

PRELIMINARY HYDROLOGY REPORT

**Located on the SE Corner of Brodiaea Avenue and Nason Street
Within a portion of the N.W. 1/4 of Section 15,
Township 3 South, Range 3 West. S.B.M.
City of Moreno Valley, California**

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE

***Tentative Parcel Map 36227
City Case Number PA09-0033***

September 12, 2016

Prepared for:

Galaxy Management Incorporated

MSA Job Number: 1968



MSA CONSULTING, INC.
PLANNING ■ CIVIL ENGINEERING ■ LAND SURVEYING

**34200 BOB HOPE DRIVE ■ RANCHO MIRAGE ■ CA 92270
TELEPHONE (760) 320-9811 ■ FAX (760) 323-7893**

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PROJECT DESCRIPTION

The proposed project is a mixed-use facility that accommodates medical offices, a wellness center, an urgent care center, assisted living, and a skilled nursing facility with a special treatment program. The proposed development will occupy approximately 18 acres at the southeast corner of Brodiaea Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The project property is comprised of two parcels assigned Assessor's Parcel Numbers 486-290-001 and 002. The location of the subject property can also be described as lying within a portion of Section 15, Township 3 South, Range 3 West, San Bernardino Base and Meridian. The project has been assigned Tentative Parcel Number 36227 (City Case Number PA09-0033). Currently the project site is undeveloped, comprised of relatively flat land which was formerly used for agricultural purposes. A vicinity map is included in Appendix A.

EXISTING CONDITIONS

Flood Rate Map

The project area is covered by FIRM Panel Number 06065C0765G, revised August 28, 2008, which indicates the project area lies within Zone X, indicating "*areas determined to be outside the 0.2% annual chance floodplain*" (see attached FEMA map – Appendix B).

National Cooperative Soil Survey

The existing soil is categorized as hydrologic soil group B, as shown on the attached National Cooperative Soil Survey exhibits in Appendix C.

Existing Storm Flows:

Currently tributary areas to the north of the subject property as well as the subject property itself are vacant and for the purposes of this report are assumed to have a land classification of "Undeveloped – Fair". The land slopes from north to south and storm flows can be generally categorized as "sheet flow" (see existing conditions hydrology exhibit). It was assumed areas north of Alessandro Boulevard are not tributary to the project. At the current time, Brodiaea Avenue has not been constructed and provides no barrier to storm flows.

PROPOSED FLOOD CONTROL REQUIREMENTS

Drainage requirements fall under the jurisdiction of the City of Moreno Valley. The project design is to intercept and convey the storm flows through a series of proposed bio swales, detention basins, catch basins, drop inlets and sub-surface storm drain systems to the existing 84" storm drain pipe (Line "1" of the Moreno Valley ADP) located in Nason Street.

Brodiaea Avenue will be constructed in accordance with City of Moreno Valley Standards for a Collector Street (Std. No. 107). Per the conditions of approval, only a 12-foot lane north of the centerline will be constructed at the current time, with a bio-swale and Type IX inlets being utilized to capture and convey storm flows from the tributary areas north of Brodiaea Avenue. The southerly ½ of the street will be constructed to its ultimate configuration and will have curb-inlet type catch basins to capture storm flows. A proposed sub-surface storm drain system will convey these flows

to the existing 84" storm drain located in Nason Street. Refer to the Proposed Conditions (Off-Site) Hydrology Exhibit.

On-site storm flows are proposed to be conveyed via the parking area and earthen channels (bio-swales) to storm drain inlets and/or detention basins and ultimately to the existing 84" storm drain line in Nason Street.

HYDROLOGY ANALYSIS DESIGN CRITERIA

Storm flows for the 100-year event were obtained utilizing the Rational Method, as described in the RCFC&WCD *Hydrology Manual*. Peak flow storm rates were analyzed using the RCFC&WCD Rational Method for the 10 and 100 year storm events. The hydrologic data used for the calculations are as follows:

Hydrologic Soil Group:

Soil Group B – Are those soils having moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Antecedent Moisture Condition:

AMC II – Moderate runoff potential, an intermediate condition. Per RCFC & WCD Hydrology Manual (Dated: April, 1978): *“For the purposes of design hydrology using District methods, AMC II should normally be assumed for both the 10 year and 100 year frequency storm”*.

Land Use Classifications and Runoff Index Numbers:

Runoff Index Numbers were obtained from RCFC&WCD Plate D-5.5 and are summarized below:

Existing Conditions – Undeveloped (Fair)	69
Proposed Conditions – Commercial Landscaping	56

Precipitation Intensities:

Precipitation intensities were obtained from the RCFC&WCD Manual for the Sunnymead/Moreno Valley Area (Plate D-4.1 Sheet 6):

10 Year 10 Minute Intensity:	2.01 inches/hour
10 Year 60 Minute Intensity:	0.82 inches/hour
100 Year 10 Minute Intensity:	2.94 inches/hour
100 Year 60 Minute Intensity:	1.20 inches/hour

Slope of Intensity Duration Curve: 0.50

See Appendix D for the respective RCFC&WCD Plates.

SUMMARY of RCFCD RATIONAL METHOD PEAK FLOWS

The rational method computer runs for the existing conditions and proposed conditions (off-site) are included in Appendix E and are summarized below.

Existing Conditions:

Existing storm flows from the 100 year and 10 year events begin at the southerly right-of-way of Alessandro Boulevard to the southerly property line as a “sheet flow” condition. Results from the analyses are shown below:

Storm Event	Peak Flow (cfs)	T _c (min)	Intensity (in/hr)	Area (acres)
100-Year	69.84	23.17	1.93	51.28
10-Year	42.47	23.81	1.30	51.28

Proposed Conditions (Off-Site):

The drainage area was sub-divided into 3 (three) distinct areas corresponding to proposed inlet and catch basin locations (refer to the Proposed Conditions – Off-Site Hydrology Exhibit).

100 Year Storm Event

Designation	Q ₁₀₀ (cfs)	T _c (min)	Intensity (in/hr)	Area (acres)
A1	11.81	21.65	2.00	8.54
A2	11.34	23.76	1.91	8.68
Sub-Area Addition	23.15			17.22
A3	1.52	7.84	3.32	0.52
Confluence (Inlet 1)	24.02	23.76	1.91	17.74
A4 (Catch Basin 1)	1.23	6.75	3.58	0.39
Total Flow: DA-A	24.67	23.76	1.91	18.13
B1	3.40	18.20	2.18	2.21
B2	4.95	20.86	2.04	3.50
Sub-Area Addition	8.35			5.71
B3	0.76	6.06	3.78	0.23
Confluence (Inlet 2)	8.77	20.86	2.04	5.94
B4 (Catch Basin 2)	0.63	6.06	3.78	0.19
Total Flow: DA-B	9.11	20.86	2.04	6.13
C1	10.62	21.28	2.02	7.60
C2	1.17	7.42	3.41	0.39
Confluence (Inlet 3)	11.32	21.28	2.02	7.99
C3 (Catch Basin 3)	0.96	7.42	3.41	0.32
Total Flow: DA-C	11.88	21.28	2.02	8.31

10 Year Storm Event

Designation	Q₁₀₀ (cfs)	T_c (min)	Intensity (in/hr)	Area (acres)
A1	7.29	21.65	1.36	8.54
A2	6.92	24.05	1.30	8.68
Sub-Area Addition	14.21			17.22
A3	1.03	7.84	2.27	0.52
Confluence (Inlet 1)	14.80	24.05	1.30	17.74
A4 (Catch Basin 1)	0.83	6.75	2.44	0.39
Total Flow: DA-A	15.24	24.05	1.30	18.13
B1	2.11	18.20	1.49	2.21
B2	3.03	21.17	1.38	3.50
Sub-Area Addition	5.41			5.71
B3	0.52	6.06	2.58	0.23
Confluence (Inlet 2)	5.42	21.17	1.38	5.94
B4 (Catch Basin 2)	0.43	6.06	2.58	0.19
Total Flow: DA-B	5.65	21.17	1.38	6.13
C1	6.56	21.28	1.38	7.60
C2	0.79	7.42	2.33	0.39
Confluence (Inlet 3)	7.03	21.28	1.38	7.99
C3 (Catch Basin 3)	0.65	7.42	2.33	0.32
Total Flow: DA-C	7.42	21.28	1.38	8.31

Proposed Conditions (On-Site):

The subject property was subdivided into 25 smaller subareas. On-Site peak storm flows were calculated manually utilizing the RCFCF Rational Method equation:

$$Q=CIA(1.008)$$

Due to the small drainage flow path lengths, a minimum time of concentration (T_c) of 5 minutes was assumed for all areas (this will also provide for a more conservative estimate of the storm flow tributary to each area). The remaining factors are shown below:

Intensity (100 Year)	4.16 in/hr	Plate D-4.1(6)
Intensity (10 Year)	2.84 in/hr	Plate D-4.1(6)
Runoff Index (RI)	56	Plate D-5.5
Runoff Coefficient (C)	Varies	Plate D-5.7(7)
1.008 Conversion Factor from inch-acre/hour to cubic feet/second		

Refer to the Proposed Conditions (On-Site) Hydrology Exhibit for locations of the drainage subareas and the Preliminary Grading Exhibit for proposed grades.

Preliminary Hydrology Report
Majestic Moreno Medical Plaza and Village

A summary of the calculated peak flows is shown below:

Drainage Subarea	Area (acres)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Storm Flows Directed To:
A	0.95	3.31	2.20	Storm Drain System
B	0.35	1.29	0.88	Storm Drain System
C	0.50	1.78	1.22	Storm Drain System
D	2.06	7.60	5.19	Storm Drain System
E	0.33	1.16	0.78	Storm Drain System
F	0.45	1.59	1.07	Detention Area
G	1.06	3.84	2.58	Storm Drain System
H	0.36	1.28	0.87	Detention Area
I	0.43	1.48	0.96	Detention Area
J	0.89	3.10	2.04	Detention Area
K	0.42	1.46	0.99	Detention Area
L	0.37	1.32	0.89	Detention Area
M	1.30	4.63	3.13	Storm Drain System
N	0.26	0.94	0.63	Detention Area
O	1.32	4.59	3.10	Storm Drain System
P	0.78	2.85	1.92	Storm Drain System
Q	0.65	2.37	1.62	Storm Drain System
R	0.34	1.23	0.83	Storm Drain System
S	0.22	0.80	0.55	Storm Drain System
T	0.30	1.11	0.76	Storm Drain System
U	0.77	2.87	1.94	Storm Drain System
V	2.97	10.96	7.48	Storm Drain System
W	0.18	0.64	0.43	Storm Drain System
X	0.89	3.06	2.04	Storm Drain System
Y	0.20	0.75	0.52	Storm Drain System
Totals	18.35	65.26	44.08	

The proposed storm drain system will outlet into the existing 84" storm drain located in Nason Street and identified as Line I of the Moreno Valley ADP. Hydraulic calculations for the sizing of the proposed drainage inlets and storm drain pipe will be analyzed and submitted for City approval during the final design process.

Proposed Courtyard Detention/Retention (Drainage Areas 'F', 'H', 'K', 'L' and 'N'): Storm flows generated from these areas are proposed to be detained and/or retained utilizing shallow (1-foot maximum depth) basins. Drain inlets will be located to provide emergency overflow from the basin to the storm drain system should the basin capacity be exceeded during the storm event.

Drainage Areas 'I' and 'J': Storm flows generated from these areas are proposed to be detained and/or retained utilizing shallow (1-foot maximum depth) basins. Emergency overflow swales will convey excess storm flows to a drain inlet located within drainage area 'G'.

EXCERPTS FROM THE PROJECT SPECIFIC WATER QUALITY MANAGEMENT PLAN

The following are excerpts from the Project Specific Preliminary Water Quality Management Plan for the Majestic Moreno Medical Plaza and Village.

The project site's former use included agricultural operations, which did not include natural vegetation or a natural drainage pattern. The entire project property will be modified by development activities. Project proponents shall implement site design concepts that achieve each of the following:

1. **Minimize Urban Runoff:** The Majestic Moreno Medical Plaza and Village development will minimize urban runoff by incorporating 4.3 acres of landscaped areas distributed throughout the site. These areas surround project buildings and buffer other impervious surfaces. The landscaped areas represent approximately 24 percent of the project site. The landscape design of this project also incorporates native and drought tolerant vegetation to minimize irrigation runoff. Select landscaped areas will be depressed to serve the purpose of retention basins and help capture first flush storm flows.
2. **Minimize Impervious Footprint:** The site design will minimize the project's impervious footprint by incorporating landscaped and pervious pavement areas. As previously described, the project will accommodate approximately 4.3 acres of pervious surfaces in the form of landscaped areas. Additionally, the project design will incorporate two rectangular pervious pavement areas in the site's primary parking lots. The pervious pavement is anticipated to cover a surface area of approximately 66,850 square feet (1.53 acres). The project's landscaped areas/detention basins and pervious pavement areas are sized to capture and treat first flush storm flows while minimizing the site's impervious footprint.
3. **Conserve Natural Areas:** The project property formerly served for agriculture uses. The site is surrounded by agricultural, residential and medical office uses, none of which contain undisturbed natural areas or drainage patterns. The project site does not contain natural areas that could be conserved as part of the project design. Therefore the project will involve installation of a new sub-surface storm drain system to tie into existing storm drain on Nason Street. Preservation of existing vegetation or drainage is not feasible for the proposed project.
4. **Minimize Directly Connected Impervious Areas (DCIAs)** The proposed project minimizes directly connected impervious areas through its landscape and pervious pavement design, which buffers and surrounds many of the site's impervious surfaces. For example, roof runoff is directed to the landscaped areas or detention basins. Parking lot surfaces, which are generally continuous, are combined with two pervious pavement areas where first flush storm flows will infiltrate.

The project's site design Best Management Practices (BMPs), described below, are sized to capture and treat first flush storm flows in accordance with design values found in the Santa Ana Watershed Water Quality Management Plan, Exhibit C. Additional flows beyond this volume are captured in drainage inlets and conveyed off-site to the 84-inch storm drain line on Nason Street.

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Summary of Exhibit C -Volume requirements per Santa Ana Watershed Water Quality Management Plan

DRAINAGE SUB-AREA	“DESIGN CAPTURE” VOLUME REQUIREMENTS (cubic feet)	NOTES
A	928	Design Capture Volume Self Contained
B	635	Design Capture Volume Self Contained
C	1245	Design Capture Volume to Underground Storage
D	3659	Design Capture Volume Tributary to Pervious Pavement
E	397	Design Capture Volume to Underground Storage
F	531	Design Capture Volume Self Contained
G	1486	Design Capture Volume to Underground Storage
H	450	Design Capture Volume Self Contained
I	362	Design Capture Volume Self Contained
J	822	Design Capture Volume Self Contained
K	436	Design Capture Volume Self Contained
L	471	Design Capture Volume Self Contained
M	1336	Design Capture Volume to Underground Storage
N	358	Design Capture Volume Self Contained
O	1416	Design Capture Volume to Underground Storage
P	1160	Design Capture Volume to Underground Storage
Q	1046	Design Capture Volume to Underground Storage
R	459	Design Capture Volume to Underground Storage
S	334	Design Capture Volume to Underground Storage
T	502	Design Capture Volume to Underground Storage

Preliminary Hydrology Report
Majestic Moreno Medical Plaza and Village

U	1396	Design Capture Volume to Underground Storage
V	5070	Design Capture Volume Tributary to Pervious Pavement
W	225	Design Capture Volume to Underground Storage
X	777	Design Capture Volume Self Contained
y	185	Design Capture Volume Self Contained
TOTAL	25,686	

Summary of Design Volume by BMP Option:

BMP Treatment Description	Volume Required (cf)
Pervious Pavement*	8,729
Sub-Area Self Contained Storage	5,955
Underground Storage	11,002
Total	25,686

*Based on Santa Ana Watershed Water Quality Management Plan a design volume of 8,729 cubic feet will require approximately 51,348 square feet of pervious pavement area (8,729 cf/0.17 ft).

The proposed project will include modified drainage inlets, vegetated swales, detention basins and porous pavement as treatment control BMPs. Drainage inlets will be designed with subsurface stone-filled infiltration basins. The vegetated swales will be incorporated into landscaped areas. Retention basins will be located in depressed landscaped areas, which include the central courtyards to four project buildings. These retention basins will be underlain by gravel to maximize containment and infiltration. Additionally, porous pavement areas will be located in centralized locations of two of the project's parking lots. The modified drainage inlets, retention areas, vegetated swales and pervious pavement surfaces are sized to capture and treat first flush storm flows. Overflow quantities will enter the on-site storm drain pipeline and be directed off-site to the existing public storm drain pipeline on Nason Street.

BEST MANAGEMENT PRACTICES FOR TREATMENT CONTROLS	
BMP LABEL	CONTROL DESCRIPTION
BMP "A"	Proposed drainage inlet with subsurface stone-filled infiltration basin.
BMP "B"	Proposed permeable pavement with subsurface stone-filled infiltration basin.
BMP "C"	Proposed landscaped area with infiltration (detention/retention) basins and graded earthen swales (bio-swales).
BMP "D"	Proposed Underground Storage

The primary non-structural source control BMP for the proposed project will involve an education program. Education for employees, residents and maintenance staff will be conducted by providing a series printed materials developed by multiple agencies. Examples of these materials include brochures and flyers offering general education on the subject and tips on water conservation, pollution prevention and cleanliness. A series of guidelines will be formulated and widely distributed for promoting beneficial habits and restricting harmful activities, such as littering. Landscaping maintenance staff will also be educated regarding these practices.

