPELINES: 01/16/1891, BOOK 127, PAGE 7 OF DEEDS
PIPELINE, DITCHES AND FLUMES: 11/03/1890, BOOK 11, PAGE 10 OF TRACT MAPS

EMWD CONDUITS, 03/4/1955, BOOK 1702, PAGE 559, O.R.
EMWD CONDUITS, 03/23/1959, BOOK 2436, PAGE 241, O.R.

NOTES

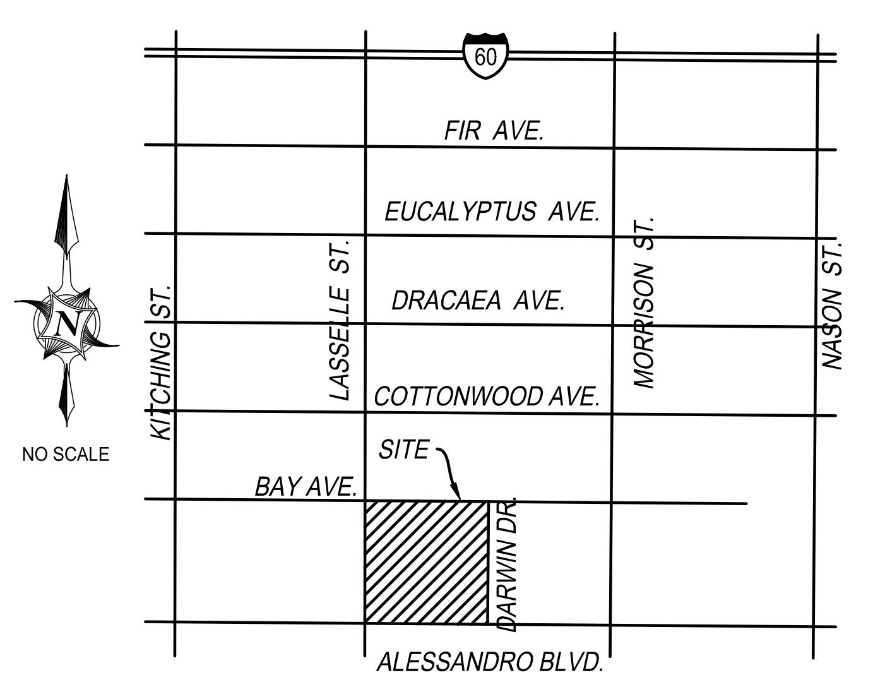
A) LOTS 1-173 ARE TO BE SINGLE FAMILY HOME LOTS.

B) LOT A IS TO BE A WATER QUALITY/DETENTION BASIN TO BE MAINTAINED BY THE CITY OF MORENO VALLEY.

C) LOTS B-THROUGH D ARE LANDSCAPED LOTS TO BE MAINTAINED BY THE HOMEOWNERS ASSOCIATION.

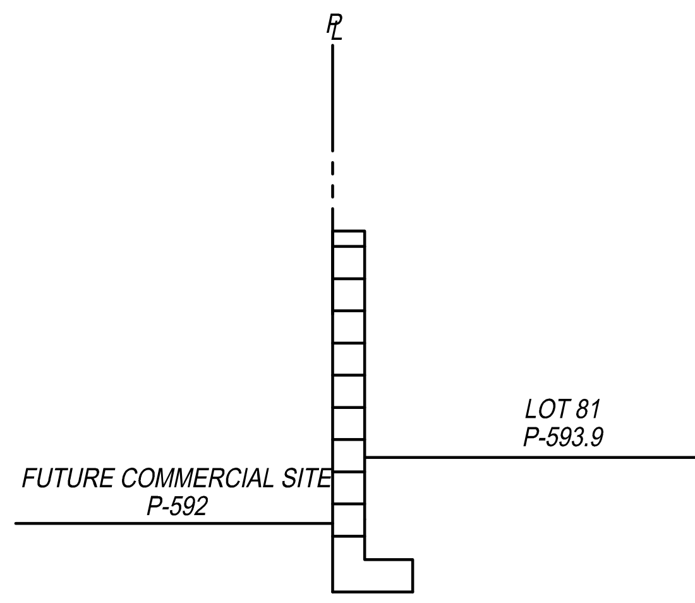
D) LOT E IS TO BE DEDICATED TO THE EASTERN MUNICIPAL WATER DISTRICT FOR DOMESTIC WATERLINE PURPOSES.

