

**PROJECT SPECIFIC PRELIMINARY
WATER QUALITY MANAGEMENT PLAN
(WQMP)**

FOR:

MORENO VALLEY LOGISTICS CENTER
INDIAN STREET AND KRAMERIA AVENUE
MORENO VALLEY, CA
APNs: 316-100-028, -030, -048, -051 and -052

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NOVEMBER 3, 2014 r1
OCTOBER 15, 2015 r2
NOVEMBER 9, 2015 r3
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JOB NO. 2890D

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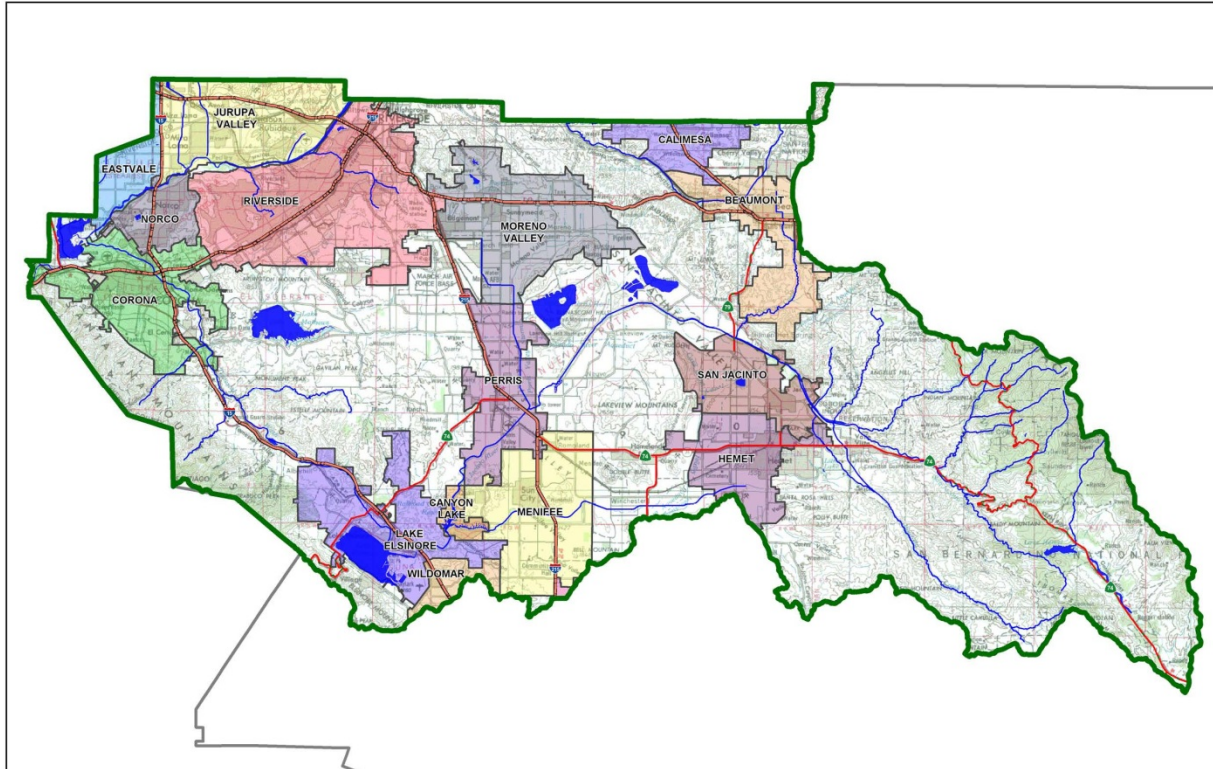
Project Specific Water Quality Management Plan