The project's structural source control BMPs are part of the design intent and will include storm drain signage, an efficient landscape irrigation system design, protection of existing slopes and channels, and the proper design of trash storage areas.

Storm drain signage will be placed to prohibit discharge and waste dumping into project storm water inlets or channels. The signage may include a written expression that explicitly prohibits the discharge or dumping. An efficient irrigation system design will minimize runoff excess irrigation water into the storm water conveyance system. With adequate maintenance, the efficient irrigation system is also recognized for helping slow runoff. The project will also incorporate the proper design of the proposed maintenance yards and trash enclosures to prevent spills, leakage and contamination of runoff or soils.

RESULTS AND CONCLUSIONS

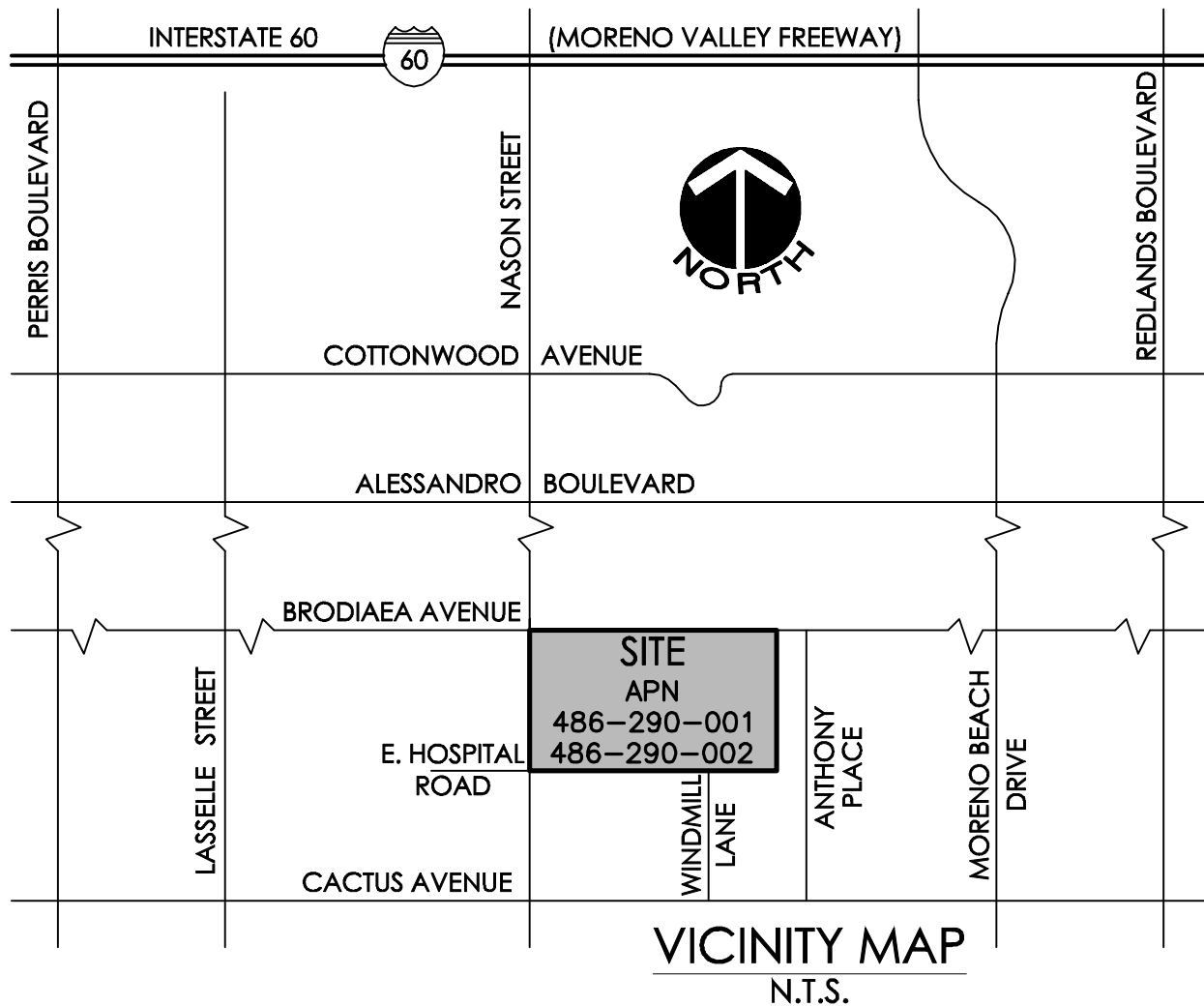
As the above summaries and narratives confirm, the proposed project meets the hydrologic conditions as set forth by the City of Moreno Valley. During the final design process, hydraulic calculations for the drainage swales and storm drain systems will be processed through the City's Engineering Department for approval.

Appendix A

Vicinity Map

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE

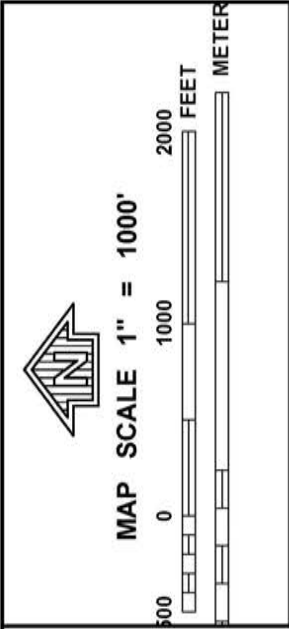
TPM 36227
CITY CASE NUMBER PA09-0033



LOCATED WITHIN A PORTION OF THE N.W. ¼ OF SECTION 15, TOWNSHIP 3 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE & MERIDIAN

Appendix B

NFIP Flood Insurance Rate Map



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0765G

FIRM
FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY,
 CALIFORNIA
 AND INCORPORATED AREAS

PANEL 765 OF 3805
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	0765	G
RIVERSIDE COUNTY	060245	0765	G

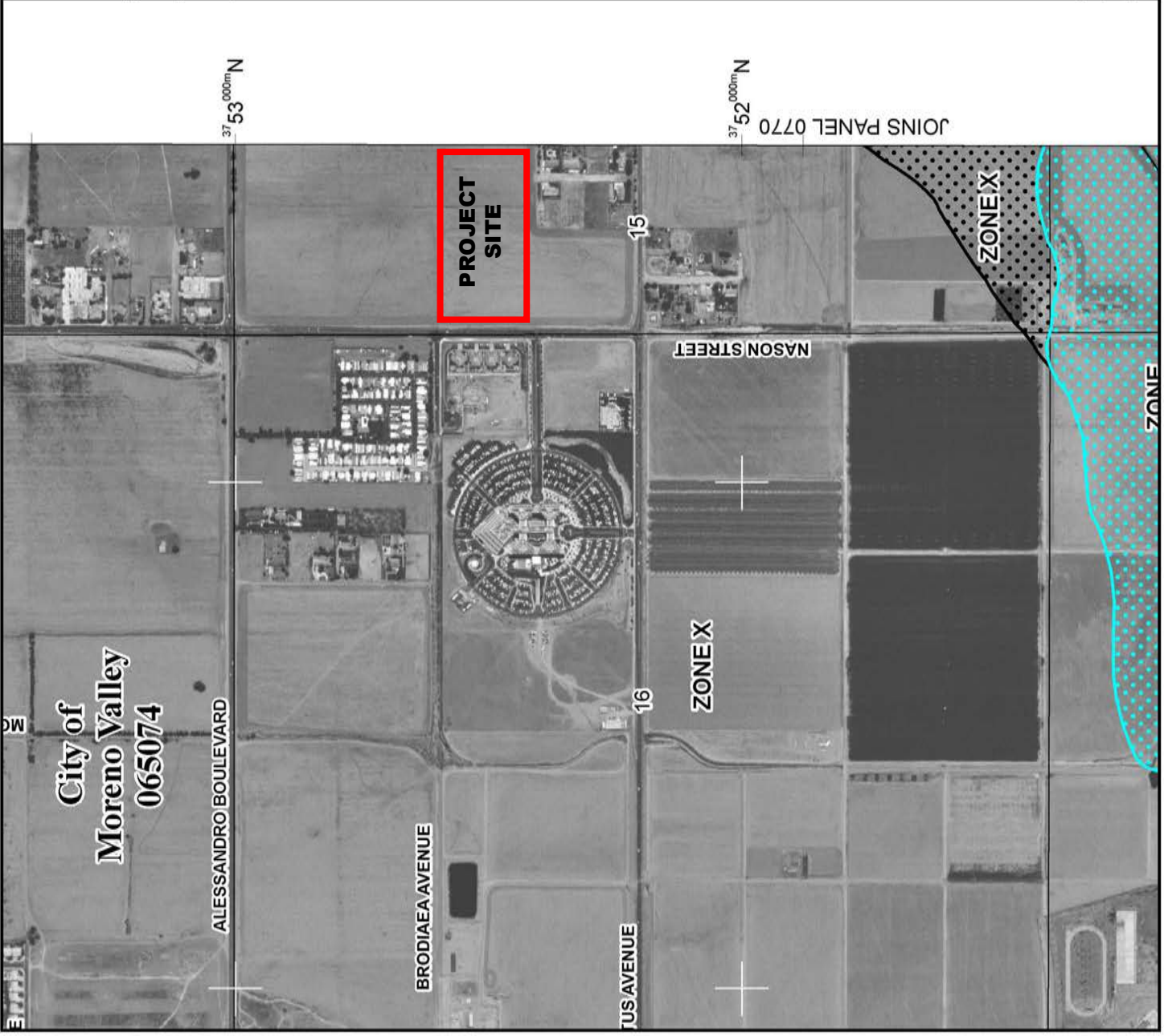
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
 06065C0765G

EFFECTIVE DATE
 AUGUST 28, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



DEFINITIONS OF FEMA FLOOD ZONE DESIGNATIONS

Moderate to Low Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters in these zones:

ZONE	DESCRIPTION
X (Shaded)	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood. Insurance purchase is not required in these zones.
X	Areas determined to be outside the 0.2% annual chance floodplain.

High Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones. For areas of alluvial fan flooding, velocities are also determined.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

High Risk – Coastal Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

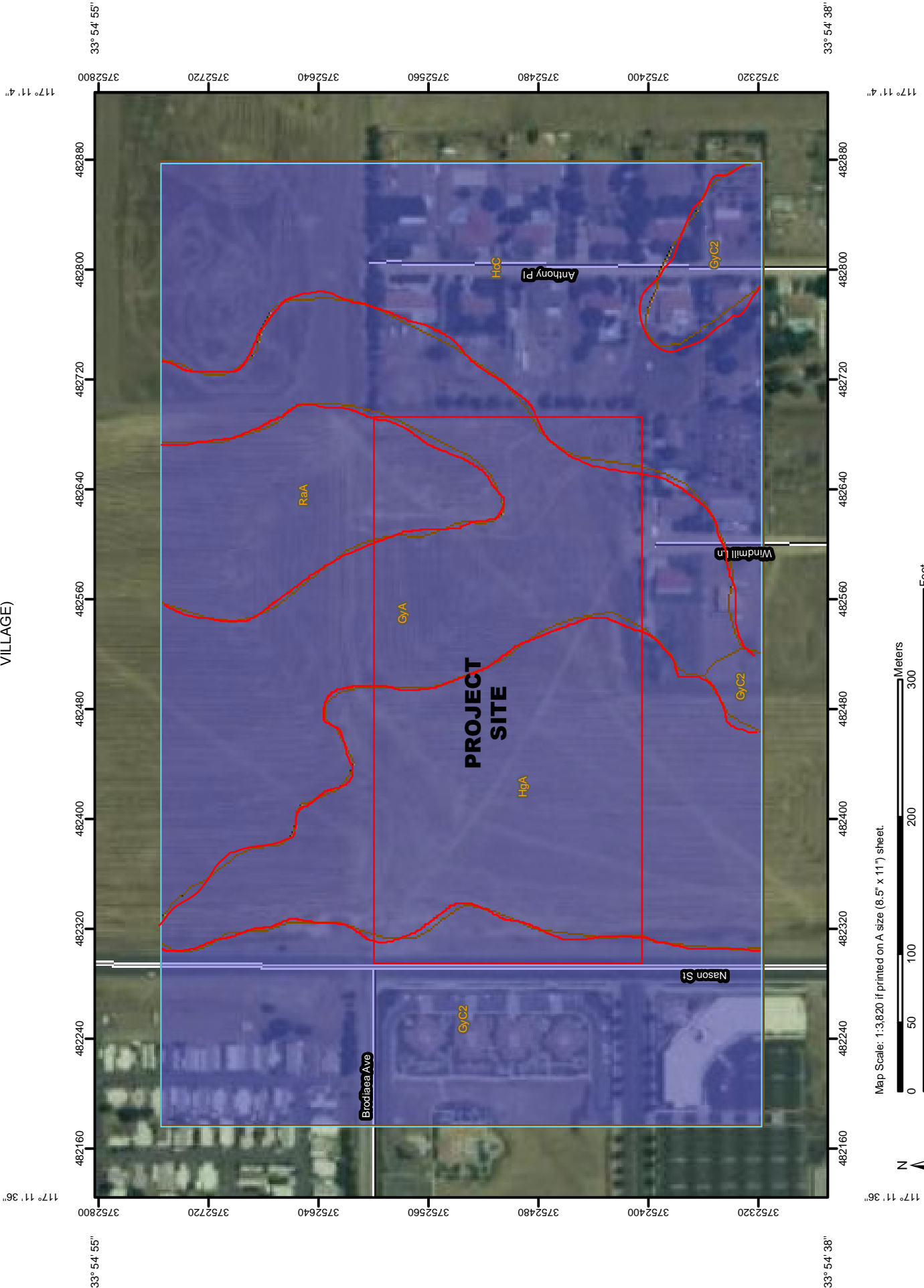
Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

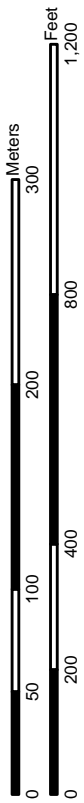
Appendix C

USDA NCSS Hydrologic Soils Map

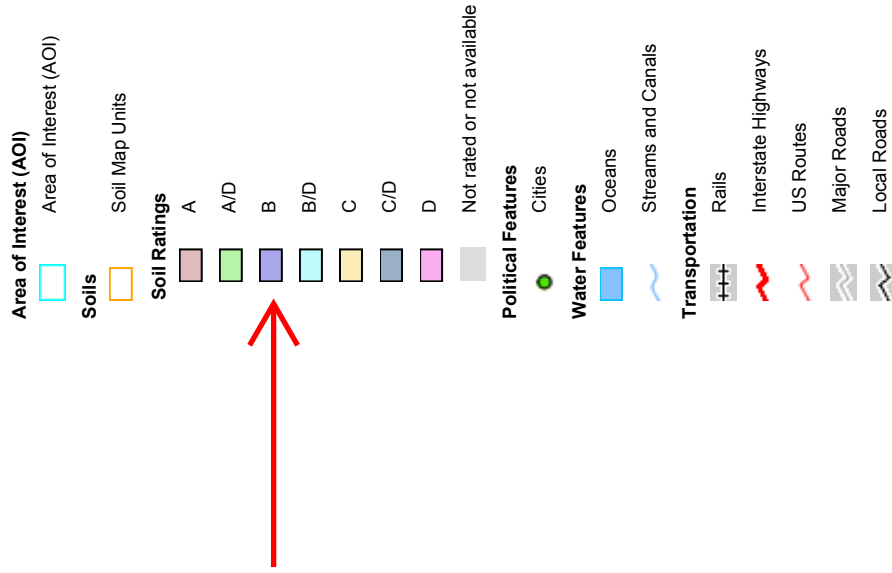
Hydrologic Soil Group—Western Riverside Area, California
 (1988 MAJESTIC MORENO MEDICAL PLAZA AND
 VILLAGE)



Map Scale: 1:3,820 if printed on A size (8.5" x 11") sheet.