E) LOT F IS TO BE DEDICATED TO THE CITY OF MORENO VALLEY FOR PARK PURPOSES.

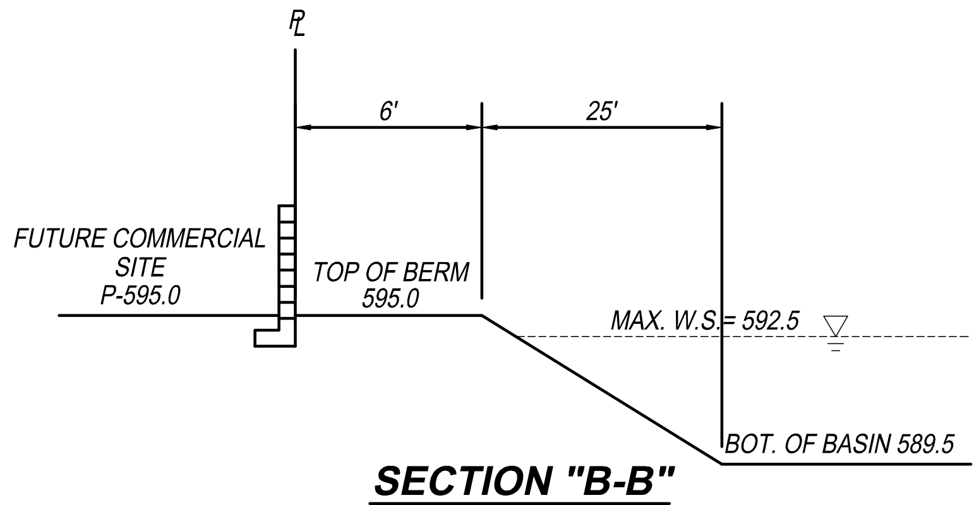


VICINITY MAP

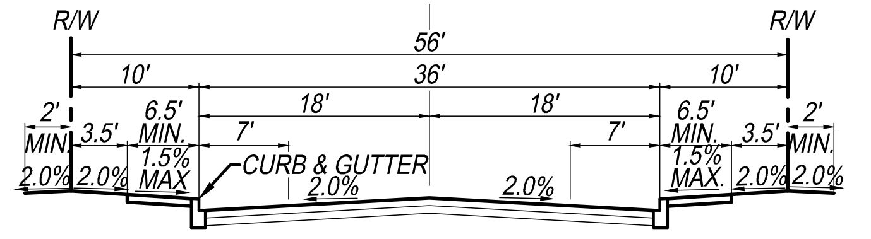
LOT NUMBER	LOT SIZE (S.F.)	LOT NUMBER	LOT SIZE (S.F.)	LOT NUMBER	LOT SIZE (S.F.)
1	5,627	71	4,860	141	5,909
2	5,887	72	4,860	142	5,891
3	6,111	73	4,860	143	5,869
4	6,106	74	4,860	144	5,844
5	6,103	75	4,860	145	6,041
6	5,828	76	4,860	146	5,500
7	5,952	77	4,860	147	5,688
8	6,882	78	5,028	148	5,688
9	6,533	79	4,683	149	5,500
10	5,207	80	4,500	150	5,000
11	5,406	81	4,500	151	5,295
12	6,385	82	4,500	152	5,681
13	5,953	83	4,500	153	6,272
14	4,918	84	4,500	154	7,299
15	4,622	85	4,500	155	5,388
16	4,791	86	4,500	156	5,000
17	5,165	87	4,500	157	5,632
18	6,012	88	4,377	158	6,759
19	4,622	89	4,843	159	5,629
20	5,443	90	7,296	160	5,600
21	5,133	91	5,034	161	5,600
22	5,325	92	5,055	162	5,600
23	4,924	93	4,554	163	5,600
24	5,882	94	4,554	164	5,600
25	5,399	95	4,838	165	5,600
26	5,088	96	5,351	166	5,600
27	4,535	97	5,009	167	6,048
28	4,508	98	5,006	168	5,395
29	4,500	99	5,003	169	5,000
30	4,871	100	5,000	170	5,000
31	4,991	101	5,329	171	5,000
32	5,243	102	5,598	172	5,000
33	5,392	103	7,056	173	5,000
34	7,644	104	7,126	174	5,000
35	5,906	105	5,171	175	5,000
36	6,770	106	4,951	176	5,000
37	5,812	107	5,052	177	5,690
38	4,681	108	5,001	A	55,806
39	4,681	109	5,000	B	16,469
40	4,633	110	5,000	C	8,281
41	4,500	111	5,991	D	13,250
42	7,204	112	5,000	E	1,723
43	8,591	113	5,000	F	88,386
44	4,646	114	5,000		
45	4,210	115	5,000		
46	4,230	116	5,050		
47	4,230	117	5,166		
48	4,244	118	5,283		
49	4,230	119	5,400		
50	7,099	120	5,960		
51	8,158	121	6,013		
52	5,379	122	5,569		
53	4,838	123	5,569		
54	4,960	124	5,569		
55	6,503	125	5,569		
56	5,425	126	5,569		
57	4,984	127	5,569		
58	4,983	128	5,569		
59	4,812	129	5,569		
60	5,792	130	6,683		
61	9,606	131	5,569		
62	7,130	132	5,569		
63	5,500	133	5,569		
64	4,500	134	5,509		
65	4,500	135	5,450		
66	4,500	136	5,574		
67	4,500	137	6,588		
68	4,832	138	6,600		
69	5,028	139	6,587		
70	4,860	140	6,656		