A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County

Project Title: Moreno Valley Logistics Center

Development No: 316-100-028, -030, -048, -051 and -052

Design Review/Case No: PA15-0014, PA15-0015, PA15-0016, and PA15-0017



- Preliminary
- Final

Original Date Prepared: November 3, 2014

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March 10, 2016

Prepared for Compliance with
Regional Board Order No. R8-2010-0033

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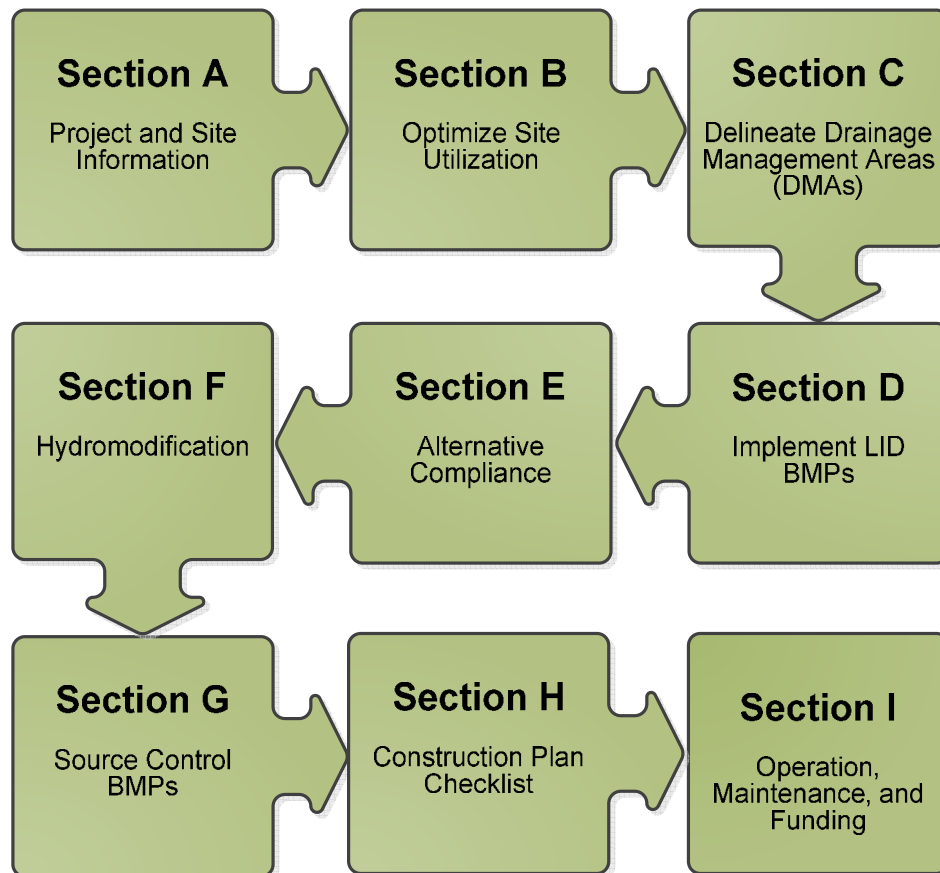
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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your “how-to” manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for **the Owner** by Thienes Engineering, Inc. for the **Moreno Valley Logistics Center** project.

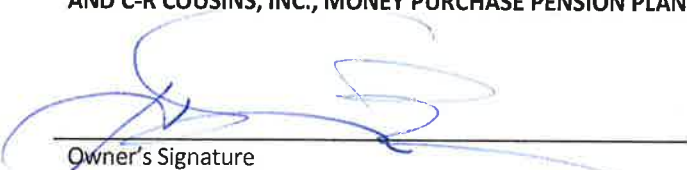
This WQMP is intended to comply with the requirements of **Moreno Valley** for **PA15-0014 (BLDG 1), PA15-0015 (BLDG 2), PA15-0016 (BLDG 3), and PA15-0017 (BLDG 4)** which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under **Moreno Valley** Water Quality Ordinance (Municipal Code Section 8.10).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

OWNERS:

**MOORPARK COUNTRY PROPERTIES, INC., A CALIFORNIA CORPORATION, AS TO AN UNDIVIDED 90% INTEREST;
AND C-R COUSINS, INC., MONEY PURCHASE PENSION PLAN AS TO AN UNDIVIDED 10% INTEREST**




Owner's Signature
Moorpark Country Properties, Inc., a California Corporation

Harry Muranaka
Owner's Printed Name
Moorpark Country Properties, Inc., a California Corporation

12-24-15

Date

President
Owner's Title/Position



Owner's Signature
C-R Cousins, Inc. Money Purchase Pension Plan

Harry Muranaka
Owner's Printed Name
C-R Cousins, Inc. Money Purchase Pension Plan

12-24-15

Date

Trustee
Owner's Title/Position

ACKNOWLEDGMENT

- Ownery
Certification

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California

County of Los Angeles

On 12-24-15 before me, M. Kendrick,

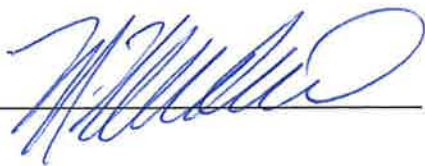
A Notary Public personally appeared Harry Muranaka

who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.


I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature



(Seal)



Owner's Signature
C-R Cousins, Inc. Money Purchase Pension Plan

12/23/15

Date

Roy Muranaka

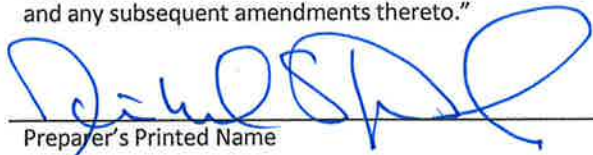
Owner's Printed Name
C-R Cousins, Inc. Money Purchase Pension Plan

Trustee

Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0033 and any subsequent amendments thereto."



Preparer's Printed Name

12/28/15

Date

Reinhard Stenzel

Preparer's Printed Name

Director of Engineering

Preparer's Title/Position

Preparer's Licensure:

ACKNOWLEDGMENT - Owners
certification

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California

County of Los Angeles

On 12-23-15 before me, M. Kendrick,

A Notary Public personally appeared Roy Muranaka

who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature



(Seal)