MAP LEGEND



MAP INFORMATION

Map Scale: 1:3,820 if printed on A size (8.5" x 11") sheet.
 The soil surveys that comprise your AOI were mapped at 1:15,840.
 Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
 Survey Area Data: Version 5, Jan 3, 2008
 Date(s) aerial images were photographed: 6/7/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GyA	Greenfield sandy loam, 0 to 2 percent slopes	B	18.5	24.3%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	B	17.3	22.8%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	B	17.1	22.6%
HgA	Hanford fine sandy loam, 0 to 2 percent slopes	B	16.8	22.2%
RaA	Ramona sandy loam, 0 to 2 percent slopes	B	6.2	8.1%
Totals for Area of Interest			75.9	100.0%



Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower



Appendix D

RCFCD Reference Plates

RAINFALL INTENSITY—INCHES PER HOUR

SUNNYMEAD - MORENO			WOODCREST		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.16	5	3.37	5.30
6	2.59	3.79	6	3.05	4.79
7	2.40	3.51	7	2.80	4.40
8	2.25	3.29	8	2.60	4.09
9	2.12	3.10	9	2.44	3.83
10	2.01	2.94	10	2.30	3.62
11	1.92	2.80	11	2.19	3.43
12	1.83	2.68	12	2.08	3.27
13	1.76	2.58	13	1.99	3.13
14	1.70	2.48	14	1.91	3.01
15	1.64	2.40	15	1.84	2.89
16	1.59	2.32	16	1.78	2.79
17	1.54	2.25	17	1.72	2.70
18	1.50	2.19	18	1.67	2.62
19	1.46	2.13	19	1.62	2.54
20	1.42	2.08	20	1.57	2.47
22	1.35	1.98	22	1.49	2.34
24	1.30	1.90	24	1.42	2.23
26	1.25	1.82	26	1.36	2.14
28	1.20	1.76	28	1.31	2.05
30	1.16	1.70	30	1.26	1.98
32	1.12	1.64	32	1.22	1.91
34	1.09	1.59	34	1.19	1.85
36	1.06	1.55	36	1.14	1.79
38	1.03	1.51	38	1.11	1.74
40	1.00	1.47	40	1.07	1.69
45	.95	1.39	45	1.01	1.58
50	.90	1.31	50	.95	1.49
55	.86	1.25	55	.90	1.42
60	.82	1.20	60	.86	1.35
65	.79	1.15	65	.82	1.29
70	.76	1.11	70	.79	1.24
75	.73	1.07	75	.76	1.19
80	.71	1.04	80	.73	1.15
85	.69	1.01	85	.71	1.11

SLOPE = .550

SLOPE = .500

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STANDARD
INTENSITY—DURATION
CURVES DATA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS
FOR
PERVIOUS AREA

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>AGRICULTURAL COVERS</u> (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:
 Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
 Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
 Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Plate C-2 for a detailed description of cover types.
4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.
5. Reference Bibliography item 17.

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**RUNOFF INDEX NUMBERS
 FOR
 PERVIOUS AREA**

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.
3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

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**IMPERVIOUS COVER
FOR
DEVELOPED AREAS**

RUNOFF COEFFICIENT CURVE DATA

The data in the following tables may be used to develop runoff coefficient (C) curves for any combination of runoff index (RI) number and antecedent moisture condition (AMC). For an RI number with an AMC of II (from Plate D-5.5) enter the tables on the following pages and plot the "C" curve data directly on Plate D-5.8. "C" curve data is given for even RI numbers only, but values may easily be interpolated for odd RI numbers.

For an AMC of I or III enter the tabulation on this page with the RI for AMC II, and read the appropriate RI for AMC I or III. Use this revised RI to enter the tables on the following pages to determine "C". For example if RI = 40 for AMC II, then RI = 22 for AMC I and RI = 60 for AMC III.

AMC ADJUSTMENT RELATIONSHIPS

RI FOR AMC II	RI FOR OTHER AMC CONDITIONS:		RI FOR AMC II	RI FOR OTHER AMC CONDITIONS:	
	AMC I	AMC III		AMC I	AMC III
10	--	22	55	35	74
11	--	24	56	36	75
12	--	25	57	37	75
13	--	27	58	38	76
14	--	28	59	39	77
15	--	30	60	40	78
16	--	31	61	41	78
17	--	33	62	42	79
18	--	34	63	43	80
19	--	36	64	44	81
20	--	37	65	45	82
21	10	38	66	46	82
22	10	39	67	47	83
23	11	41	68	48	84
24	11	42	69	50	84
25	12	43	70	51	85
26	12	44	71	52	86
27	13	46	72	53	86
28	14	47	73	54	87
29	14	49	74	55	88
30	15	50	75	57	88
31	16	51	76	58	89
32	16	52	77	59	89
33	17	53	78	60	90
34	18	54	79	62	91
35	18	55	80	63	91
36	19	56	81	64	92
37	20	57	82	66	92
38	21	58	83	67	93
39	21	59	84	68	93
40	22	60	85	70	94
41	23	61	86	72	94
42	24	62	87	73	95
43	25	63	88	75	95
44	25	64	89	76	96
45	26	65	90	78	96
46	27	66	91	80	97
47	28	67	92	81	97
48	29	68	93	83	98
49	30	69	94	85	98
50	31	70	95	87	98
51	31	70	96	89	99
52	32	71	97	91	99
53	33	72	98	94	99
54	34	73	99	97	--

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RUNOFF COEFFICIENT
CURVE DATA

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 52

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.26	.40	.49	.56	.60	.64	.67	.69	.72	.75
5.	.04	.29	.43	.51	.57	.62	.65	.68	.70	.73	.75
10.	.09	.32	.45	.53	.59	.63	.66	.69	.71	.74	.76
15.	.13	.36	.48	.56	.61	.65	.68	.70	.72	.75	.77
20.	.18	.39	.50	.58	.63	.66	.69	.71	.73	.76	.78
25.	.22	.42	.53	.60	.64	.68	.70	.72	.74	.77	.79
30.	.27	.45	.55	.62	.66	.69	.72	.74	.75	.78	.79
35.	.31	.48	.58	.64	.68	.71	.73	.75	.76	.78	.80
40.	.36	.52	.60	.66	.69	.72	.74	.76	.77	.79	.81
45.	.40	.55	.63	.68	.71	.74	.76	.77	.78	.80	.82
50.	.45	.58	.65	.70	.73	.75	.77	.78	.79	.81	.82
55.	.49	.61	.68	.72	.75	.77	.78	.79	.80	.82	.83
60.	.54	.64	.70	.74	.76	.78	.80	.81	.82	.83	.84
65.	.58	.68	.73	.76	.78	.80	.81	.82	.83	.84	.85
70.	.63	.71	.75	.78	.80	.81	.82	.83	.84	.85	.85
75.	.67	.74	.78	.80	.81	.83	.83	.84	.85	.86	.86
80.	.72	.77	.80	.82	.83	.84	.85	.85	.86	.86	.87
85.	.76	.80	.83	.84	.85	.86	.86	.86	.87	.87	.88
90.	.81	.84	.85	.86	.87	.87	.87	.88	.88	.88	.88
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 54

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.28	.42	.51	.57	.62	.65	.68	.70	.73	.76
5.	.04	.31	.45	.53	.59	.63	.67	.69	.71	.74	.76
10.	.09	.34	.47	.55	.61	.65	.68	.70	.72	.75	.77
15.	.13	.37	.49	.57	.62	.66	.69	.71	.73	.76	.78
20.	.18	.40	.52	.59	.64	.68	.70	.72	.74	.77	.79
25.	.22	.43	.54	.61	.66	.69	.71	.73	.75	.78	.79
30.	.27	.46	.56	.63	.67	.70	.73	.75	.76	.78	.80
35.	.31	.49	.59	.65	.69	.72	.74	.76	.77	.79	.81
40.	.36	.53	.61	.67	.70	.73	.75	.77	.78	.80	.81
45.	.40	.56	.64	.69	.72	.75	.76	.78	.79	.81	.82
50.	.45	.59	.66	.71	.74	.76	.78	.79	.80	.82	.83
55.	.49	.62	.68	.73	.75	.77	.79	.80	.81	.83	.84
60.	.54	.65	.71	.74	.77	.79	.80	.81	.82	.83	.84
65.	.58	.68	.73	.76	.79	.80	.82	.83	.84	.85	.86
70.	.63	.71	.76	.78	.80	.82	.83	.84	.85	.86	.86
75.	.67	.74	.78	.80	.82	.83	.84	.84	.85	.86	.86
80.	.72	.78	.80	.82	.83	.84	.85	.86	.86	.87	.87
85.	.76	.81	.83	.84	.85	.86	.86	.87	.87	.88	.88
90.	.81	.84	.85	.86	.87	.87	.88	.88	.88	.88	.89
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 56

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.29	.44	.53	.59	.63	.67	.69	.71	.74	.77
5.	.04	.32	.46	.55	.61	.65	.68	.70	.72	.75	.77
10.	.09	.35	.49	.57	.62	.66	.69	.71	.73	.76	.78
15.	.13	.38	.51	.59	.64	.67	.70	.72	.74	.77	.79
20.	.18	.41	.53	.60	.65	.69	.71	.73	.75	.78	.79
25.	.22	.44	.55	.62	.67	.70	.73	.74	.76	.78	.80
30.	.27	.47	.58	.64	.68	.71	.74	.75	.77	.79	.81
35.	.31	.50	.60	.66	.70	.73	.75	.77	.78	.80	.81
40.	.36	.53	.62	.68	.71	.74	.76	.78	.79	.81	.82
45.	.40	.56	.65	.70	.73	.75	.77	.79	.80	.81	.83
50.	.45	.60	.67	.71	.75	.77	.78	.79	.80	.81	.83
55.	.49	.63	.69	.73	.76	.78	.80	.81	.82	.83	.84
60.	.54	.66	.72	.75	.78	.79	.81	.82	.83	.84	.85
65.	.58	.69	.74	.77	.79	.81	.82	.83	.83	.85	.85
70.	.63	.72	.76	.79	.81	.82	.83	.84	.84	.85	.86
75.	.67	.75	.78	.81	.82	.83	.84	.85	.85	.86	.87
80.	.72	.78	.81	.83	.84	.85	.85	.86	.86	.87	.87
85.	.76	.81	.83	.84	.85	.86	.86	.87	.87	.88	.88
90.	.81	.84	.85	.86	.87	.87	.88	.88	.88	.88	.89
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 58

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.31	.46	.55	.61	.65	.68	.71	.73	.75	.78
5.	.04	.34	.48	.57	.62	.66	.69	.72	.73	.76	.78
10.	.09	.37	.50	.58	.64	.67	.70	.72	.74	.77	.79
15.	.13	.40	.52	.60	.65	.69	.71	.73	.75	.78	.79
20.	.18	.43	.55	.62	.67	.70	.72	.74	.76	.78	.80
25.	.22	.46	.57	.64	.68	.71	.74	.75	.77	.79	.81
30.	.27	.48	.59	.65	.69	.72	.75	.76	.78	.80	.81
35.	.31	.51	.61	.67	.71	.74	.76	.77	.79	.81	.82
40.	.36	.54	.63	.69	.72	.75	.77	.78	.79	.81	.83
45.	.40	.57	.66	.71	.74	.76	.78	.79	.80	.82	.83
50.	.45	.60	.68	.72	.75	.77	.79	.80	.81	.82	.83
55.	.49	.63	.70	.74	.77	.79	.80	.81	.82	.83	.84
60.	.54	.66	.72	.76	.78	.80	.81	.82	.83	.84	.85
65.	.58	.69	.75	.78	.80	.82	.83	.84	.85	.86	.86
70.	.63	.71	.76	.79	.81	.82	.83	.84	.85	.86	.86
75.	.67	.74	.78	.80	.82	.83	.84	.84	.85	.86	.86
80.	.72	.78	.80	.82	.83	.84	.85	.86	.86	.87	.87
85.	.76	.81	.83	.84	.85	.86	.86	.87	.87	.88	.88
90.	.81	.84	.85	.86	.87	.87	.88	.88	.88	.88	.89
95.	.86	.87	.88	.88	.88	.89	.89	.89	.89	.89	.89
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

Appendix E
RCFCD Rational Method Analyses Computer Runs
Manual Peak Flow Calculations (Proposed On-Site)

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 02/12/10 File:1968exist100yr.out

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
EXISTING CONDITIONS
100 YEAR STORM EVENT

***** Hydrology Study Control Information *****

English (in-lb) Units used in input data file

Program License Serial Number 6041

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 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 = 100.0
Calculated rainfall intensity data:
1 hour intensity = 1.200(In/Hr)
Slope of intensity duration curve = 0.5000

+++++
Process from Point/Station 100.000 to Point/Station 110.000
**** INITIAL AREA EVALUATION **** **EX-1**

Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 1588.000(Ft.)
Bottom (of initial area) elevation = 1577.000(Ft.)
Difference in elevation = 11.000(Ft.)
Slope = 0.02115 s(percent)= 2.12
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.732 min.
Rainfall intensity = 2.148(In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.704
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 14.872(CFS)
Total initial stream area = 9.840(Ac.)
Pervious area fraction = 1.000

+++++
Process from Point/Station 110.000 to Point/Station 120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **EX-2**

Top of natural channel elevation = 1577.000(Ft.)
End of natural channel elevation = 1550.000(Ft.)
Length of natural channel = 1400.000(Ft.)
Estimated mean flow rate at midpoint of channel = 46.187(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$
Velocity using mean channel flow = 5.25(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0193
Corrected/adjusted channel slope = 0.0193
Travel time = 4.44 min. TC = 23.17 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.687
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.931(In/Hr) for a 100.0 year storm
Subarea runoff = 54.964(CFS) for 41.440(Ac.)
Total runoff = 69.836(CFS) Total area = 51.280(Ac.)
End of computations, total study area = 51.28 (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 = 69.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 02/12/10 File:1968exist10yr.out

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE

EXISTING CONDITIONS

10 YEAR STORM EVENT

***** Hydrology Study Control Information *****

English (in-lb) Units used in input data file

Program License Serial Number 6041

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 100.000 to Point/Station 110.000
**** INITIAL AREA EVALUATION **** **EX-1**

Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 1588.000(Ft.)
Bottom (of initial area) elevation = 1577.000(Ft.)
Difference in elevation = 11.000(Ft.)
Slope = 0.02115 s(percent)= 2.12
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.732 min.
Rainfall intensity = 1.468(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.639
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 9.229(CFS)
Total initial stream area = 9.840(Ac.)
Pervious area fraction = 1.000

+++++
Process from Point/Station 110.000 to Point/Station 120.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **EX-2**

Top of natural channel elevation = 1577.000 (Ft.)
End of natural channel elevation = 1550.000 (Ft.)
Length of natural channel = 1400.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 28.664 (CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{.5}))$
Velocity using mean channel flow = 4.59 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0193
Corrected/adjusted channel slope = 0.0193
Travel time = 5.08 min. TC = 23.81 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.616
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.302 (In/Hr) for a 10.0 year storm
Subarea runoff = 33.245 (CFS) for 41.440 (Ac.)
Total runoff = 42.474 (CFS) Total area = 51.280 (Ac.)
End of computations, total study area = 51.28 (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 = 69.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 02/12/10 File:1968PROFF100YR.out

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE

PROPOSED CONDITIONS - OFFSITE

100 YEAR STORM EVENT

***** Hydrology Study Control Information *****

English (in-lb) Units used in input data file

Program License Serial Number 6041

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 100.00 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 = 100.0

Calculated rainfall intensity data:

1 hour intensity = 1.200(In/Hr)

Slope of intensity duration curve = 0.5000

+++++

Process from Point/Station 1100.000 to Point/Station 1110.000

**** INITIAL AREA EVALUATION **** **DA-A1**

Initial area flow distance = 700.000(Ft.)

Top (of initial area) elevation = 1588.000(Ft.)

Bottom (of initial area) elevation = 1575.000(Ft.)

Difference in elevation = 13.000(Ft.)

Slope = 0.01857 s(percent)= 1.86

TC = k(0.710)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 21.654 min.

Rainfall intensity = 1.998(In/Hr) for a 100.0 year storm

UNDEVELOPED (fair cover) subarea

Runoff Coefficient = 0.692

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) = 69.00

Pervious area fraction = 1.000; Impervious fraction = 0.000

Initial subarea runoff = 11.811(CFS)

Total initial stream area = 8.540(Ac.)

Pervious area fraction = 1.000

++++
Process from Point/Station 1110.000 to Point/Station 1125.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **DA-A2**

Top of natural channel elevation = 1575.000(Ft.)
End of natural channel elevation = 1557.800(Ft.)
Length of natural channel = 615.000(Ft.)
Estimated mean flow rate at midpoint of channel = 17.813(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352) (slope^0.5)
Velocity using mean channel flow = 4.86(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0280
Corrected/adjusted channel slope = 0.0280
Travel time = 2.11 min. TC = 23.76 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.685
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.907(In/Hr) for a 100.0 year storm
Subarea runoff = 11.335(CFS) for 8.680(Ac.)
Total runoff = 23.146(CFS) Total area = 17.220(Ac.)

++++
Process from Point/Station 1110.000 to Point/Station 1125.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 17.220(Ac.)
Runoff from this stream = 23.146(CFS)
Time of concentration = 23.76 min.
Rainfall intensity = 1.907(In/Hr)

++++
Process from Point/Station 1120.000 to Point/Station 1125.000
**** INITIAL AREA EVALUATION **** **DA-A3**

Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 1565.300(Ft.)
Bottom (of initial area) elevation = 1557.800(Ft.)
Difference in elevation = 7.500(Ft.)
Slope = 0.01667 s(percent)= 1.67
TC = k(0.300)*[(length^3)/(elevation change)]^0.2

Initial area time of concentration = 7.835 min.
 Rainfall intensity = 3.321(In/Hr) for a 100.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.878
 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 = 1.517(CFS)
Total initial stream area = 0.520(Ac.)
 Pervious area fraction = 0.100

++++
 Process from Point/Station 1120.000 to Point/Station 1125.000
 **** CONFLUENCE OF MINOR STREAMS **** **Flow to Inlet 1**

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.520(Ac.)
 Runoff from this stream = 1.517(CFS)
 Time of concentration = 7.83 min.
 Rainfall intensity = 3.321(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	23.146	23.76	1.907
2	1.517	7.83	3.321

Largest stream flow has longer time of concentration
 $Q_p = 23.146 + \text{sum of } Q_b \cdot I_a/I_b$
 $Q_p = 23.146 + 1.517 * 0.574 = 24.017$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 23.146 1.517
 Area of streams before confluence:
 17.220 0.520
 Results of confluence:
Total flow rate = 24.017(CFS)
Time of concentration = 23.764 min.
Effective stream area after confluence = 17.740(Ac.)