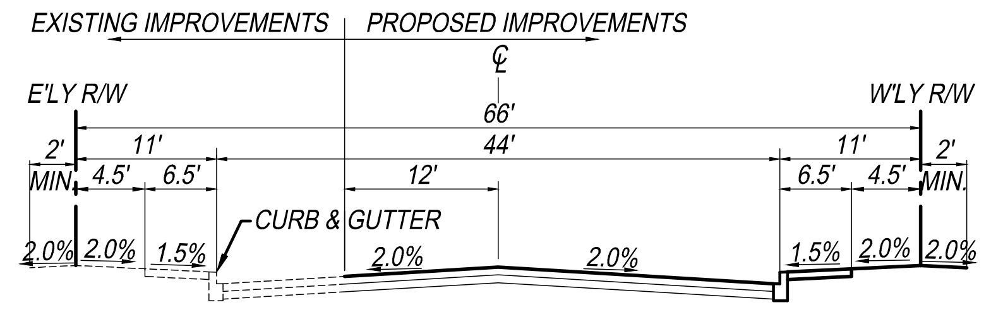
SECTION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.

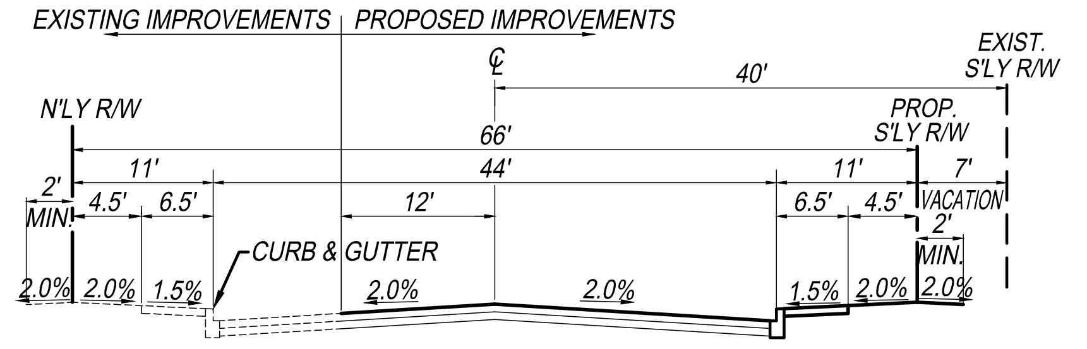


STREET "A" THRU "I" & BARBADOS LANE
SHORT LOCAL STREET STD. NO. MVSI-107A-0
TYPICAL SECTION
N.T.S.