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Light Industrial
Planning Area:	Industrial/Business Park
Community Name:	N/A
Development Name:	Moreno Valley Logistics Center
PROJECT LOCATION	
Latitude & Longitude (DMS): 33.877577, - 117.238998	
Project Watershed and Sub-Watershed: Santa Ana River & San Jacinto	
APN(s): 316-100-028, -030, -048, -051 and -052	
Map Book and Page No.: Assessor's Map BK.316 PG.10	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Light Industrial
Proposed or Potential SIC Code(s)	1541
Area of Impervious Project Footprint (SF)	0
Total Area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	3,698,244 (84.90 acres)
Does the project consist of offsite road improvements?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Does the project propose to construct unpaved roads?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Is the project part of a larger common plan of development (phased project)?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the project limits (SF)	0
Is the project located within any MSHCP Criteria Cell?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Is a Geotechnical Report attached?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	Geotech Report Available
What is the Water Quality Design Storm Depth for the project?	0.64
Project Description: The overall project property encompasses approximately 84.9 acres (an additional 1.28 acres for Cosmo Street). Currently, the site consists of several undeveloped dirt lots. Runoff generally surface drains south-easterly and into the Perris Valley Storm Drain Channel. Proposed improvements to the site consist of the construction of four commercial type buildings ranging from 92,222 to 1,331,770 square feet. There will be truck yards and vehicle parking lots adjacent to each building. There will be several sand filter basins: Basins "4" and "5" south of Building 1, Basin "3" west of Building 1, Basin "2" south of Building 2, Basin "6" east of Building 3 and Basin "1" east of Building 4. The existing Cosmos Street will be extended southerly between Buildings 1 and 2. The remainder of the project site will be reserved for landscaping. Treatment for Cosmo Street will be taken to Sand Filter Basin "2."	
<u>BMP Hierarchy:</u>	
Infiltration - the project is bypassing all infiltration BMPs because the entire site sits over a groundwater plume as shown in Appendix 5.	
Biofiltration - the project is bypassing biofiltration facilities, in the form of planters, because the project is required to detain stormwater for 100-year purposes. Planters are not practical for 100-year detention since the ponding depth and tributary area are maxed out at 6-inches and 10 acres, respectfully. Furthermore, the County of Riverside Airport Land Use Commission (ALUC) had a hearing on October 8, 2015 for jurisdiction case no. PA15-0014, PA15-0015, PA15-0016, and PA15-0017 (Moreno Valley Logistics Center) to provide their concerns and requirements. Condition #4 requires all basins to drawdown within 48 hours and to remain totally dry between rainfalls. In order to design an Extended	

Detention Basin (EDB) to drawdown 100% of the volume within 48 hours, we are unable to hold 50% of the volume for 24+ hours. EDBs rely on holding stormwater for longer periods of time as their primary treatment mechanism. Not being able to do so would reduce treatment efficiency.

Treatment Control - the project proposes to use sand filter basins to avoid infiltration over a groundwater plume, to assist with 100-year detention, and to meet the drawdown requirements of ALUC.

See Appendix 5 for more detail.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water’s 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris Valley Storm Drain	None	None	Not classified as a RARE waterbody.
San Jacinto River, Reach 3	None	AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Canyon Lake (aka San Jacinto River, Reach 2)	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
San Jacinto River, Reach 1	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Lake Elsinore	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs (polychlorinated biphenyls), Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Temescal Creek, Reach 6	Indicator Bacteria	GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Temescal Creek, Reach 5	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE	23 miles
Temescal Creek, Reach 4	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE	29 miles
Temescal Creek, Reach 3 (aka Lee Lake)	None	AGR, IND, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Temescal Creek, Reach 2	None	AGR, IND, GWR, REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Temescal Creek, Reach 1	pH	REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Santa Ana River, Reach 3	Pathogens, Copper, and Lead	AGR, GWR, REC1, REC2, WARM, WILD, RARE	46 miles
The Prado Basin Management Zone	Pathogens and Nitrate	REC1, REC2, WARM, WILD, RARE	46 miles
Santa Ana River, Reach 2	Indicator Bacteria	AGR, GWR, REC1, REC2, WARM, WILD, RARE	51 miles
Santa Ana River, Reach 1	None	REC1, REC2, WARM, WILD	Not classified as a RARE waterbody.
Tidal Prism of Santa Ana River and Newport Slough	Enterococcus, Fecal Coliform, Total Coliform	REC1, REC2, COMM, WILD, RARE, MAR	77 miles
Pacific Ocean Near shore Zone	None	IND, NAV, REC1, REC2, COMM, WILD, RARE, SPWN, MAR, SHEL	77 miles
Pacific Ocean Offshore Zone	None	IND, NAV, REC1, REC2, COMM, WILD, RARE, SPWN, MAR	78 miles

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
US Army Corps of Engineers, CWA Section 404 Permit	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Statewide Construction General Permit Coverage	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Statewide Industrial General Permit Coverage	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Other (please list in the space below as required)	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
City of Moreno Valley Grading Permit	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Other (please list in the space below as required)	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
City of Moreno Valley Building Permit	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

- *There are no creeks, wetlands, or riparian habitats nearby.*
- *Existing drainage patterns flows southeasterly and into the Perris Valley Storm Drain Channel. Proposed condition drainage patterns mimic pre-development conditions.*

Did you identify and protect existing vegetation? If so, how? If not, why?

- *Not applicable, there are no sensitive areas.*
- *Not applicable, there are no existing trees or vegetation to preserve.*

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

- *Infiltration is not recommended because the project site is situated over a known groundwater plume.*

Did you identify and minimize impervious area? If so, how? If not, why?