++++
 Process from Point/Station 1120.000 to Point/Station 1125.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 17.740(Ac.)
 Runoff from this stream = 24.017(CFS)
 Time of concentration = 23.76 min.
 Rainfall intensity = 1.907(In/Hr)

Program is now starting with Main Stream No. 2

++++
Process from Point/Station 1130.000 to Point/Station 1135.000
**** INITIAL AREA EVALUATION **** **DA-A4 Flow to Catch Basin 1**

Initial area flow distance = 360.000(Ft.)
Top (of initial area) elevation = 1565.900(Ft.)
Bottom (of initial area) elevation = 1557.800(Ft.)
Difference in elevation = 8.100(Ft.)
Slope = 0.02250 s(percent)= 2.25
TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
Initial area time of concentration = 6.748 min.
Rainfall intensity = 3.578(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.880
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 = 1.227(CFS)
Total initial stream area = 0.390(Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 1130.000 to Point/Station 1135.000
**** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'A'**

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 0.390(Ac.)
Runoff from this stream = 1.227(CFS)
Time of concentration = 6.75 min.
Rainfall intensity = 3.578(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	24.017	23.76	1.907
2	1.227	6.75	3.578

Largest stream flow has longer time of concentration

Qp = 24.017 + sum of
Qb Ia/Ib
1.227 * 0.533 = 0.654
Qp = 24.671

Total of 2 main streams to confluence:

Flow rates before confluence point:
24.017 1.227
Area of streams before confluence:
17.740 0.390

Results of confluence:

Total flow rate = 24.671 (CFS)
Time of concentration = 23.764 min.
Effective stream area after confluence = 18.130 (Ac.)

+++++
Process from Point/Station 2100.000 to Point/Station 2110.000
**** INITIAL AREA EVALUATION **** **DA-B1**

Initial area flow distance = 510.000 (Ft.)
Top (of initial area) elevation = 1588.000 (Ft.)
Bottom (of initial area) elevation = 1576.000 (Ft.)
Difference in elevation = 12.000 (Ft.)
Slope = 0.02353 s(percent)= 2.35
TC = $k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 18.196 min.
Rainfall intensity = 2.179 (In/Hr) for a 100.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.706
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 3.400 (CFS)
Total initial stream area = 2.210 (Ac.)
Pervious area fraction = 1.000

+++++
Process from Point/Station 2110.000 to Point/Station 2125.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **DA-B2**

Top of natural channel elevation = 1576.000 (Ft.)
End of natural channel elevation = 1557.800 (Ft.)
Length of natural channel = 610.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 6.092 (CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{.352})(\text{slope}^{0.5}))$
Velocity using mean channel flow = 3.82 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0298
Corrected/adjusted channel slope = 0.0298
Travel time = 2.66 min. TC = 20.86 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.695
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) = 69.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
 Rainfall intensity = 2.035(In/Hr) for a 100.0 year storm
Subarea runoff = 4.953(CFS) for 3.500(Ac.)
Total runoff = 8.353(CFS) Total area = 5.710(Ac.)

++++++
 Process from Point/Station 2110.000 to Point/Station 2125.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 5.710(Ac.)
 Runoff from this stream = 8.353(CFS)
 Time of concentration = 20.86 min.
 Rainfall intensity = 2.035(In/Hr)

++++++
 Process from Point/Station 2120.000 to Point/Station 2125.000
 **** INITIAL AREA EVALUATION **** **DA-B3**

Initial area flow distance = 150.000(Ft.)
 Top (of initial area) elevation = 1558.800(Ft.)
 Bottom (of initial area) elevation = 1557.800(Ft.)
 Difference in elevation = 1.000(Ft.)
 Slope = 0.00667 s(percent)= 0.67
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 6.064 min.
 Rainfall intensity = 3.775(In/Hr) for a 100.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.880
 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 = 0.764(CFS)
Total initial stream area = 0.230(Ac.)
 Pervious area fraction = 0.100

++++++
 Process from Point/Station 2120.000 to Point/Station 2125.000
 **** CONFLUENCE OF MINOR STREAMS **** **Total Flow to Inlet 2**

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.230(Ac.)
 Runoff from this stream = 0.764(CFS)
 Time of concentration = 6.06 min.
 Rainfall intensity = 3.775(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.353	20.86	2.035
2	0.764	6.06	3.775

Largest stream flow has longer time of concentration
 $Q_p = 8.353 + \text{sum of } Q_b \cdot I_a/I_b$
 $0.764 * 0.539 = 0.412$
 $Q_p = 8.765$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 8.353 0.764
 Area of streams before confluence:
 5.710 0.230

Results of confluence:
Total flow rate = 8.765 (CFS)
Time of concentration = 20.857 min.
Effective stream area after confluence = 5.940 (Ac.)

++++
 Process from Point/Station 2120.000 to Point/Station 2125.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
 In Main Stream number: 1
 Stream flow area = 5.940 (Ac.)
 Runoff from this stream = 8.765 (CFS)
 Time of concentration = 20.86 min.
 Rainfall intensity = 2.035 (In/Hr)
 Program is now starting with Main Stream No. 2

++++
 Process from Point/Station 2120.000 to Point/Station 2130.000
 **** INITIAL AREA EVALUATION **** **DA-B4 Flow to Catch Basin 2**

Initial area flow distance = 150.000 (Ft.)
 Top (of initial area) elevation = 1558.800 (Ft.)
 Bottom (of initial area) elevation = 1557.800 (Ft.)
 Difference in elevation = 1.000 (Ft.)
 Slope = 0.00667 s(percent) = 0.67
 $TC = k(0.300) * [(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 6.064 min.
 Rainfall intensity = 3.775 (In/Hr) for a 100.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.880
 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 = 0.631 (CFS)
Total initial stream area = 0.190 (Ac.)
 Pervious area fraction = 0.100

++++
 Process from Point/Station 2120.000 to Point/Station 2130.000
 **** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'B'**

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 0.190 (Ac.)
 Runoff from this stream = 0.631 (CFS)
 Time of concentration = 6.06 min.
 Rainfall intensity = 3.775 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	8.765	20.86	2.035
2	0.631	6.06	3.775

Largest stream flow has longer time of concentration

Qp = 8.765 + sum of
 $Q_b \cdot I_a/I_b$
 0.631 * 0.539 = 0.340
 Qp = 9.106

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 8.765 0.631
 Area of streams before confluence:
 5.940 0.190

Results of confluence:

Total flow rate = 9.106 (CFS)
Time of concentration = 20.857 min.
Effective stream area after confluence = 6.130 (Ac.)

++++
 Process from Point/Station 3100.000 to Point/Station 3115.000
 **** INITIAL AREA EVALUATION **** DA-C1

Initial area flow distance = 875.000 (Ft.)
 Top (of initial area) elevation = 1585.500 (Ft.)
 Bottom (of initial area) elevation = 1557.800 (Ft.)
 Difference in elevation = 27.700 (Ft.)
 Slope = 0.03166 s(percent) = 3.17
 $TC = k(0.710) * [(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 21.280 min.
 Rainfall intensity = 2.015 (In/Hr) for a 100.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.694
 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) = 69.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 10.624 (CFS)
Total initial stream area = 7.600 (Ac.)
 Pervious area fraction = 1.000

++++

Process from Point/Station 3100.000 to Point/Station 3115.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 7.600(Ac.)
Runoff from this stream = 10.624(CFS)
Time of concentration = 21.28 min.
Rainfall intensity = 2.015(In/Hr)

++++
Process from Point/Station 3110.000 to Point/Station 3115.000
**** INITIAL AREA EVALUATION **** **DA-C2**

Initial area flow distance = 325.000(Ft.)
Top (of initial area) elevation = 1561.500(Ft.)
Bottom (of initial area) elevation = 1557.800(Ft.)
Difference in elevation = 3.700(Ft.)
Slope = 0.01138 s(percent)= 1.14
TC = $k(0.300)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 7.424 min.
Rainfall intensity = 3.412(In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
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 = 1.169(CFS)
Total initial stream area = 0.390(Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 3110.000 to Point/Station 3115.000
**** CONFLUENCE OF MINOR STREAMS **** **Total Flow to Inlet 3**

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 0.390(Ac.)
Runoff from this stream = 1.169(CFS)
Time of concentration = 7.42 min.
Rainfall intensity = 3.412(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	10.624	21.28	2.015
2	1.169	7.42	3.412

Largest stream flow has longer time of concentration
Qp = 10.624 + sum of
Qb Ia/Ib
1.169 * 0.591 = 0.691
Qp = 11.315

Total of 2 streams to confluence:
Flow rates before confluence point:
10.624 1.169
Area of streams before confluence:
7.600 0.390

Results of confluence:
Total flow rate = 11.315 (CFS)
Time of concentration = 21.280 min.
Effective stream area after confluence = 7.990 (Ac.)

++++
Process from Point/Station 3110.000 to Point/Station 3115.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
Stream flow area = 7.990 (Ac.)
Runoff from this stream = 11.315 (CFS)
Time of concentration = 21.28 min.
Rainfall intensity = 2.015 (In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 3110.000 to Point/Station 3120.000
**** INITIAL AREA EVALUATION **** **DA-C3 Total Flow to Catch Basin 3**

Initial area flow distance = 325.000 (Ft.)
Top (of initial area) elevation = 1561.500 (Ft.)
Bottom (of initial area) elevation = 1557.800 (Ft.)
Difference in elevation = 3.700 (Ft.)
Slope = 0.01138 s(percent) = 1.14
TC = $k(0.300) * [(length^3) / (elevation\ change)]^{0.2}$
Initial area time of concentration = 7.424 min.
Rainfall intensity = 3.412 (In/Hr) for a 100.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.879
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 = 0.959 (CFS)
Total initial stream area = 0.320 (Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 3110.000 to Point/Station 3120.000
**** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'C'**

The following data inside Main Stream is listed:

In Main Stream number: 2
Stream flow area = 0.320 (Ac.)
Runoff from this stream = 0.959 (CFS)
Time of concentration = 7.42 min.
Rainfall intensity = 3.412 (In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	11.315	21.28	2.015
2	0.959	7.42	3.412

Largest stream flow has longer time of concentration

$Q_p = 11.315 + \text{sum of}$
 $Q_b \quad I_a/I_b$
 $0.959 * 0.591 = 0.567$
 $Q_p = 11.881$

Total of 2 main streams to confluence:

Flow rates before confluence point:
11.315 0.959

Area of streams before confluence:
7.990 0.320

Results of confluence:

Total flow rate = 11.881 (CFS)
Time of concentration = 21.280 min.
Effective stream area after confluence = 8.310 (Ac.)
End of computations, total study area = 32.57 (Ac.)

The following figures may be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction (A_p) = 0.944
Area averaged RI index number = 68.2

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989 - 2005 Version 7.1
Rational Hydrology Study Date: 02/12/10 File:1968PROFF10YR.out

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
PROPOSED CONDITIONS - OFFSITE
10 YEAR STORM EVENT

***** Hydrology Study Control Information *****

English (in-lb) Units used in input data file

Program License Serial Number 6041

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 1100.000 to Point/Station 1110.000
**** INITIAL AREA EVALUATION **** **DA-A1**

Initial area flow distance = 700.000(Ft.)
Top (of initial area) elevation = 1588.000(Ft.)
Bottom (of initial area) elevation = 1575.000(Ft.)
Difference in elevation = 13.000(Ft.)
Slope = 0.01857 s(percent)= 1.86
TC = k(0.710)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 21.654 min.
Rainfall intensity = 1.365(In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.625
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 7.291(CFS)
Total initial stream area = 8.540(Ac.)
Pervious area fraction = 1.000

++++
Process from Point/Station 1110.000 to Point/Station 1125.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **DA-A2**

Top of natural channel elevation = 1575.000(Ft.)
End of natural channel elevation = 1557.800(Ft.)
Length of natural channel = 615.000(Ft.)
Estimated mean flow rate at midpoint of channel = 10.997(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity(ft/s) = (7 + 8(q(English Units)^.352) (slope^0.5)
Velocity using mean channel flow = 4.28(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0280
Corrected/adjusted channel slope = 0.0280
Travel time = 2.39 min. TC = 24.05 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.615
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.295(In/Hr) for a 10.0 year storm
Subarea runoff = 6.919(CFS) for 8.680(Ac.)
Total runoff = 14.210(CFS) Total area = 17.220(Ac.)

++++
Process from Point/Station 1110.000 to Point/Station 1125.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 17.220(Ac.)
Runoff from this stream = 14.210(CFS)
Time of concentration = 24.05 min.
Rainfall intensity = 1.295(In/Hr)

++++
Process from Point/Station 1120.000 to Point/Station 1125.000
**** INITIAL AREA EVALUATION **** **DA-A3**

Initial area flow distance = 450.000(Ft.)
Top (of initial area) elevation = 1565.300(Ft.)
Bottom (of initial area) elevation = 1557.800(Ft.)
Difference in elevation = 7.500(Ft.)
Slope = 0.01667 s(percent)= 1.67
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.835 min.
Rainfall intensity = 2.269(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type
 Runoff Coefficient = 0.872
 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 = 1.028(CFS)
Total initial stream area = 0.520(Ac.)
 Pervious area fraction = 0.100

++++++
 Process from Point/Station 1120.000 to Point/Station 1125.000
 **** CONFLUENCE OF MINOR STREAMS **** **Total Flow to Inlet 1**

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.520(Ac.)
 Runoff from this stream = 1.028(CFS)
 Time of concentration = 7.83 min.
 Rainfall intensity = 2.269(In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	14.210	24.05	1.295
2	1.028	7.83	2.269

Largest stream flow has longer time of concentration
 $Q_p = 14.210 + \text{sum of } Q_b \cdot I_a/I_b$
 $1.028 * 0.571 = 0.587$
 $Q_p = 14.797$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 14.210 1.028
 Area of streams before confluence:
 17.220 0.520

Results of confluence:
Total flow rate = 14.797(CFS)
Time of concentration = 24.047 min.
Effective stream area after confluence = 17.740(Ac.)

++++++
 Process from Point/Station 1120.000 to Point/Station 1125.000
 **** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1
 Stream flow area = 17.740(Ac.)
 Runoff from this stream = 14.797(CFS)
 Time of concentration = 24.05 min.
 Rainfall intensity = 1.295(In/Hr)
 Program is now starting with Main Stream No. 2

+++++

Process from Point/Station 1130.000 to Point/Station 1135.000
 **** INITIAL AREA EVALUATION **** **DA-A4 Flow to Catch Basin 1**

Initial area flow distance = 360.000(Ft.)
 Top (of initial area) elevation = 1565.900(Ft.)
 Bottom (of initial area) elevation = 1557.800(Ft.)
 Difference in elevation = 8.100(Ft.)
 Slope = 0.02250 s(percent)= 2.25
 $TC = k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$
 Initial area time of concentration = 6.748 min.
 Rainfall intensity = 2.445(In/Hr) for a 10.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.873
 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 = 0.832 (CFS)
Total initial stream area = 0.390 (Ac.)
 Pervious area fraction = 0.100

++++
 Process from Point/Station 1130.000 to Point/Station 1135.000
 **** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'A'**

The following data inside Main Stream is listed:

In Main Stream number: 2
 Stream flow area = 0.390 (Ac.)
 Runoff from this stream = 0.832 (CFS)
 Time of concentration = 6.75 min.
 Rainfall intensity = 2.445 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
------------	-----------------	----------	----------------------------

1	14.797	24.05	1.295
2	0.832	6.75	2.445

Largest stream flow has longer time of concentration

Qp = 14.797 + sum of
 Qb Ia/Ib
 0.832 * 0.530 = 0.441
 Qp = 15.238

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 14.797 0.832
 Area of streams before confluence:
 17.740 0.390

Results of confluence:
Total flow rate = 15.238 (CFS)
Time of concentration = 24.047 min.

Effective stream area after confluence = 18.130 (Ac.)