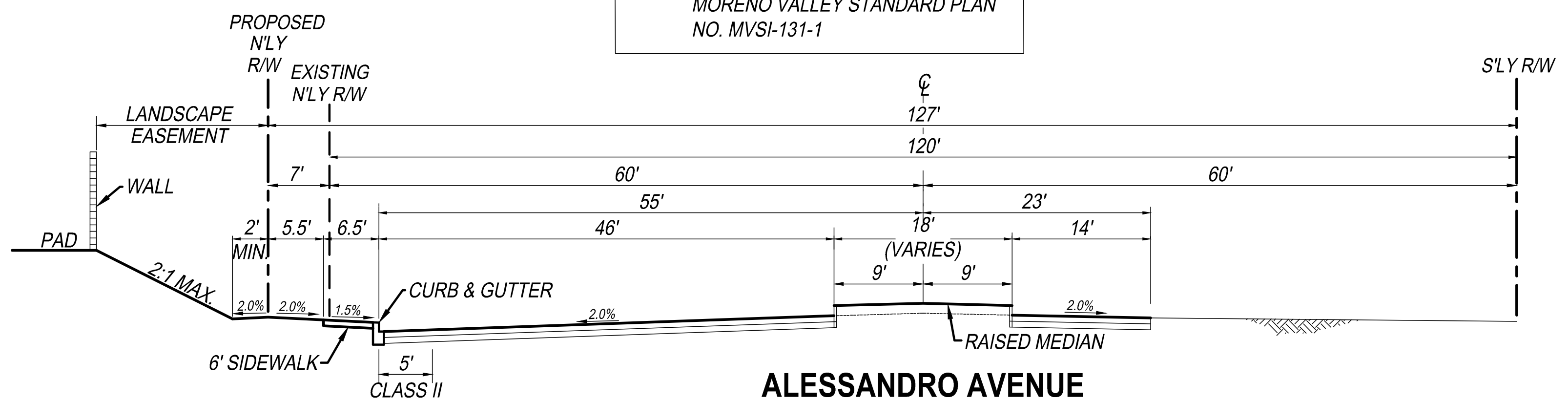


DARWIN DRIVE
COLLECTOR STD. NO. MVSI-106B-0
TYPICAL SECTION
N.T.S.

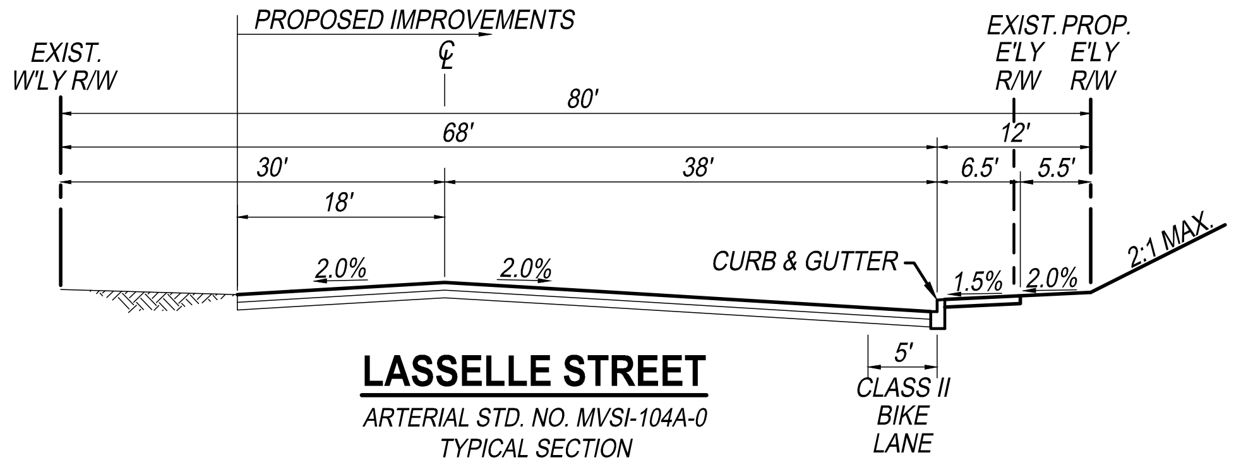
NOTE: ALL CROSS SECTIONS FOR PERIMETER STREETS JOIN EXISTING PAVEMENT SECTION PER CITY OF MORENO VALLEY STANDARD PLAN NO. MVSI-131-1