- *Impervious area on the site has been minimized to County/City standards.*
- *Due to the nature of the project site (large trucks), substitution of pavement for landscaping is not feasible. The project does not propose overflow parking where substitution of pavement for landscaping would be optimal. Landscaping has been provided wherever applicable and to the maximum extent practicable.*
- *The entire Design Capture Volume (DCV) is handled by the proposed BMPs. Permeable pavement is not needed to meet the DCV.*

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

- *Roof runoff is directed to the proposed BMPs for treatment.*
- *The site is not on a hillside.*
- *All stormwater runoff will be piped or sheet flow towards their respective BMPs.*

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s) ¹	Area (Sq. Ft.)	Area (Acres)	DMA Type
1A	Roofs/Conc/Asphalt	307,098	7.05	Type D
1B	Ornamental Landscaping	69,696	1.60	Type D
2A	Roofs/Conc/Asphalt	297,515	6.83	Type D
2B	Ornamental Landscaping	50,094	1.15	Type D
3A	Roofs/Conc/Asphalt	609,840	14.00	Type D
3B	Ornamental Landscaping	50,094	1.15	Type D
4A	Roofs/Conc/Asphalt	1,078,110	24.75	Type D
4B	Ornamental Landscaping	113,256	2.60	Type D
5A	Roofs/Conc/Asphalt	609,840	14.00	Type D
5B	Ornamental Landscaping	115,434	2.65	Type D
6A	Roofs/Conc/Asphalt	226,512	5.20	Type D
6B	Ornamental Landscaping	45,738	1.05	Type D
7	Ornamental Landscaping	180,774	4.15	Type A

¹Reference Table 2-1 in the WQMP Guidance Document to populate this column

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
7	180,774	California Native Vegetation	Timed Sprinklers

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID [C] Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name / ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
1A	Sand Filter Basin #1
1B	Sand Filter Basin #1
2A	Sand Filter Basin #2
2B	Sand Filter Basin #2
3A	Sand Filter Basin #3
3B	Sand Filter Basin #3
4A	Sand Filter Basin #4
4B	Sand Filter Basin #4
5A	Sand Filter Basin #5
5B	Sand Filter Basin #5
6A	Sand Filter Basin #6
6B	Sand Filter Basin #6

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream ‘Highest and Best Use’ for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? Y N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream ‘Highest and Best Use’ feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermitttee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? Y N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site...	YES	NO
...have any DMAs with a seasonal high groundwater mark shallower than 10 feet? If Yes, list affected DMAs:		X
...have any DMAs located within 100 feet of a water supply well? If Yes, list affected DMAs:		X
...have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact? If Yes, list affected DMAs:		X
...have measured in-situ infiltration rates of less than 1.6 inches / hour? If Yes, list affected DMAs: DMAs 4 and 5 have a rate of 0.3 in/hr and DMA 2 has a rate of 2.5 in/hr. However, infiltration is infeasible due to the fact that the project site is located over a known groundwater plume.	X	
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface? If Yes, list affected DMAs:		X
...geotechnical report identifies other site-specific factors that would preclude effective and safe infiltration? Describe here:		X
...have areas of known soil or groundwater contamination (unless with written authorization from the Regional Board Executive Officer) If yes, list affected DMAs: The entire project site is located within the vicinity of a groundwater plume area.	X	

If you answered “Yes” to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies:

- Reclaimed water will be used for the non-potable water demands for the project.
- Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 14.35 acres

Type of Landscaping (Conservation Design or Active Turf): Conservation design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 70.55 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 1.05

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 74.07 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
74.07 acres	14.35 acres

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 1,050 (# of parking stalls)

Project Type: Industrial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 70.55 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number of toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 185

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 13,052

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
<i>13,052</i>	<i>1,050</i>

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

- LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).
- A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
1A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

BMP Hierarchy:

Infiltration - the project is bypassing all infiltration BMPs because the entire site sits over a groundwater plume as shown in Appendix 5.

Biofiltration - the project is bypassing biofiltration facilities, in the form of planters, because the project is required to detain stormwater for 100-year purposes. Planters are not practical for 100-year detention since the ponding depth and tributary area are maxed out at 6-inches and 10 acres, respectfully. Furthermore, the County of Riverside Airport Land Use Commission (ALUC) had a hearing on October 8, 2015 for jurisdiction case no. PA15-0014, PA15-0015, PA15-0016, and PA15-0017 (Moreno Valley Logistics Center) to provide their concerns and requirements. Condition #4 requires all basins to drawdown within 48 hours and to remain totally dry between rainfalls. In order to design an Extended Detention Basin (EDB) to drawdown 100% of the volume within 48 hours, we are unable to hold 50% of the volume for 24+ hours. EDBs rely on holding stormwater for longer periods of time as their primary treatment mechanism. Not being able to do so would reduce treatment efficiency.

Treatment Control - the project proposes to use sand filter basins to avoid infiltration over a groundwater plume, to assist with 100-year detention, and to meet the drawdown requirements of ALUC.

See Appendix 5 for more detail.

DMA 7 is considered a self-treating area and will not be routed through the proposed sand filter basins due to a technical infeasibility. Due to the difference in elevation between the site and the public right-of-way, these landscaped areas could not drain onsite.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First, calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	<i>n/a</i>		
	[A]		[B]	[C]	[A] x [C]			
<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>Design Storm Depth (in)</i>	<i>Design Capture Volume, V_{BMP} (cubic feet)</i>	<i>Proposed Volume on Plans (cubic feet)</i>
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D] \times [E]}{12}$	[G]