++++
Process from Point/Station 2100.000 to Point/Station 2110.000
**** INITIAL AREA EVALUATION **** **DA-B1**

Initial area flow distance = 510.000 (Ft.)
Top (of initial area) elevation = 1588.000 (Ft.)
Bottom (of initial area) elevation = 1576.000 (Ft.)
Difference in elevation = 12.000 (Ft.)
Slope = 0.02353 s(percent) = 2.35
TC = $k(0.710)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 18.196 min.
Rainfall intensity = 1.489 (In/Hr) for a 10.0 year storm
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.642
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 2.112 (CFS)
Total initial stream area = 2.210 (Ac.)
Pervious area fraction = 1.000

++++
Process from Point/Station 2110.000 to Point/Station 2125.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION **** **DA-B2**

Top of natural channel elevation = 1576.000 (Ft.)
End of natural channel elevation = 1557.800 (Ft.)
Length of natural channel = 610.000 (Ft.)
Estimated mean flow rate at midpoint of channel = 3.784 (CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
Velocity (ft/s) = $(7 + 8(q(\text{English Units})^{0.352})(\text{slope}^{0.5}))$
Velocity using mean channel flow = 3.42 (Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
Normal channel slope = 0.0298
Corrected/adjusted channel slope = 0.0298
Travel time = 2.98 min. TC = 21.17 min.

Adding area flow to channel
UNDEVELOPED (fair cover) subarea
Runoff Coefficient = 0.628
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) = 69.00
Pervious area fraction = 1.000; Impervious fraction = 0.000
Rainfall intensity = 1.380 (In/Hr) for a 10.0 year storm

Subarea runoff = 3.032 (CFS) for 3.500 (Ac.)
 Total runoff = 5.145 (CFS) Total area = 5.710 (Ac.)

Process from Point/Station 2110.000 to Point/Station 2125.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 5.710 (Ac.)
 Runoff from this stream = 5.145 (CFS)
 Time of concentration = 21.17 min.
 Rainfall intensity = 1.380 (In/Hr)

Process from Point/Station 2120.000 to Point/Station 2125.000
 **** INITIAL AREA EVALUATION **** **DA-B3**

Initial area flow distance = 150.000 (Ft.)
 Top (of initial area) elevation = 1558.800 (Ft.)
 Bottom (of initial area) elevation = 1557.800 (Ft.)
 Difference in elevation = 1.000 (Ft.)
 Slope = 0.00667 s(percent) = 0.67
 $TC = k(0.300) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 6.064 min.
 Rainfall intensity = 2.579 (In/Hr) for a 10.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.874
 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 = 0.518 (CFS)
Total initial stream area = 0.230 (Ac.)
 Pervious area fraction = 0.100

Process from Point/Station 2120.000 to Point/Station 2125.000
 **** CONFLUENCE OF MINOR STREAMS **** **Total Flow to Inlet 2**

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.230 (Ac.)
 Runoff from this stream = 0.518 (CFS)
 Time of concentration = 6.06 min.
 Rainfall intensity = 2.579 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.145	21.17	1.380
2	0.518	6.06	2.579

Largest stream flow has longer time of concentration
 $Q_p = 5.145 + \text{sum of } Q_b \text{ Ia/Ib}$

Qp = 0.518 * 0.535 = 0.277
5.422

Total of 2 streams to confluence:
Flow rates before confluence point:
5.145 0.518
Area of streams before confluence:
5.710 0.230

Results of confluence:
Total flow rate = 5.422 (CFS)
Time of concentration = 21.171 min.
Effective stream area after confluence = 5.940 (Ac.)

++++
Process from Point/Station 2120.000 to Point/Station 2125.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 5.940 (Ac.)
Runoff from this stream = 5.422 (CFS)
Time of concentration = 21.17 min.
Rainfall intensity = 1.380 (In/Hr)
Program is now starting with Main Stream No. 2

++++
Process from Point/Station 2120.000 to Point/Station 2130.000
**** INITIAL AREA EVALUATION **** **DA-B4 Flow to Catch Basin 2**

Initial area flow distance = 150.000 (Ft.)
Top (of initial area) elevation = 1558.800 (Ft.)
Bottom (of initial area) elevation = 1557.800 (Ft.)
Difference in elevation = 1.000 (Ft.)
Slope = 0.00667 s(percent) = 0.67
TC = k(0.300)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.064 min.
Rainfall intensity = 2.579 (In/Hr) for a 10.0 year storm
COMMERCIAL subarea type
Runoff Coefficient = 0.874
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 = 0.428 (CFS)
Total initial stream area = 0.190 (Ac.)
Pervious area fraction = 0.100

++++
Process from Point/Station 2120.000 to Point/Station 2130.000
**** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'B'**

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area = 0.190 (Ac.)

Runoff from this stream = 0.428 (CFS)
 Time of concentration = 6.06 min.
 Rainfall intensity = 2.579 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	5.422	21.17	1.380
2	0.428	6.06	2.579

Largest stream flow has longer time of concentration

Qp = 5.422 + sum of
 Qb Ia/Ib
 0.428 * 0.535 = 0.229
 Qp = 5.651

Total of 2 main streams to confluence:
 Flow rates before confluence point:
 5.422 0.428
 Area of streams before confluence:
 5.940 0.190

Results of confluence:
Total flow rate = 5.651 (CFS)
Time of concentration = 21.171 min.
Effective stream area after confluence = 6.130 (Ac.)

++++
 Process from Point/Station 3100.000 to Point/Station 3115.000
 **** INITIAL AREA EVALUATION **** **DA-C1**

Initial area flow distance = 875.000 (Ft.)
 Top (of initial area) elevation = 1585.500 (Ft.)
 Bottom (of initial area) elevation = 1557.800 (Ft.)
 Difference in elevation = 27.700 (Ft.)
 Slope = 0.03166 s(percent) = 3.17
 TC = k(0.710)*[(length^3)/(elevation change)]^0.2
 Initial area time of concentration = 21.280 min.
 Rainfall intensity = 1.377 (In/Hr) for a 10.0 year storm
 UNDEVELOPED (fair cover) subarea
 Runoff Coefficient = 0.627
 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) = 69.00
 Pervious area fraction = 1.000; Impervious fraction = 0.000
Initial subarea runoff = 6.563 (CFS)
Total initial stream area = 7.600 (Ac.)
 Pervious area fraction = 1.000

++++
 Process from Point/Station 3100.000 to Point/Station 3115.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
 Stream flow area = 7.600 (Ac.)
 Runoff from this stream = 6.563 (CFS)
 Time of concentration = 21.28 min.
 Rainfall intensity = 1.377 (In/Hr)

++++
 Process from Point/Station 3110.000 to Point/Station 3115.000
 **** INITIAL AREA EVALUATION **** **DA-C2**

Initial area flow distance = 325.000 (Ft.)
 Top (of initial area) elevation = 1561.500 (Ft.)
 Bottom (of initial area) elevation = 1557.800 (Ft.)
 Difference in elevation = 3.700 (Ft.)
 Slope = 0.01138 s(percent) = 1.14
 $TC = k(0.300) * [(length^3) / (elevation\ change)]^{0.2}$
 Initial area time of concentration = 7.424 min.
 Rainfall intensity = 2.331 (In/Hr) for a 10.0 year storm
 COMMERCIAL subarea type
 Runoff Coefficient = 0.872
 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 = 0.793 (CFS)
Total initial stream area = 0.390 (Ac.)
 Pervious area fraction = 0.100

++++
 Process from Point/Station 3110.000 to Point/Station 3115.000
 **** CONFLUENCE OF MINOR STREAMS **** **Flow to Inlet 3**

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 0.390 (Ac.)
 Runoff from this stream = 0.793 (CFS)
 Time of concentration = 7.42 min.
 Rainfall intensity = 2.331 (In/Hr)
 Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	6.563	21.28	1.377
2	0.793	7.42	2.331

Largest stream flow has longer time of concentration
 $Q_p = 6.563 + \text{sum of } Q_b \cdot I_a/I_b$
 $0.793 * 0.591 = 0.468$
 $Q_p = 7.031$

Total of 2 streams to confluence:
 Flow rates before confluence point:
 6.563 0.793

Area of streams before confluence:

7.600 0.390

Results of confluence:

Total flow rate = 7.031(CFS)

Time of concentration = 21.280 min.

Effective stream area after confluence = 7.990(Ac.)

++++
Process from Point/Station 3110.000 to Point/Station 3115.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:

In Main Stream number: 1

Stream flow area = 7.990(Ac.)

Runoff from this stream = 7.031(CFS)

Time of concentration = 21.28 min.

Rainfall intensity = 1.377(In/Hr)

Program is now starting with Main Stream No. 2

++++
Process from Point/Station 3110.000 to Point/Station 3120.000
**** INITIAL AREA EVALUATION **** **DA-C3 Flow to Catch Basin 3**

Initial area flow distance = 325.000(Ft.)

Top (of initial area) elevation = 1561.500(Ft.)

Bottom (of initial area) elevation = 1557.800(Ft.)

Difference in elevation = 3.700(Ft.)

Slope = 0.01138 s(percent)= 1.14

TC = $k(0.300)*[(length^3)/(elevation\ change)]^{0.2}$

Initial area time of concentration = 7.424 min.

Rainfall intensity = 2.331(In/Hr) for a 10.0 year storm

COMMERCIAL subarea type

Runoff Coefficient = 0.872

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 = 0.651(CFS)

Total initial stream area = 0.320(Ac.)

Pervious area fraction = 0.100

++++
Process from Point/Station 3110.000 to Point/Station 3120.000
**** CONFLUENCE OF MAIN STREAMS **** **Total Flow Drainage Area 'C'**

The following data inside Main Stream is listed:

In Main Stream number: 2

Stream flow area = 0.320(Ac.)

Runoff from this stream = 0.651(CFS)

Time of concentration = 7.42 min.

Rainfall intensity = 2.331(In/Hr)

Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)

1	7.031	21.28	1.377
2	0.651	7.42	2.331

Largest stream flow has longer time of concentration

Qp = 7.031 + sum of

	Qb	Ia/Ib	
	0.651 *	0.591	= 0.384

Qp = 7.415

Total of 2 main streams to confluence:
Flow rates before confluence point:

7.031	0.651
-------	-------

Area of streams before confluence:

7.990	0.320
-------	-------

Results of confluence:

Total flow rate = 7.415 (CFS)

Time of concentration = 21.280 min.

Effective stream area after confluence = 8.310 (Ac.)

End of computations, total study area = 32.57 (Ac.)

The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction (Ap) = 0.944

Area averaged RI index number = 68.2

**MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
PROPOSED CONDITIONS (ON-SITE) LAND USE**

MSA Job Number

1968

Drainage Subarea	Impervious (acres)	Area Pervious (acres)	Total (acres)	Percent Impervious
A	0.56	0.39	0.95	59%
B	0.32	0.03	0.35	91%
C	0.37	0.13	0.50	74%
D	1.86	0.20	2.06	90%
E	0.23	0.10	0.33	70%
F	0.31	0.14	0.45	69%
G	0.83	0.23	1.06	78%
H	0.26	0.10	0.36	72%
I	0.22	0.21	0.43	51%
J	0.50	0.39	0.89	56%
K	0.26	0.16	0.42	62%
L	0.27	0.10	0.37	73%
M	0.94	0.36	1.30	72%
N	0.20	0.06	0.26	77%
O	0.84	0.48	1.32	64%
P	0.63	0.15	0.78	81%
Q	0.55	0.10	0.65	85%
R	0.26	0.08	0.34	76%
S	0.18	0.04	0.22	82%
T	0.26	0.04	0.30	87%
U	0.70	0.07	0.77	91%
V	2.61	0.36	2.97	88%
W	0.13	0.05	0.18	72%
X	0.47	0.42	0.89	53%
Y	0.20	0.00	0.20	100%
Totals	13.96	4.39	18.35	76%

Buildings	4.32 ac
Pavement/Hardscape	9.64 ac
Landscape	4.39 ac
Total Area	18.35 ac

**MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
PROPOSED CONDITIONS (ON-SITE) RATIONAL METHOD**

100 Year Storm Event

MSA Job Number

1968

Intensity (100 Yr)

4.16 in/hr Plate D-4.1(6)

Runoff Index

56 Plate D-5.5(1)

Drainage Subarea	Area (acres)	PERCENT IMPERVIOUS	C Plate D-5.7	Q ₁₀₀ (cfs)
A	0.95	59%	0.83	3.31
B	0.35	91%	0.88	1.29
C	0.50	74%	0.85	1.78
D	2.06	90%	0.88	7.60
E	0.33	70%	0.84	1.16
F	0.45	69%	0.84	1.59
G	1.06	78%	0.86	3.84
H	0.36	72%	0.85	1.28
I	0.43	51%	0.82	1.48
J	0.89	56%	0.83	3.10
K	0.42	62%	0.83	1.46
L	0.37	73%	0.85	1.32
M	1.30	72%	0.85	4.63
N	0.26	77%	0.86	0.94
O	1.32	64%	0.83	4.59
P	0.78	81%	0.87	2.85
Q	0.65	85%	0.87	2.37
R	0.34	76%	0.86	1.23
S	0.22	82%	0.87	0.80
T	0.30	87%	0.88	1.11
U	0.77	91%	0.89	2.87
V	2.97	88%	0.88	10.96
W	0.18	72%	0.85	0.64
X	0.89	53%	0.82	3.06
Y	0.20	100%	0.90	0.75
Totals	18.35			65.26

**MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
PROPOSED CONDITIONS (ON-SITE) RATIONAL METHOD**

10 Year Storm Event

MSA Job Number

1968

Intensity (10 Yr)

2.84 in/hr Plate D-4.1(6)

Runoff Index

56 Plate D-5.5(1)

Drainage Subarea	Area (acres)	IMPERVIOUS PERCENT	C Plate D-5.7	Q ₁₀ (cfs)
A	0.95	59%	0.81	2.20
B	0.35	91%	0.88	0.88
C	0.50	74%	0.85	1.22
D	2.06	90%	0.88	5.19
E	0.33	70%	0.83	0.78
F	0.45	69%	0.83	1.07
G	1.06	78%	0.85	2.58
H	0.36	72%	0.84	0.87
I	0.43	51%	0.78	0.96
J	0.89	56%	0.80	2.04
K	0.42	62%	0.82	0.99
L	0.37	73%	0.84	0.89
M	1.30	72%	0.84	3.13
N	0.26	77%	0.85	0.63
O	1.32	64%	0.82	3.10
P	0.78	81%	0.86	1.92
Q	0.65	85%	0.87	1.62
R	0.34	76%	0.85	0.83
S	0.22	82%	0.87	0.55
T	0.30	87%	0.88	0.76
U	0.77	91%	0.88	1.94
V	2.97	88%	0.88	7.48
W	0.18	72%	0.84	0.43
X	0.89	53%	0.80	2.04
Y	0.20	100%	0.90	0.52
Totals	18.35			44.08

Appendix F
Santa Ana Watershed Water Quality Management Plan Exhibit
C – Volume Based Calculations

MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE DESIGN STORAGE VOLUME SUMMARY

Required Volumes Obtained from Santa Ana Watershed worksheets

Drainage Sub-Areas Tributary to Underground Storage

Drainage Sub-Area	Area (acres)	Volume Required (cu-ft)
C	0.50	1,245
E	0.33	397
G	1.06	1,486
M	1.30	1,336
O	1.32	1,416
P	0.78	1,160
Q	0.65	1,046
R	0.34	459
S	0.22	334
T	0.30	502
U	0.77	1,396
W	0.18	225
TOTAL	7.75	11,002

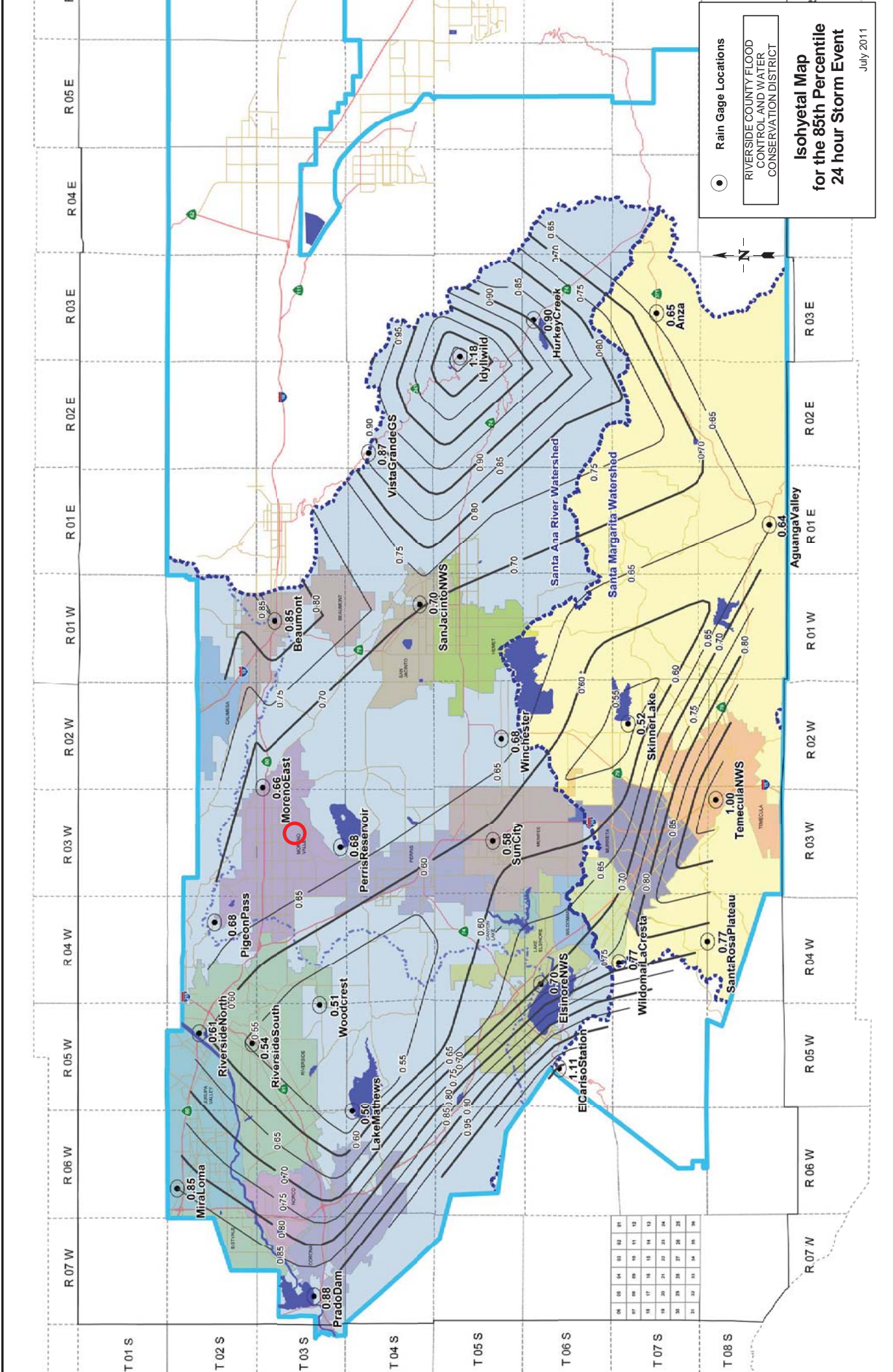
Drainage Sub-Areas Tributary to Pervious Pavement