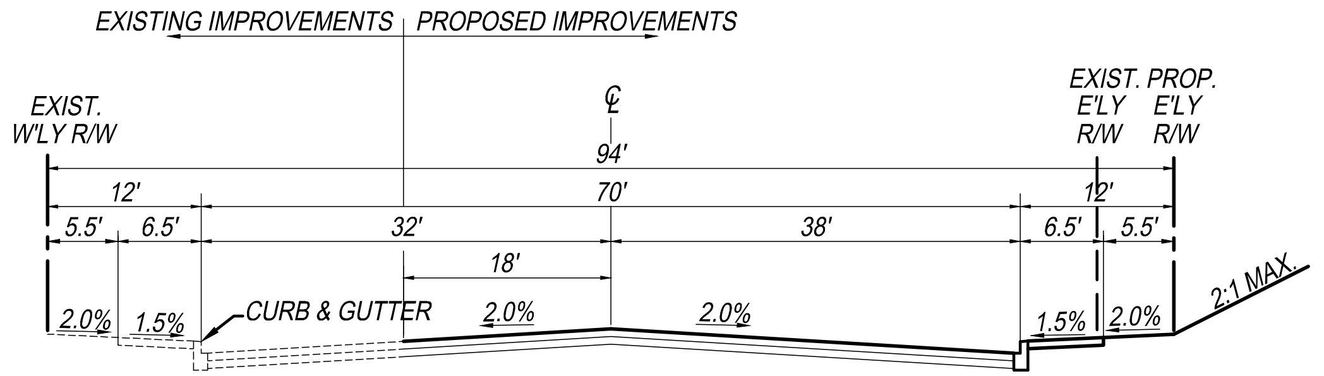
BAY AVENUE
COLLECTOR STD. NO. MVSI-106B-0
TYPICAL SECTION
N.T.S.



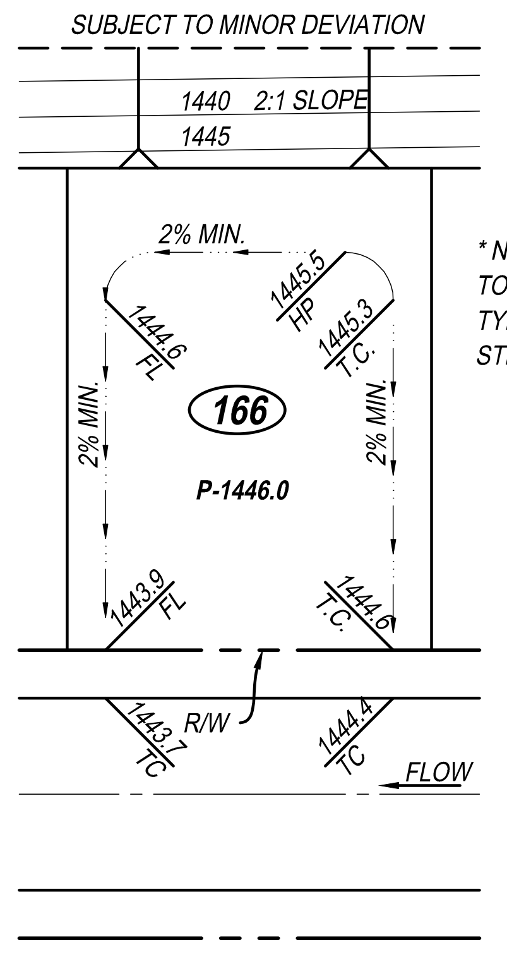
ALESSANDRO AVENUE
DIVIDED MAJOR ARTERIAL STD. NO. MVSI-101A-0
TYPICAL SECTION
N.T.S.