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- Or -

The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
<input type="checkbox"/> Detached Residential Development	P	N	P	P	N	P	P	P
<input type="checkbox"/> Attached Residential Development	P	N	P	P	N	P	P	P ⁽²⁾
<input checked="" type="checkbox"/> Commercial/Industrial Development	P ⁽³⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁵⁾	P ⁽¹⁾	P	P
<input type="checkbox"/> Automotive Repair Shops	N	P	N	N	P ^(4, 5)	N	P	P
<input type="checkbox"/> Restaurants (>5,000 ft ²)	P	N	N	N	N	N	P	P
<input type="checkbox"/> Hillside Development (>5,000 ft ²)	P	N	P	P	N	P	P	P
<input checked="" type="checkbox"/> Parking Lots (>5,000 ft ²)	P ⁽⁶⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P ⁽¹⁾	P	P
<input type="checkbox"/> Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern⁽⁷⁾	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

P = Potential

N = Not Potential

⁽¹⁾ A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

⁽²⁾ A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

⁽³⁾ A potential Pollutant is land use involving animal waste

⁽⁴⁾ Specifically petroleum hydrocarbons

⁽⁵⁾ Specifically solvents

⁽⁶⁾ Bacterial indicators are routinely detected in pavement runoff

⁽⁷⁾ Pollutants that are listed for the development type, and also are on the 303(d) list or have adopted TMDLs, are considered Pollutants of Concern.

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage ²
N/A	
<i>Total Credit Percentage¹</i>	

¹Cannot Exceed 50%

²Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic)	Proposed Volume on Plans (cubic feet)
	[A]		[B]	[C]	[A] x [C]			
1A	307,098	Roofs/Conc/Asphalt	1.00	0.89	273,931.4	0.64	14609.7	18,774
1B	69,696	Ornamental Landscaping	0.10	0.11	7,698.5	0.64	410.6	
2A	297,515	Roofs/Conc/Asphalt	1.00	0.89	265,383.2	0.64	14153.8	17,466
2B	50,094	Ornamental Landscaping	0.10	0.11	5,533.3	0.64	295.1	
3A	609,840	Roofs/Conc/Asphalt	1.00	0.89	543,977.3	0.64	29012.1	41,361
3B	50,094	Ornamental Landscaping	0.10	0.11	5,533.3	0.64	295.1	
4A	1,078,110	Roofs/Conc/Asphalt	1.00	0.89	961,674.1	0.64	51289.3	56,063
4B	113,256	Ornamental Landscaping	0.10	0.11	12,510.0	0.64	667.2	
5A	609,840	Roofs/Conc/Asphalt	1.00	0.89	543,977.3	0.64	29012.1	32,886
5B	115,434	Ornamental Landscaping	0.10	0.11	12,750.6	0.64	680	
6A	226,512	Roofs/Conc/Asphalt	1.00	0.89	202,048.7	0.64	10775.9	13,860
6B	45,738	Ornamental Landscaping	0.10	0.11	5,052.1	0.64	269.4	
	3,573,227				2,840,070	0.64	151,470.3	180,410

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High:** equal to or greater than 80% removal efficiency
- **Medium:** between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID ¹	Priority Pollutant(s) of Concern to Mitigate ²	Removal Efficiency Percentage ³
Sand Filter Basin	Bacterial Indicators	Medium / 65% ⁴
Sand Filter Basin	Metals	Medium / 72-86% ⁴
Sand Filter Basin	Trash and Debris	High / 89% ⁴
Sand Filter Basin	Toxic Organic Compounds	High / 89% ⁴

¹ Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

² Cross Reference Table E.1 above to populate this column.

³ As documented in a Co-Permittee Approved Study and provided in Appendix 6.

⁴ Medium/High removal effectiveness as documented in Appendix E of "Design Handbook for Low Impact Development Best Management Practices" by Riverside County Flood Control and Water Conservation District (rev. 9/11). Percentages as documented in TC-40 for Media Filter of "New Development and Redevelopment Handbook" by CASQA (January 2003).

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermitttee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration¹ of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? Y N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	Post-condition	% Difference
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

¹ Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

The adequate sumps that apply to the project site are Canyon Lake, Lake Elsinore, Prado Dam, and the Santa Ana River. Runoff from the project site will drain to Perris Valley Storm Drain, Canyon Lake, Lake Elsinore, Prado Dam and the Santa Ana River, which are engineered and regularly maintained. These waterbodies are not sensitive stream habitats. No stream habitat areas will be affected by the development.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

- a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.
- b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.
- c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and “housekeeping”, that must be implemented by the site’s occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. **Identify Pollutant Sources:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.
2. **Note Locations on Project-Specific WQMP Exhibit:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.
3. **Prepare a Table and Narrative:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.
4. **Identify Operational Source Control BMPs:** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
A. On-site storm drain inlets	<ul style="list-style-type: none"> Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. 	<ul style="list-style-type: none"> Maintain and periodically repaint or replace inlet markings annually. Provide stormwater pollution prevention information to new site owners, lessees, or operators upon occupancy and annually thereafter. See CASQA fact sheets SC-44 for “Drainage System Maintenance,” and SD-13 for “Storm Drain Signage” included in Appendix of this document. Include the following lease agreements: “Tenant shall not allow anyone to discharge anything to storm drain or to store or deposit materials so as to create a potential discharge to storm drains.”