Drainage Sub-Area	Area (acres)	Volume Required (cu-ft)
D	2.06	3,659
V	2.97	5,070
TOTAL	5.03	8,729

Drainage Sub-Areas Tributary to Basins

Drainage Sub-Area	Area (acres)	Volume Required (cu-ft)
A	0.95	928
B	0.35	635
F	0.45	531
H	0.36	450
I	0.43	362
J	0.89	822
K	0.42	436
L	0.37	471
N	0.26	358
X	0.89	777
y	0.20	185
TOTAL	5.57	5,955

Total **18.35** **25,686**



Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

06	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

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 **MSA Consulting, Inc.**

Date **9/15/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-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

$D_{85} =$ **0.67** 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)
A	41382	Mixed Surface Types	0.59	0.40	16609			
	41382		Total		16609	0.67	927.3	950

Notes:

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 **MSA Consulting, Inc.**

Date **9/15/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-B**

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

$D_{85} =$ **0.67** 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)
<i>B</i>	<i>15246</i>	<i>Mixed Surface Types</i>	<i>0.91</i>	<i>0.74</i>	<i>11358.1</i>			
	15246		Total		11358.1	0.67	634.2	650

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-C**

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

$D_{85} =$ **0.67** 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)
C	41780	Mixed Surface Types	0.74	0.53	22281.9			
	41780		Total		22281.9	0.67	1244.1	1,250

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-D**

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

$D_{85} =$ **0.67** 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)
<i>D</i>	89733	Mixed Surface Types	0.9	0.73	65530.4			
	89733		Total		65530.4	0.67	3658.8	3,700

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-E**

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

$D_{85} =$ **0.67** 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)
<i>E</i>	<i>14374</i>	<i>Mixed Surface Types</i>	<i>0.7</i>	<i>0.49</i>	<i>7099.2</i>			
	14374	Total			7099.2	0.67	396.4	400

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-F**

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

$D_{85} =$ **0.67** 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)
<i>F</i>	<i>19602</i>	<i>Mixed Surface Types</i>	<i>0.69</i>	<i>0.48</i>	<i>9498.4</i>			
	19602	Total			9498.4	0.67	530.3	550

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-G**

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} = **0.67** 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)
G	46173	Mixed Surface Types	0.78	0.58	26611.1			
	46173		Total		26611.1	0.67	1485.8	1,500

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-H**

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

$D_{85} =$ **0.67** 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)
<i>H</i>	<i>15681</i>	<i>Mixed Surface Types</i>	<i>0.72</i>	<i>0.51</i>	<i>8047.1</i>			
	15681		Total		8047.1	0.67	449.3	460

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-I**

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} = **0.67** 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)
<i>I</i>	<i>18730</i>	<i>Mixed Surface Types</i>	<i>0.51</i>	<i>0.35</i>	<i>6474.5</i>			
	18730		Total		6474.5	0.67	361.5	370

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-J**

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

$D_{85} =$ **0.67** 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)
<i>J</i>	<i>38768</i>	<i>Mixed Surface Types</i>	<i>0.56</i>	<i>0.38</i>	<i>14712.9</i>			
	38768		Total		14712.9	0.67	821.5	830

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-K**

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

$D_{85} =$ **0.67** 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)
K	18295	Mixed Surface Types	0.62	0.42	7766.8			
	18295		Total		7766.8	0.67	433.6	440

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Moreno Valley Medical Center

BMP Identification

BMP NAME / ID **DA-L**

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} = **0.67** 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)
L	16117	Mixed Surface Types	0.73	0.52	8431.4			
	16117		Total		8431.4	0.67	470.8	480

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-M**

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

$D_{85} =$ **0.67** 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)
M	46628	Mixed Surface Types	0.72	0.51	23928.3			
	46628		Total		23928.3	0.67	1336	1,350

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-N**

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

$D_{85} =$ **0.67** 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)
<i>N</i>	<i>11325</i>	<i>Mixed Surface Types</i>	<i>0.77</i>	<i>0.57</i>	<i>6401.2</i>			
	11325		Total		6401.2	0.67	357.4	370

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-O**

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

$D_{85} =$ **0.67** 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)
<i>O</i>	<i>57499</i>	<i>Mixed Surface Types</i>	<i>0.64</i>	<i>0.44</i>	<i>25345.1</i>			
	57499		Total		25345.1	0.67	1415.1	1,430

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-P**

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

$D_{85} =$ **0.67** 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)
<i>P</i>	33976	<i>Mixed Surface Types</i>	<i>0.81</i>	<i>0.61</i>	<i>20764.7</i>			
	33976		Total		20764.7	0.67	1159.4	1,170

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-Q**

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

$D_{85} =$ **0.67** 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)
Q	28314	Mixed Surface Types	0.85	0.66	18723.2			
	28314		Total		18723.2	0.67	1045.4	1,060

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Moreno Valley Medical Center

BMP Identification

BMP NAME / ID **DA-R**

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

$D_{85} =$ **0.67** 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)
R	14810	Mixed Surface Types	0.76	0.55	8210			
	14810		Total		8210	0.67	458.4	470

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2006**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-S**

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

$D_{85} =$ **0.67** 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)
S	9583	Mixed Surface Types	0.82	0.62	5972.9			
	9583		Total		5972.9	0.67	333.5	340

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-U**

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

$D_{85} =$ **0.67** 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)
<i>U</i>	33541	Mixed Surface Types	0.91	0.74	24987.6			
	33541		Total		24987.6	0.67	1395.1	1,400

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-V**

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

$D_{85} =$ **0.67** 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)
V	129373	Mixed Surface Types	0.88	0.70	90792.8			
	129373		Total		90792.8	0.67	5069.3	5,100

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-W**

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} = **0.67** 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)
W	7840	Mixed Surface Types	0.72	0.51	4023.3			
	7840		Total		4023.3	0.67	224.6	230

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-X**

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

$D_{85} =$ **0.67** 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)
X	38768	Mixed Surface Types	0.53	0.36	13912.1			
	38768		Total		13912.1	0.67	776.8	790

Notes:

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 **MSA Consulting, Inc.**

Date **9/16/2016**

Designed by **JSA/JH**

Case No

Company Project Number/Name

1968 - Majestic Moreno Medical Plaza and Village

BMP Identification

BMP NAME / ID **DA-Y**

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

$D_{85} =$ **0.67** 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)
Y	3712	Concrete or Asphalt	1	0.89	3311.1			
	3712		Total		3311.1	0.67	184.9	190

Notes:

JOB NAME: MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
 JOB #: 1968
 DATE: September 17, 2016
 BASIN CHARACTERISTICS

BASIN STORAGE VOLUMES BASED ON THE CONIC METHOD

WHERE:
$$V = \frac{1}{3}(E_1 - E_2)(A_1 + A_2 + \sqrt{A_1 A_2})$$

DRAINAGE AREA 'F'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		2,015	0	0	0.00
1	1	1	1,015	3,030	2,505	2,505	0.06

DRAINAGE AREA 'H'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		3,210	0	0	0.00
1	1	1	1,250	4,460	3,818	3,818	0.09

DRAINAGE AREA 'K'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		3,215	0	0	0.00
1	1	1	1,205	4,420	3,802	3,802	0.09

DRAINAGE AREA 'L'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		3,245	0	0	0.00
1	1	1	1,255	4,500	3,855	3,855	0.09

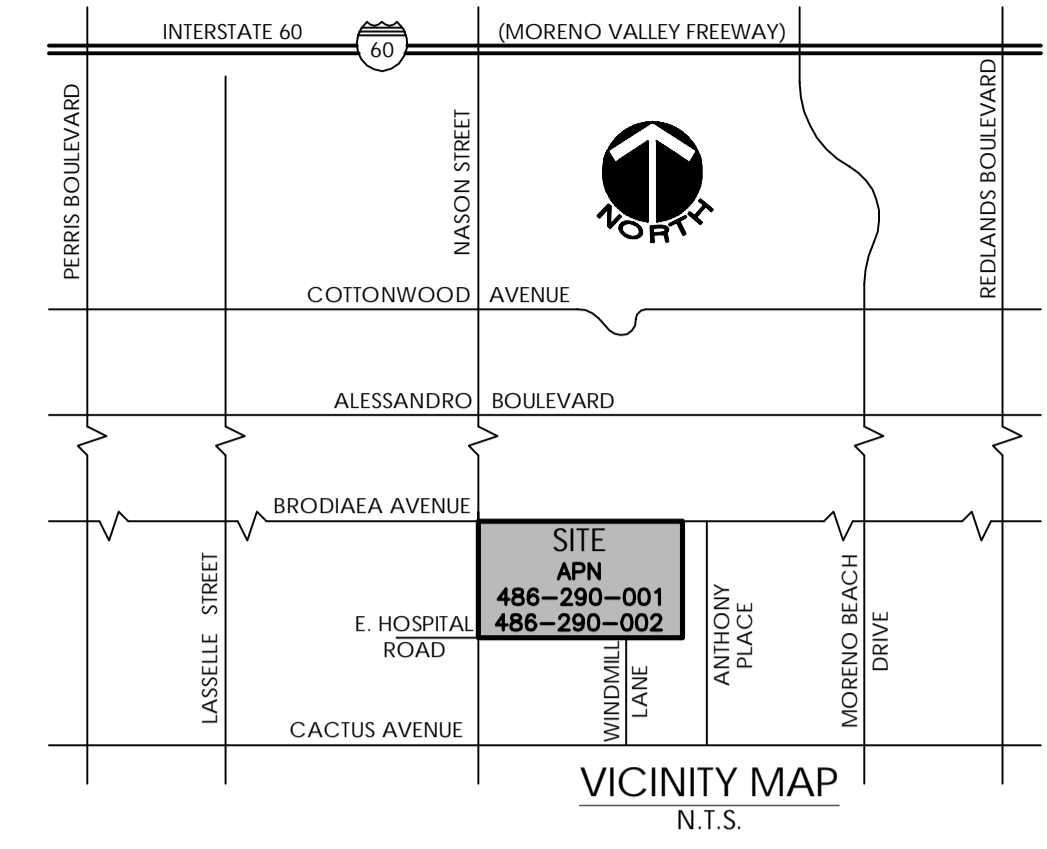
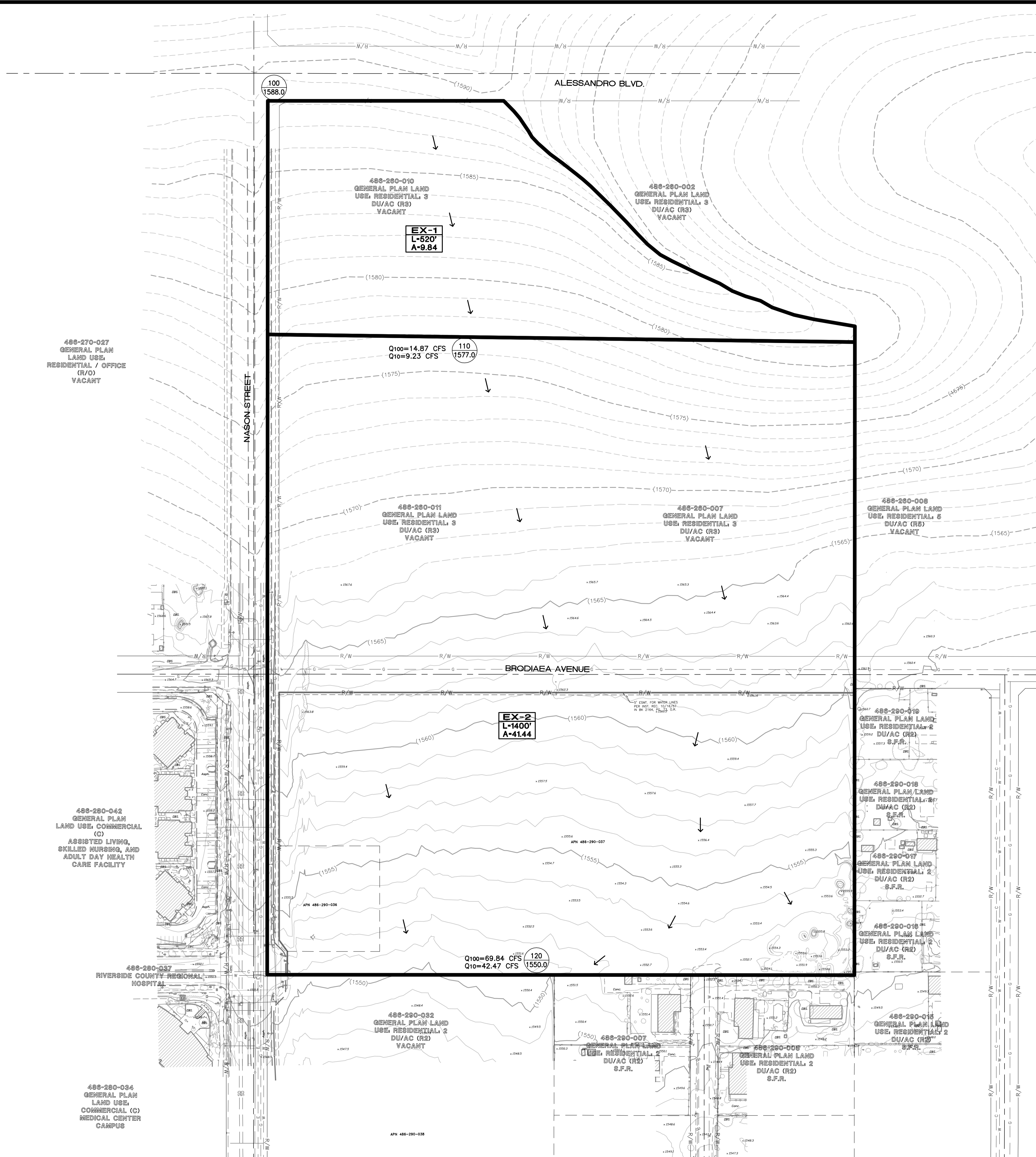
DRAINAGE AREA 'N'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		1,390	0	0	0.00
1	1	1	1,125	2,515	1,925	1,925	0.04

DRAINAGE AREA 'G','I' & 'J'

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	TOTAL (acre-ft)
0	0	0		2,838	0	0	0.00
1	1	1	10,585	13,423	7,478	7,478	0.17

Appendix G
Hydrology Exhibits
Preliminary Grading Exhibit



- LEGEND**
- DRAINAGE FLOW
 - TRIBUTARY AREA BOUNDARY
 - DRAINAGE SUB-AREA ID
FLOW TRAVEL LENGTH (FT)
AREA (AC)
 - NODE & ELEVATION