LASSELLE STREET
ARTERIAL STD. NO. MVSI-104A-0
TYPICAL SECTION
(BETWEEN TIMO ST. AND ALESSANDRO BLVD.)
N.T.S.



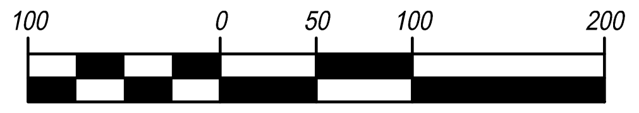
LASSELLE STREET
ARTERIAL STD. NO. MVSI-104A-0
TYPICAL SECTION
(BETWEEN BAY AVE. AND TIMO ST.)
N.T.S.



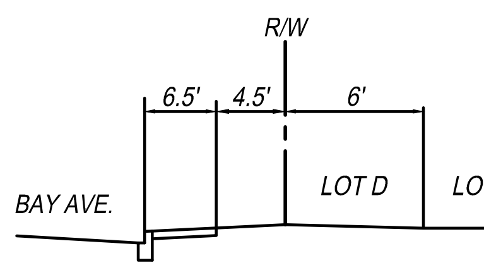
* NOTE: FINAL TYPICAL LOT DRAINAGE IS TO BE PER CITY OF MORENO VALLEY TYPICAL LOT DRAINAGE AND YARD DRAIN STD. NO. MVSI-153A-1.

ROUGH GRADE TYPICAL LOT DRAINAGE
N.T.S.

GRAPHIC SCALE



(IN FEET)
SCALE: 1" - 100'



SECTION "C-C"
N.T.S.

GENERAL NOTES

1. EXISTING GENERAL PLAN DESIGNATION: DC
2. EXISTING ZONING: DC-PUD
3. PROPOSED ZONING: DC-PUD
4. EXISTING LAND USE: VACANT
5. PROPOSED LAND USE: SINGLE FAMILY RESIDENTIAL
6. GROSS PROJECT ACREAGE: 33.57 ACRES
7. NET PROJECT ACREAGE: 26.25 ACRES
8. MINIMUM RESIDENTIAL LOT SIZE: 4,210 S.F.
9. TOTAL NUMBER OF RESIDENTIAL LOTS: 177
10. PROJECT DENSITY: 5.3 DU / AC
11. UTILITY PURVEYORS:
    WATER: EASTERN MUNICIPAL WATER DISTRICT
    SEWER: EASTERN MUNICIPAL WATER DISTRICT
    GAS: SOUTHERN CALIFORNIA GAS COMPANY
    ELECTRIC: MORENO VALLEY UTILITY
    CABLE: ADELPHIA
    TELEPHONE: VERISON
    STORM DRAIN: RCFCD AND CITY
12. SCHOOL DISTRICT: MORENO VALLEY UNIFIED SCHOOL DISTRICT.
13. ZONE X, AREA AT MINIMAL FLOOD HAZARD PER FEMA FLOOD INSURANCE PANEL NO. 06065C0765G, SUBJECT TRACT IS NOT WITHIN THE 500 YEAR FLOOD PLAIN.
14. THOMAS BROTHERS MAP: 2005 SAN BERNARDINO AND RIVERSIDE COUNTIES PAGE 717 J-5
15. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
16. MINIMUM FRONT YARD SETBACK: TWENTY (20) FEET.
17. MINIMUM SIDE YARD SETBACK: FIVE (5) FEET - TEN (10) FEET ON CORNER LOTS.
18. MINIMUM REAR YARD SETBACK: FIFTEEN (15) FEET.
19. COMMUNICATION CONDUIT SHALL BE PROVIDED ALONG THE PROJECT FRONTAGE PER CITY STANDARD NO. MVSI-186-0.
20. SOURCE OF TOPOGRAPHY: TOPOGRAPHIC AND A.L.T.A./A.C.S.M. LAND TITLE SURVEY OF LOTS 4 & 5 BLOCK 103, MAP 1 BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO. PREPARED BY ROBERT WADA & ASSOCIATES DATED: APRIL 6, 2006.
21. ALL RETAINING WALLS PER SEPARATE PERMIT.