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
B. Interior floor drains and elevator shaft sump pumps	<ul style="list-style-type: none"> Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer. 	<ul style="list-style-type: none"> Inspect and maintain drains semi-annually to prevent blockages and overflow.
D2. Landscape / Outdoor Pesticide Use	<ul style="list-style-type: none"> Landscape plans will minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Pest-resistant plants will be used adjacent to hardscape. The landscape plans will consider plants appropriate to the site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. 	<ul style="list-style-type: none"> Maintain landscaping only using minimum pesticides, when needed. See Appendix 10 for "Landscape and Gardening" brochure by RCFlood. Provide Integrated Pest Management (IPM) information to new owners, lessees and operators upon occupancy and annually thereafter. IPM is an effective and environmentally sensitive approach to pest management.
G. Refuse Areas	<ul style="list-style-type: none"> Site refuse will be handled by contractor on a weekly basis. Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. 	<ul style="list-style-type: none"> A minimum of two receptacles will be provided and locate indoors. Receptacles are to be inspected daily and repairs or replacements to leaky receptacles will be completed immediately. Receptacles are to remain covered with not in use. Dumping of liquid or hazardous wastes is prohibited. A "no hazardous materials" sign will be posted. Spills will be cleaned immediately upon discovery. Spill control materials will be available onsite. See Appendix 10 for CASQA fact sheets SC-34 for "Waste Handling and Disposal" and SD-32 for "Trash Storage Areas"
H. Industrial processes	<ul style="list-style-type: none"> All process activities to be performed indoors. No processes to drain to exterior or to storm drain system. 	<ul style="list-style-type: none"> See Appendix 10 for CASQA fact sheet SC-10 for "Non-Stormwater Discharges"
M. Loading Docks	<ul style="list-style-type: none"> Spills will be cleaned up immediately and disposed of properly. 	<ul style="list-style-type: none"> Move loaded and unloaded items indoors as soon as possible. See Appendix 10 for CASQA fact sheets SC-30 for "Outdoor Loading and Unloading" and SD-31 for "Maintenance Bays and Docks"
P. Plazas, sidewalks, and parking lots (only parking lots applicable)		<ul style="list-style-type: none"> Sweep parking lots monthly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain. See Appendix 10 for CASQA fact sheet SC-43 for "Parking/Storage Area Maintenance"

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
<p>Q. Additional CASQA fact sheets (see Appendix 10)</p>		<ul style="list-style-type: none"> • SC-10: Non-Stormwater Discharge • SC-11: Spill Prevention, Control & Cleanup • SC-32: Outdoor Equipment Operations • SC-35: Safer Alternative Products • SC-41: Building and Grounds Maintenance • SC-42: Building Repair and Construction • SD-12: Efficient Irrigation

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
A	On-site storm drain inlets	WQMP Site Map	---	---
B	Interior floor drains and elevator shaft sump pumps	N/A	---	---
D2	Landscape / Outdoor Pesticide Use	On-site Landscape Improvement Plans	---	---
G	Refuse Areas	WQMP Site Map	---	---
H	Industrial processes	WQMP Site Map (indoors, if any)	---	---
M	Loading Docks	WQMP Site Map	---	---
P	Plazas, sidewalks, and parking lots (only parking lots applicable)	WQMP Site Map	---	---
SFB #1	Sand Filter Basin #1	WQMP Site Map	33.879526	-117.241517
SFB #2	Sand Filter Basin #2	WQMP Site Map	33.879490	-117.239725
SFB #3	Sand Filter Basin #3	WQMP Site Map	33.877148	-117.238674
SFB #4	Sand Filter Basin #4	WQMP Site Map	33.874716	-117.235509
SFB #5	Sand Filter Basin #5	WQMP Site Map	33.874725	-117.236625
SFB #6	Sand Filter Basin #6	WQMP Site Map	33.873985	-117.237762

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: City of Moreno Valley:
Stormwater Treatment Device and Control Measure Access and
Maintenance Covenant

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

Y N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



TEI Thienes Engineering, Inc.
 CIVIL ENGINEERING • LAND SURVEYING
 14349 FIRESTONE BOULEVARD
 LA MIRADA, CALIFORNIA 90638
 PH.(714)521-4811 FAX(714)521-4173