488-270-027
GENERAL PLAN
LAND USE
RESIDENTIAL / OFFICE
(R/O)
VACANT

488-280-062
GENERAL PLAN
LAND USE, COMMERCIAL
(C)
ASSISTED LIVING,
SKILLED NURSING, AND
ADULT DAY HEALTH
CARE FACILITY

488-280-037
RIVERSIDE COUNTY REGIONAL
HOSPITAL

488-280-036
GENERAL PLAN
LAND USE
COMMERCIAL (C)
MEDICAL CENTER
CAMPUS

488-280-010
GENERAL PLAN LAND
USE, RESIDENTIAL 3
DU/AC (R3)
VACANT

EX-1
L-620
A-9.84

488-280-002
GENERAL PLAN LAND
USE, RESIDENTIAL 3
DU/AC (R3)
VACANT

Q100=14.87 CFS
Q10=9.23 CFS

110
1577.0

488-280-011
GENERAL PLAN LAND
USE, RESIDENTIAL 3
DU/AC (R3)
VACANT

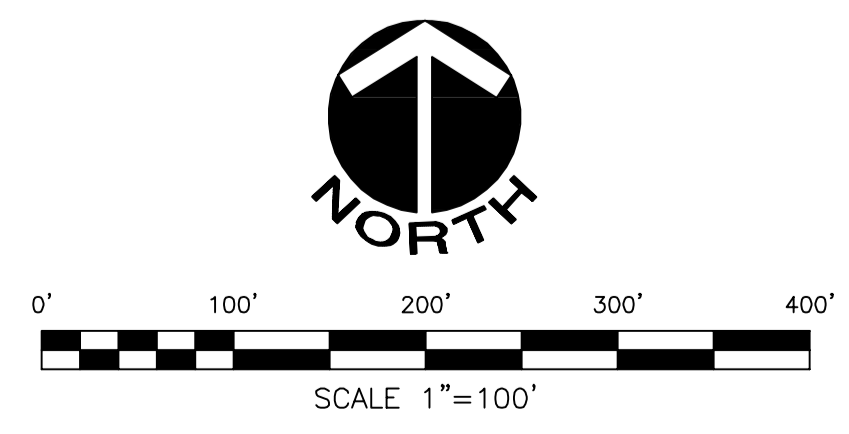
488-280-007
GENERAL PLAN LAND
USE, RESIDENTIAL 3
DU/AC (R3)
VACANT

488-280-008
GENERAL PLAN LAND
USE, RESIDENTIAL 3
DU/AC (R3)
VACANT

EX-2
L-1400
A-41.44

Q100=69.84 CFS
Q10=42.47 CFS

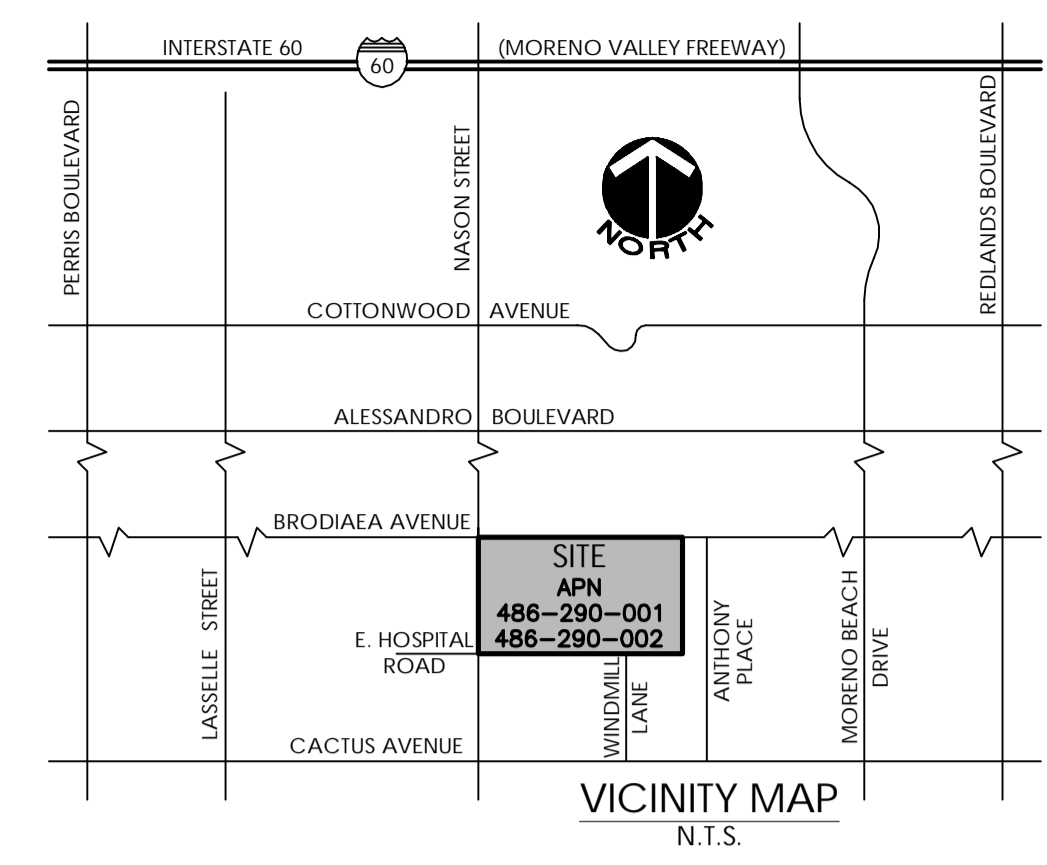
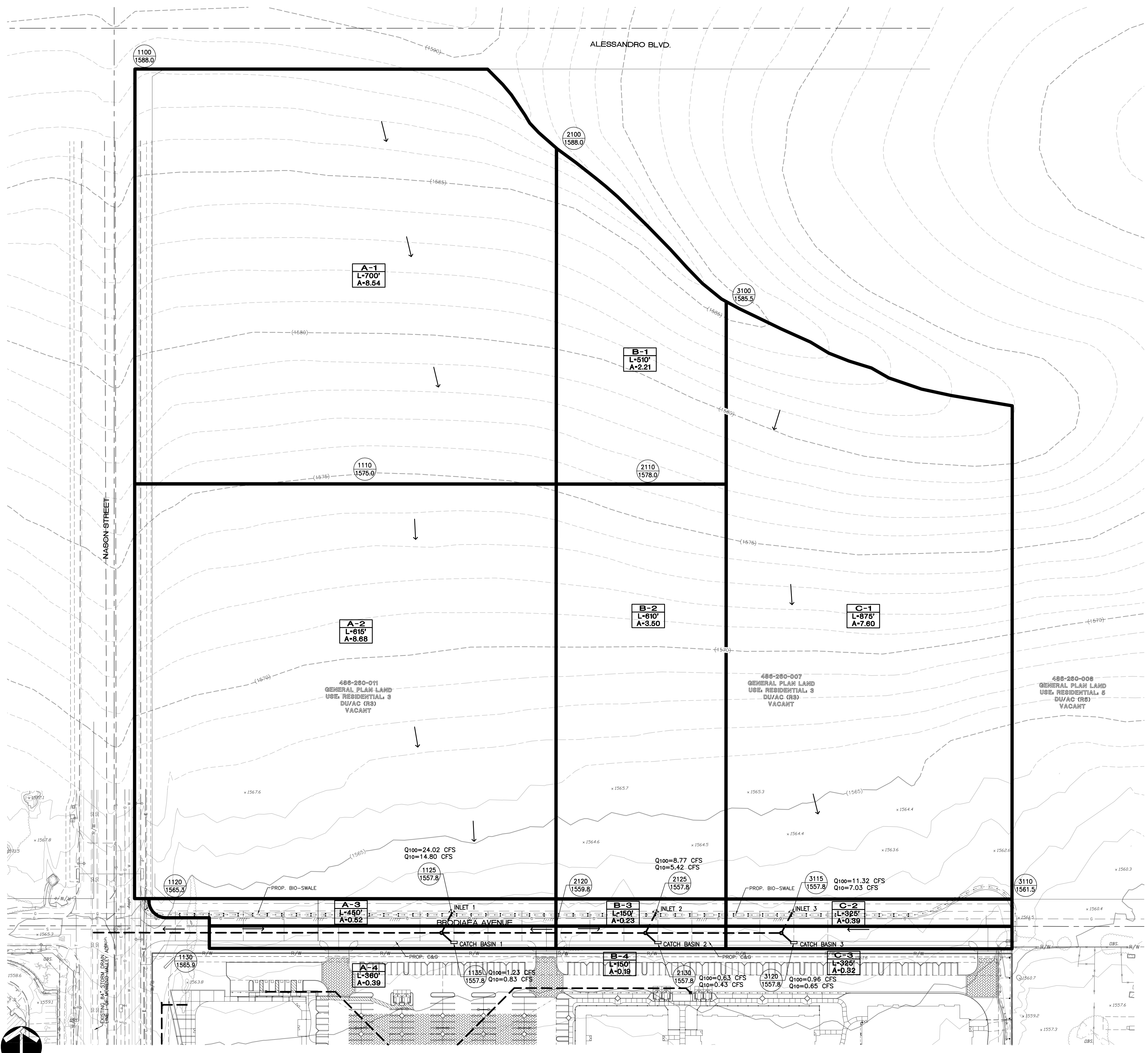
120
1550.0



MSA CONSULTING, INC.
PLANNING ■ CIVIL ENGINEERING ■ LAND SURVEYING
34200 BOB HOPE DRIVE ■ RANCHO MIRAGE ■ CA 92270
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SEPTEMBER 2016
CITY OF MORENO VALLEY, CALIFORNIA
MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
CITY CASE NUMBER PA09-0033
EXISTING CONDITIONS HYDROLOGY EXHIBIT

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LEGEND

DRAINAGE FLOW →
 TRIBUTARY AREA BOUNDARY ———
 DRAINAGE SUB-AREA ID
 FLOW TRAVEL LENGTH (FT)
 AREA (AC)

A
L-123
A-4.5

NODE & ELEVATION
 EXISTING RIGHT-OF-WAY ———
 EXISTING CENTERLINE ———

100 YEAR STORM EVENT SUMMARY

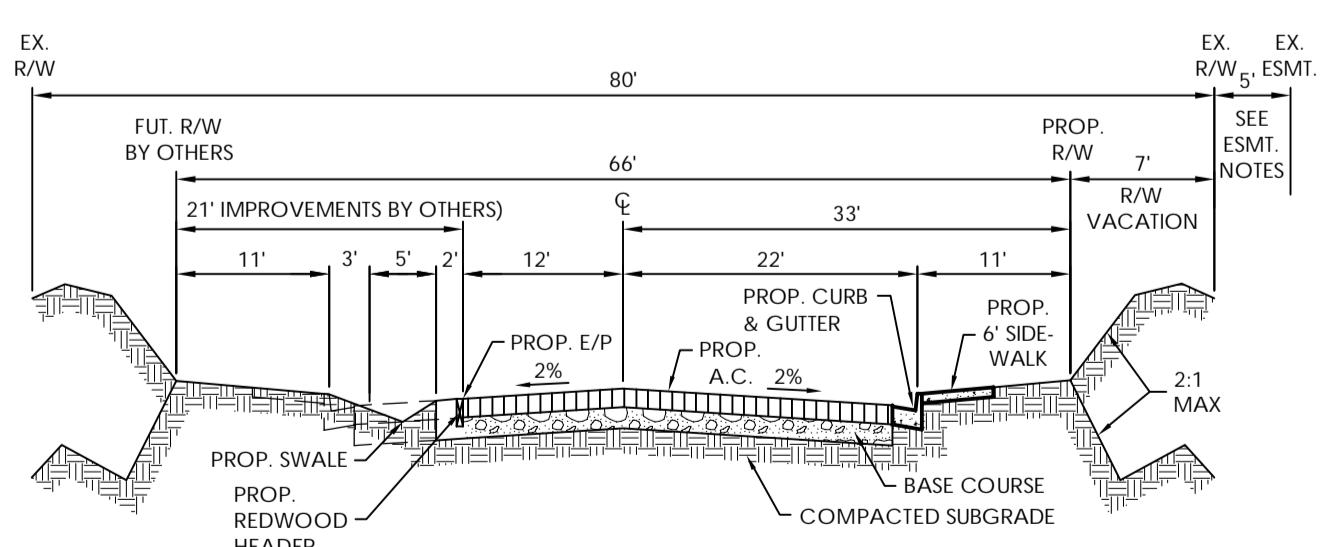
DRAINAGE AREA	Q100 (CFS)	Tc (MIN)	I (N/HR)	AREA (ACRES)
DA-A1	11.81	21.65	2.00	8.54
DA-A2	11.34	23.76	1.91	8.68
SUB AREA ADDITION	23.15			17.22
DA-A3	1.52	7.84	3.32	0.52
CONFLUENCE: FLOW TO INLET 1	24.02	23.76	1.91	17.74
DA-A4: FLOW TO CB-1	1.23	6.75	3.58	0.39
TOTAL FLOW DRAINAGE AREA 'A'	24.67	23.76	2.18	18.13
DA-B1	3.40	18.20	1.91	2.21
DA-B2	4.95	20.86	2.04	3.50
SUB AREA ADDITION	8.35			5.71
DA-B3	0.76	6.06	3.78	0.23
CONFLUENCE: FLOW TO INLET 2	8.77	20.86	2.04	5.94
DA-B4: FLOW TO CB-2	0.63	6.06	3.78	0.19
TOTAL FLOW DRAINAGE AREA 'B'	9.11	20.86	2.04	6.13
DA-C1	10.62	21.28	2.02	7.60
DA-C2	1.17	7.42	3.41	0.39
CONFLUENCE: FLOW TO INLET 3	11.32	21.28	2.02	7.99
DA-C3: FLOW TO CB-3	0.96	7.42	3.41	0.32
TOTAL FLOW DRAINAGE AREA 'C'	11.88	21.28	2.02	8.31

TOTAL STUDY AREA = 32.57 ACRES
 AREA AVERAGED PERVIOUS AREA FRACTION (Ap) = 0.94
 AREA AVERAGED RI INDEX NUMBER = 68.2

10 YEAR STORM EVENT SUMMARY

DRAINAGE AREA	Q10 (CFS)	Tc (MIN)	I (N/HR)	AREA (ACRES)
DA-A1	7.29	21.65	1.36	8.54
DA-A2	6.92	24.05	1.30	8.68
SUB AREA ADDITION	14.21			17.22
DA-A3	1.03	7.84	2.27	0.52
CONFLUENCE: FLOW TO INLET 1	14.80	24.05	1.03	17.74
DA-A4: FLOW TO CB-1	0.83	6.75	2.44	0.39
TOTAL FLOW DRAINAGE AREA 'A'	15.24	24.05	1.30	18.13
DA-B1	2.11	18.20	1.49	2.21
DA-B2	3.03	21.17	1.38	3.50
SUB AREA ADDITION	5.14			5.71
DA-B3	0.52	6.06	2.58	0.23
CONFLUENCE: FLOW TO INLET 2	5.42	21.17	1.38	5.94
DA-B4: FLOW TO CB-2	0.43	6.06	2.58	0.19
TOTAL FLOW DRAINAGE AREA 'B'	5.85	21.17	1.38	6.13
DA-C1	6.56	21.28	1.38	7.60
DA-C2	0.79	7.42	2.33	0.39
CONFLUENCE: FLOW TO INLET 3	7.03	21.28	1.38	7.99
DA-C3: FLOW TO CB-3	0.65	7.42	2.33	0.32
TOTAL FLOW DRAINAGE AREA 'C'	7.42	21.28	1.38	8.31