LEGEND

TENTATIVE MAP BOUNDARY	——— – – ———
BEGIN/END VERTICAL CURVE	——○—— – ——○——
POINT OF INTERSECTION	PI
FINISHED SURFACE	FS
CENTERLINE RADIUS	CLR=300'
STREET CENTERLINE ELEVATION	580
STREET GRADE	2% →
LOT NUMBER	48
PAD ELEVATION	P-631.0
FIRST AND LAST RESIDENTIAL LOT NUMBER	○
EXISTING WATERLINE	— —W— — —
EXISTING STORM DRAIN	═ ═SD═ ═
PROPOSED WATERLINE	———W———
PROPOSED STORM DRAIN	— – — – —
PROPOSED SEWER AND MANHOLES	———S———○—
CROSS GUTTER	
EXISTING LOT NUMBER	PARCEL 4
SLOPE (2:1 MAX)	– – Y – – –

EARTHWORK QUANTITIES

	CUT (C.Y.)	FILL (C.Y.)
RAW VOLUMES	130,900	146,380
SUBSIDENCE		5,703
ALLUVIAL REMOVALS		7,683
BULK OF STREET OVER X 5%		(980)
CUT LOT OVER X BULK 5%		(3,526)
BLASTING BULK 22%		(24,360)
TOTALS:	130,900 C.Y.	130,900 C.Y.

LEGAL PROJECT DESCRIPTION

BEING A RESUBDIVISION OF PARCEL 1 OF TENTATIVE PARCEL MAP NO. 38098, MORE PARTICULARLY DESCRIBED AS LOTS 3, 4, AND 6, AND A PORTION OF LOT 5 OF BLOCK 103 OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO., IN THE CITY OF MORENO VALLEY, FILED IN MAP BOOK 11, PAGE 10, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, TOGETHER WITH LOTS K AND M OF TRACT NO. 32505, IN THE CITY OF MORENO VALLEY, FILED IN MAP BOOK 435, PAGES 63 THROUGH 66, INCLUSIVE, RECORDS OF SAID COUNTY AND STATE.

APPLICANT/OWNER/DEVELOPER

D·R·HORTON® DHI
America's Builder

2280 WARDLOW CIR.
CORONA, CA. 92880
(951) 272-9000

ASSESSOR'S PARCEL NUMBER

487-470-028, 487-470-025, 487-574-001, 487-574-002

DATE OF MAP

SEPTEMBER 1, 2021

ENGINEER/CONTACT PERSON

THIS MAP WAS PREPARED UNDER THE DIRECTION OF DRU J. MAYERS, A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA.

DRU J. MAYERS
RCE 38474

DATE

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

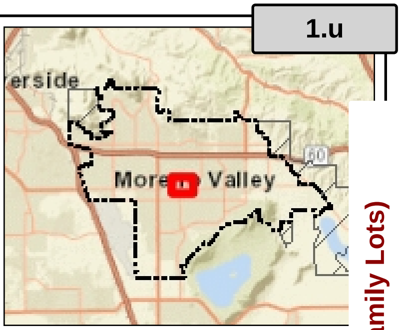
TENTATIVE TRACT MAP NO.
38123

IN THE CITY OF MORENO VALLEY, CALIFORNIA

PEN21-0136

MORENO VALLEY
WHERE DREAMS SOAR

Aerial Map



Legend

Zoning

- 🟥 Commercial
- 🟧 Center Mixed Use
- 🟫 Downtown Center
- 🟥 Corridor Mixed Use
- 🟦 Industrial/Business Park
- 🟦 Public Facilities
- 🟪 Highway Office/Commercial
- 🟪 Office
- 🟪 Business Flex
- 🟫 Large Lot Residential
- ⬜ Residential Agriculture 2 DU/AC
- 🟨 Residential 2 DU/AC
- 🟨 Suburban Residential
- 🟧 Multi-family
- 🟩 Open Space/Park

Master Plan of Trails

- — Bridge
- — Improved
- — Multiuse
- — Proposed
- — Regional
- — State

Road Labels

☐ Parcels

Image Source: Nearmap

Notes:

1,261.9 0 630.96 1,261.9 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/20/2022

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.