VICINITY MAP
 FOR
MORENO VALLEY LOGISTICS CENTER



NOT TO SCALE

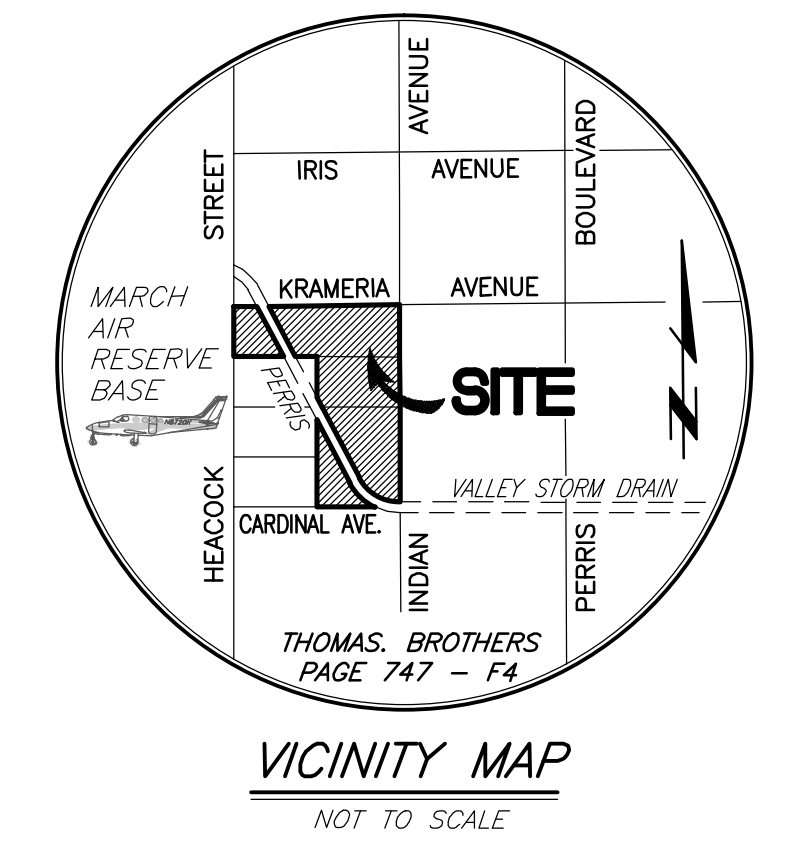
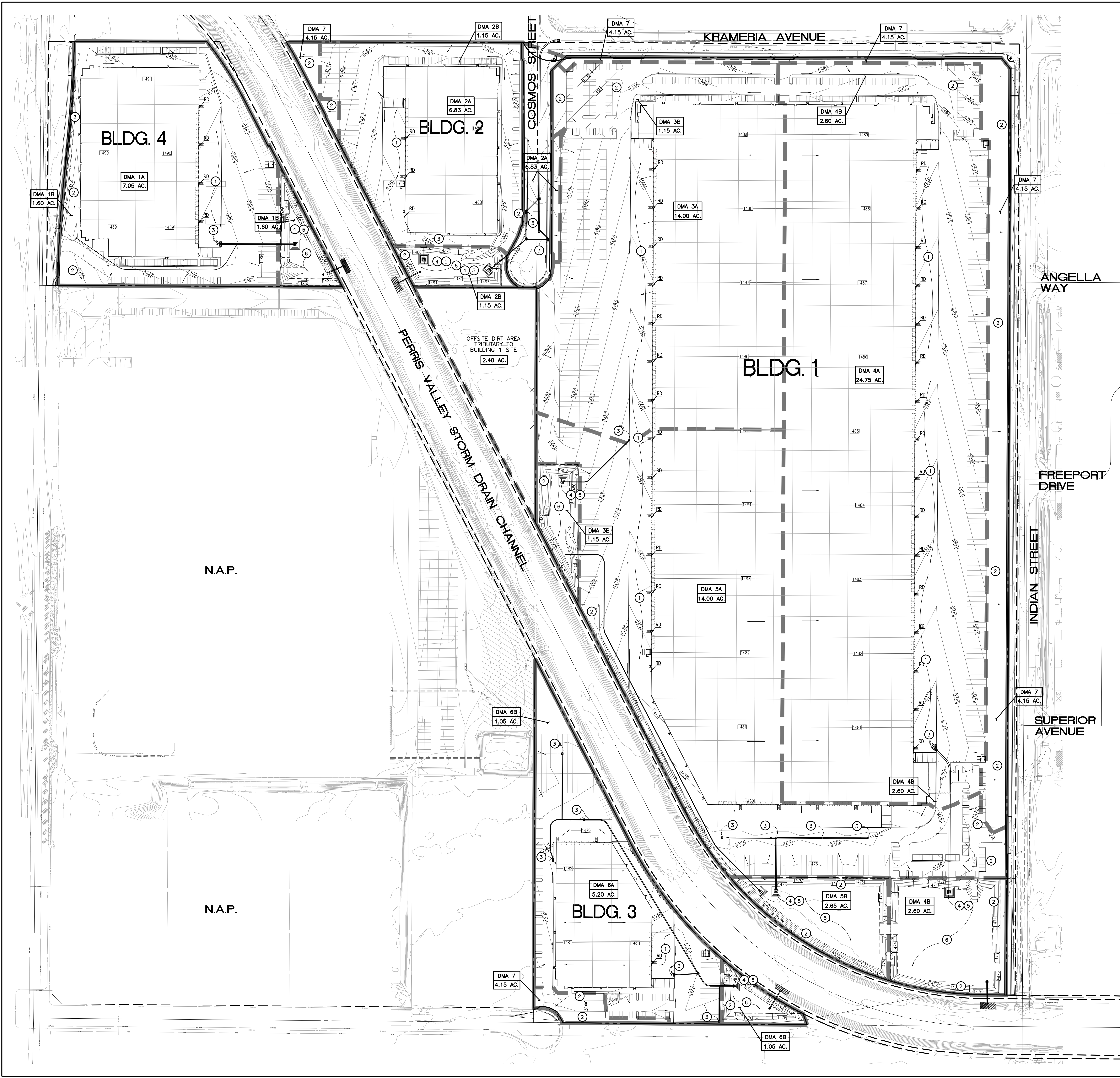


← FLOW

RECEIVING WATERS MAP
FOR
MORENO VALLEY LOGISTICS CENTER

TEI *Thienes Engineering, Inc.*
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