TOTAL STUDY AREA = 32.57 ACRES
 AREA AVERAGED PERVIOUS AREA FRACTION (Ap) = 0.94
 AREA AVERAGED RI INDEX NUMBER = 68.2



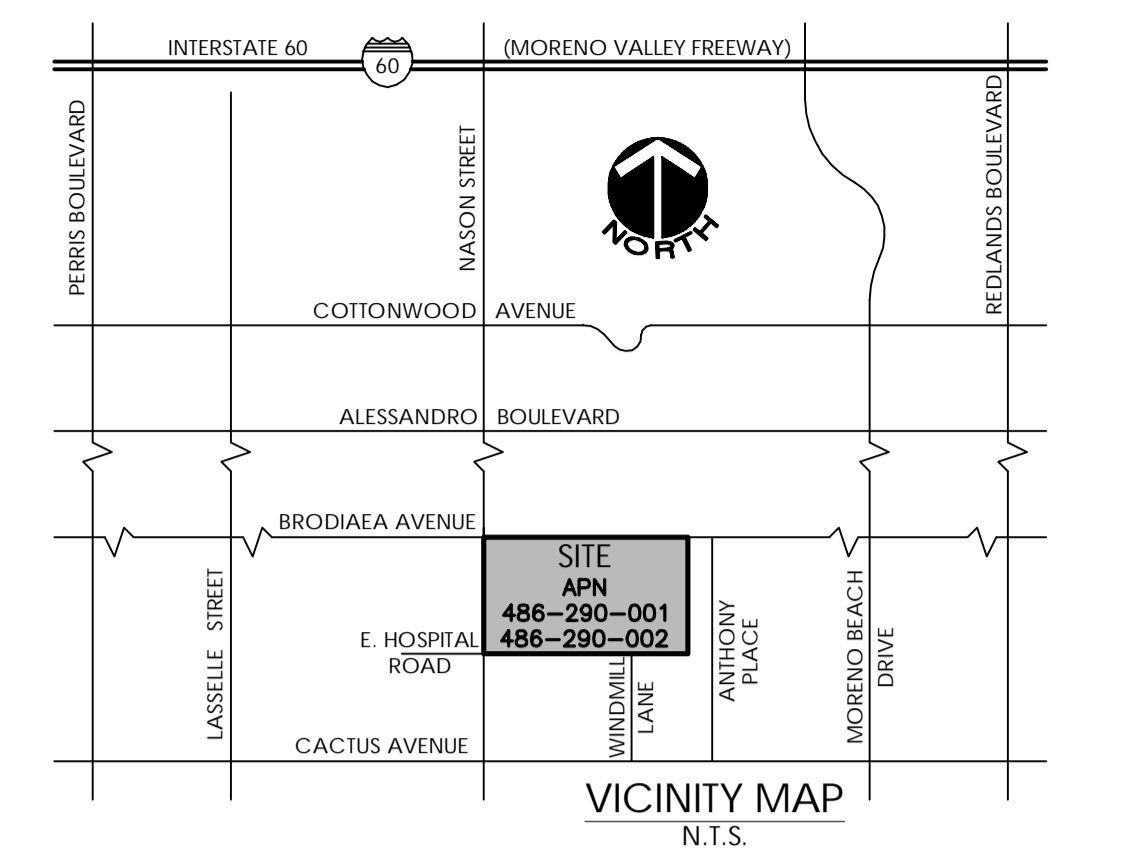
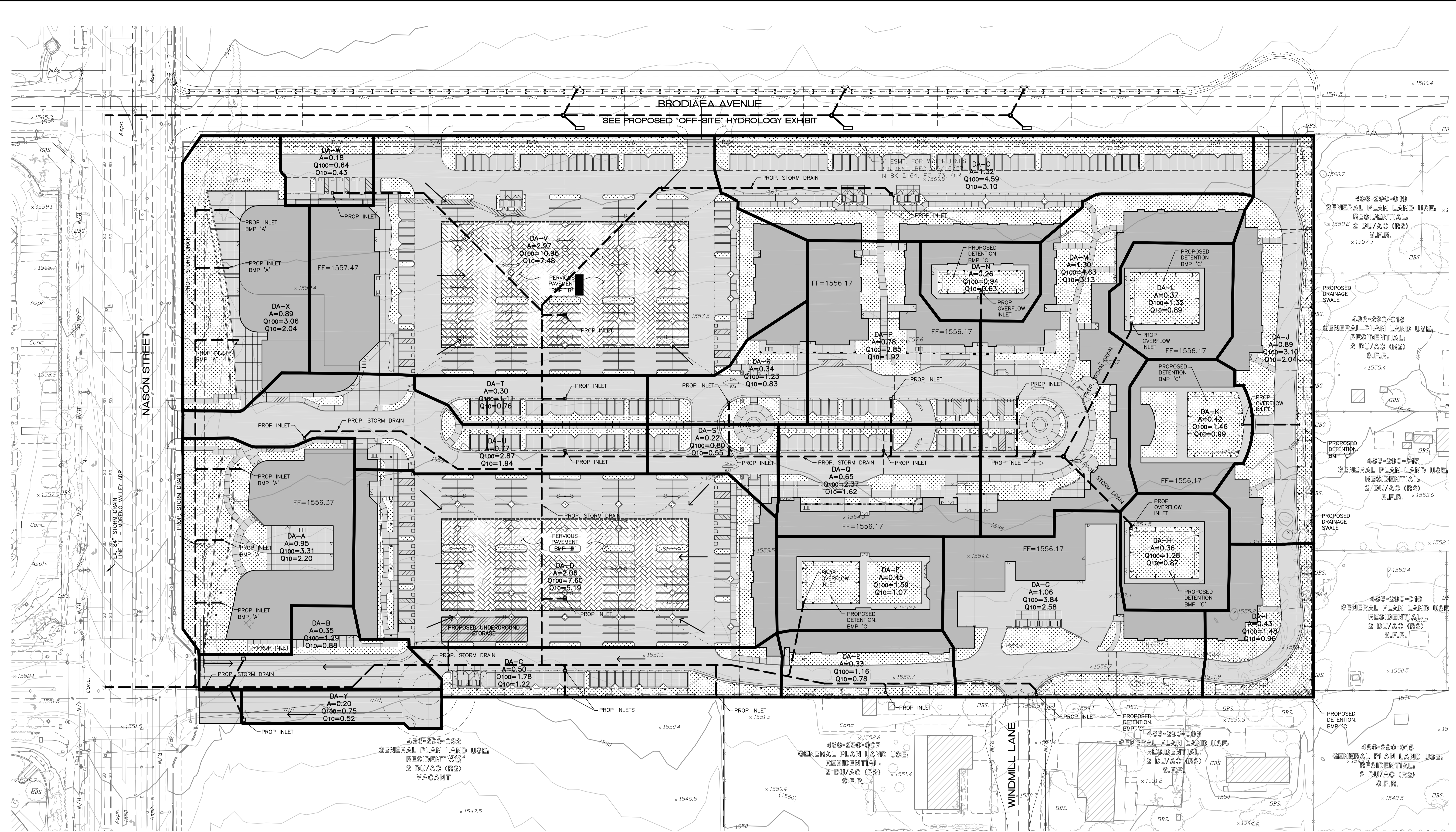
BRODIAEA AVENUE COLLECTOR, STD. NO. 107
N.T.S.



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SEPTEMBER 2016
 CITY OF MORENO VALLEY, CALIFORNIA
 MAJESTIC MORENO MEDICAL PLAZA AND VILLAGE
 CITY CASE NUMBER PA09-0033
 PROPOSED CONDITIONS (OFF-SITE) HYDROLOGY EXHIBIT

E:\198\ACAD\Hydrology\198\JOB\PROP\BRODIAEA OFF-SITE HYDRO EXHIBIT.DWG, 9/20/2016 3:03:36 PM, jiangqin@msa.com



BEST MANAGEMENT PRACTICES FOR TREATMENT CONTROLS

BMP LABEL ON PLAN	CONTROL DESCRIPTION
BMP 'A'	PROP. DRAIN INLET WITH SUBSURFACE STONE-FILLED INFILTRATION BASIN
BMP 'B'	PROP. PERMEABLE PAVEMENT WITH SUBSURFACE STONE-FILLED INFILTRATION BASIN
BMP 'C'	PROP. LANDSCAPED AREA WITH INFILTRATION BASINS AND TRENCHES
BMP 'D'	PROP. UNDERGROUND STORAGE

PROPOSED LAND USE SUMMARY

DRAINAGE SUBAREA	IMPERVIOUS (ACRES)	AREA PERVIOUS (ACRES)	TOTAL (ACRES)	PERCENT IMPERVIOUS
A	0.36	0.39	0.75	48%
B	0.32	0.03	0.35	91%
C	0.37	0.13	0.50	74%
D	1.86	0.20	2.06	90%
E	0.23	0.10	0.33	70%
F	0.31	0.14	0.45	69%
G	0.83	0.23	1.06	78%
H	0.26	0.10	0.36	72%
I	0.23	0.21	0.43	51%
J	0.50	0.39	0.89	56%
K	0.26	0.16	0.42	62%
L	0.84	0.48	1.32	64%
M	0.94	0.36	1.30	72%
N	0.20	0.06	0.26	77%
O	0.64	0.48	1.12	57%
P	0.63	0.15	0.78	81%
Q	0.55	0.10	0.65	85%
R	0.26	0.08	0.34	76%
S	0.18	0.04	0.22	82%
T	0.26	0.04	0.30	87%
U	0.70	0.07	0.77	91%
V	2.61	0.36	2.97	88%
W	0.13	0.05	0.18	72%
X	0.47	0.42	0.89	53%
Y	0.20	0.00	0.20	100%
TOTALS	13.96	4.39	18.35	76%

PROPOSED PEAK FLOW SUMMARY (Q100)

DRAINAGE SUBAREA	AREA (ACRES)	PERCENT IMPERVIOUS	RUNOFF COEFFICIENT	Q100 (CFS)
A	0.95	59%	0.83	3.31
B	0.35	91%	0.88	1.29
C	0.50	74%	0.85	1.78
D	2.06	90%	0.88	7.60
E	0.33	70%	0.84	1.18
F	0.45	69%	0.84	1.59
G	1.06	78%	0.86	3.84
H	0.36	72%	0.85	1.28
I	0.43	51%	0.82	1.48
J	0.89	56%	0.83	3.10
K	0.42	62%	0.83	1.46
L	0.37	73%	0.85	1.32
M	1.30	72%	0.85	4.63
N	0.26	77%	0.86	0.94
O	1.32	64%	0.83	4.59
P	0.78	81%	0.87	2.85
Q	0.65	85%	0.87	2.37
R	0.34	76%	0.86	1.23
S	0.22	82%	0.87	0.80
T	0.30	87%	0.88	1.11
U	0.77	91%	0.89	2.87
V	2.97	88%	0.88	10.36
W	0.18	72%	0.85	0.64
X	0.89	53%	0.82	3.06
Y	0.20	100%	0.90	0.35
TOTALS	18.35			65.26

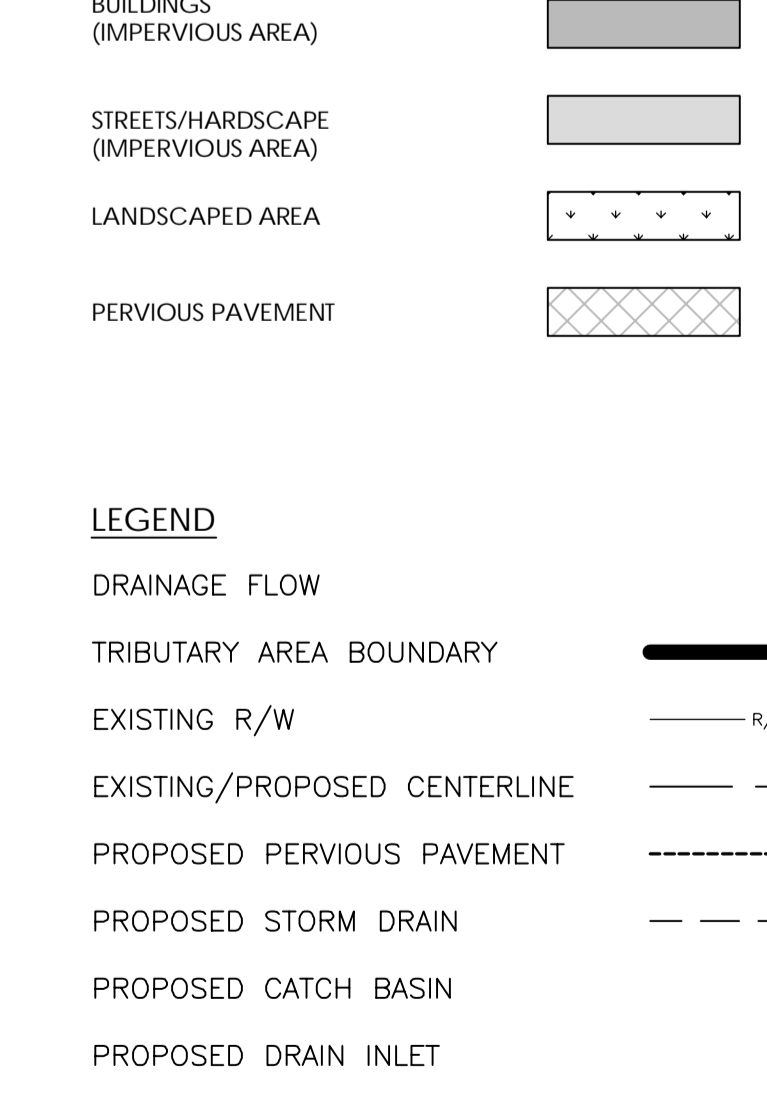
PROPOSED PEAK FLOW SUMMARY (Q10)

DRAINAGE SUBAREA	AREA (ACRES)	PERCENT IMPERVIOUS	RUNOFF COEFFICIENT	Q10 (CFS)
A	0.95	59%	0.81	2.20
B	0.35	91%	0.88	0.88
C	0.50	74%	0.85	1.22
D	2.06	90%	0.88	5.19
E	0.33	70%	0.83	0.78
F	0.45	69%	0.83	1.07
G	1.06	78%	0.85	2.98
H	0.36	72%	0.84	0.87
I	0.43	51%	0.78	0.96
J	0.89	56%	0.80	2.04
K	0.42	62%	0.82	0.99
L	0.37	73%	0.84	0.89
M	1.30	72%	0.84	3.13
N	0.26	77%	0.85	0.61
O	1.32	64%	0.82	3.10
P	0.78	81%	0.86	1.92
Q	0.65	85%	0.87	1.62
R	0.34	76%	0.85	0.83
S	0.22	82%	0.87	0.56
T	0.30	87%	0.88	0.76
U	0.77	91%	0.88	1.94
V	2.97	88%	0.88	7.48
W	0.18	72%	0.84	0.43
X	0.89	53%	0.80	2.04
Y	0.20	100%	0.90	0.51
TOTALS	18.35			44.08

WOMP DESIGN VOLUMES

DRAINAGE AREA	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)	IMPERVIOUS FRACTION	DESIGN CAPTURE VOLUME (C.F.)	PROPOSED VOLUME (C.F.)	NOTES
A	24,394	16,998	41,392	0.59	928	950	PR. VOL. IS SELF CONTAINED
B	13,840	1,306	15,246	0.91	635	650	PR. VOL. IS SELF CONTAINED
C	16,117	5,863	41,780	0.74	1,245	1,250	PR. VOL. TO UNDERGROUND STORAGE
D	81,021	8,712	89,733	0.90	3,659	3,700	PR. VOL. TRIBUTARY TO PERVIOUS P.V.M.T.
E	9,583	4,356	14,374	0.70	397	400	PR. VOL. TO UNDERGROUND STORAGE
F	13,504	6,098	19,602	0.69	531	550	PR. VOL. IS SELF CONTAINED
G	36,154	10,018	46,173	0.78	1,486	1,500	PR. VOL. TO UNDERGROUND STORAGE
H	10,890	4,356	15,681	0.72	450	460	PR. VOL. IS SELF CONTAINED
I	10,018	9,147	18,730	0.51	362	370	PR. VOL. IS SELF CONTAINED
J	21,780	16,988	38,768	0.56	822	830	PR. VOL. IS SELF CONTAINED
K	11,325	6,969	18,295	0.62	434	440	PR. VOL. IS SELF CONTAINED
L	11,781	4,356	16,117	0.73	471	480	PR. VOL. IS SELF CONTAINED
M	40,946	15,681	46,628	0.72	1,336	1,350	PR. VOL. TO UNDERGROUND STORAGE
N	8,712	2,613	11,325	0.77	358	370	PR. VOL. IS SELF CONTAINED
O	36,590	20,909	57,499	0.64	1,416	1,430	PR. VOL. TO UNDERGROUND STORAGE
P	23,442	6,534	33,976	0.81	1,160	1,170	PR. VOL. TO UNDERGROUND STORAGE
Q	23,958	4,356	28,314	0.85	1,046	1,060	PR. VOL. TO UNDERGROUND STORAGE
R	11,325	3,485	14,810	0.76	459	470	PR. VOL. TO UNDERGROUND STORAGE
S	7,840	1,743	9,583	0.82	334	340	PR. VOL. TO UNDERGROUND STORAGE
T	11,325	1,743	13,068	0.87	502	510	PR. VOL. TO UNDERGROUND STORAGE
U	30,492	3,049	33,541	0.91	1,396	1,400	PR. VOL. TO UNDERGROUND STORAGE
V	113,691	15,682	129,373	0.88	5,070	5,100	PR. VOL. TRIBUTARY TO PERVIOUS P.V.M.T.
W	5,862	2,178	7,840	0.72	225	230	PR. VOL. TO UNDERGROUND STORAGE
X	20,473	18,295	38,768	0.53	777	790	PR. VOL. IS SELF CONTAINED
Y	3,712	0.00	3,712	1.00	185	190	PR. VOL. IS SELF CONTAINED
TOTALS	608,098	191,228	799,326		25,684	25,990	

LAND USE LEGEND



DRAINAGE AREAS: 'F', 'H', 'K', 'L' AND 'N' ARE PROPOSED COURTYARD DETENTION AREAS:

STORM FLOWS GENERATED FROM THESE AREAS ARE PROPOSED TO BE DETAINED AND/OR RETAINED UTILIZING SMALL (1-FOOT DEEP MAXIMUM) BASINS. DRAIN INLETS WILL BE LOCATED TO PROVIDE EMERGENCY OVERFLOW FROM THE BASIN TO THE STORM DRAIN SYSTEM SHOULD THE BASIN CAPACITY BE EXCEEDED DURING THE STORM EVENT.

DRAINAGE AREAS: 'I' AND 'J':

STORM FLOWS GENERATED FROM THESE AREAS ARE PROPOSED TO BE DETAINED AND/OR RETAINED UTILIZING SMALL (1-FOOT DEEP MAXIMUM) BASINS. EMERGENCY OVERFLOW SWALES WILL CONVEY EXCESS STORM FLOWS TO THE DRAIN INLET LOCATED WITHIN DRAINAGE AREA 'G'.

NOTE: THE ABOVE STORM PEAK FLOWS WERE OBTAINED UTILIZING THE RATIONAL METHOD EQUATION FOR PEAK FLOW AS PRESCRIBED BY RCDFCD.
 $Q = CIA(1.008)^X$
 WHERE:
 SUBAREA TO 5 MINUTES
 100 YEAR INTENSITY 4.16 IN/HR Plate D-4.1(6)
 10 YEAR INTENSITY 2.84 IN/HR Plate D-4.1(6)
 RUNOFF COEFFICIENT AS SHOWN Plate D-5.7(7)