Last Update: 11/6/15
C:\2800-2899\2890\2890d\2890d\Receiving Waters.dwg



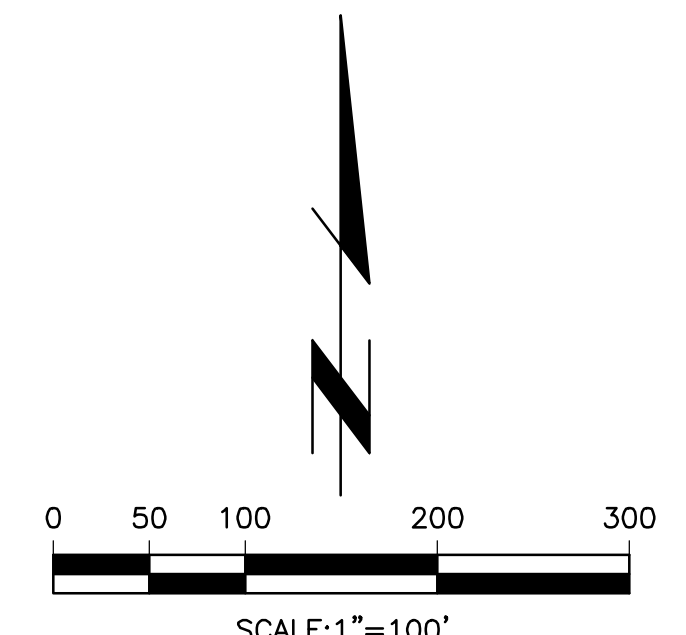
LEGEND

- 1 ABOVEGROUND TRUCK DOCK
- 2 LANDSCAPE/EFFICIENT IRRIGATION
- 3 STORM DRAIN SYSTEM SIGNS ONLY RAIN DOWN THE STORM DRAIN*
- 4 FOREBAY
- 5 BUBBLER INLET WITH ENERGY DISSIPATOR
- 6 SAND FILTER BASIN

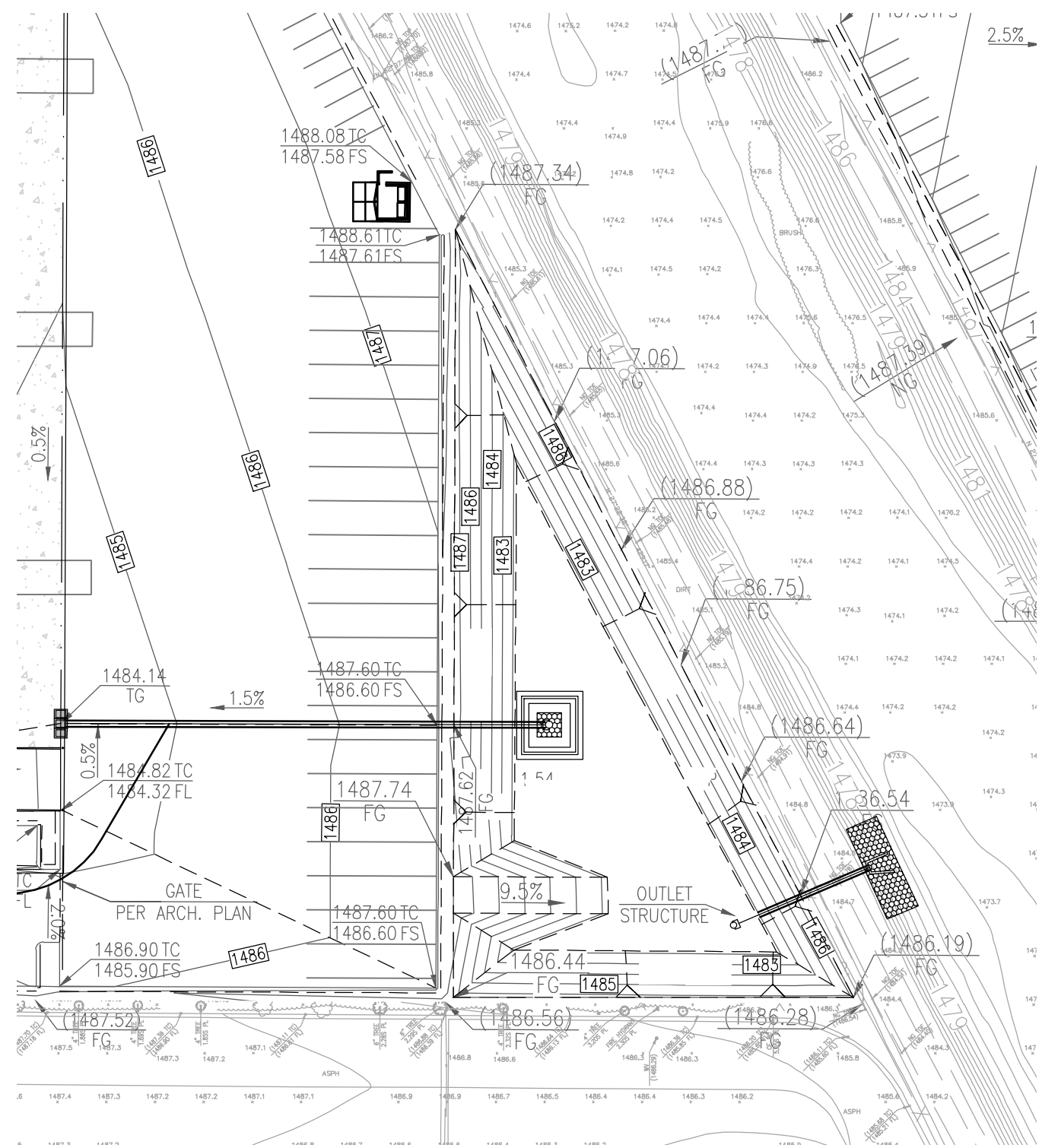
NOTE:

- RD ROOF DRAIN
- BOUNDARY
- DRAINAGE AREAS
- FLOW LINE

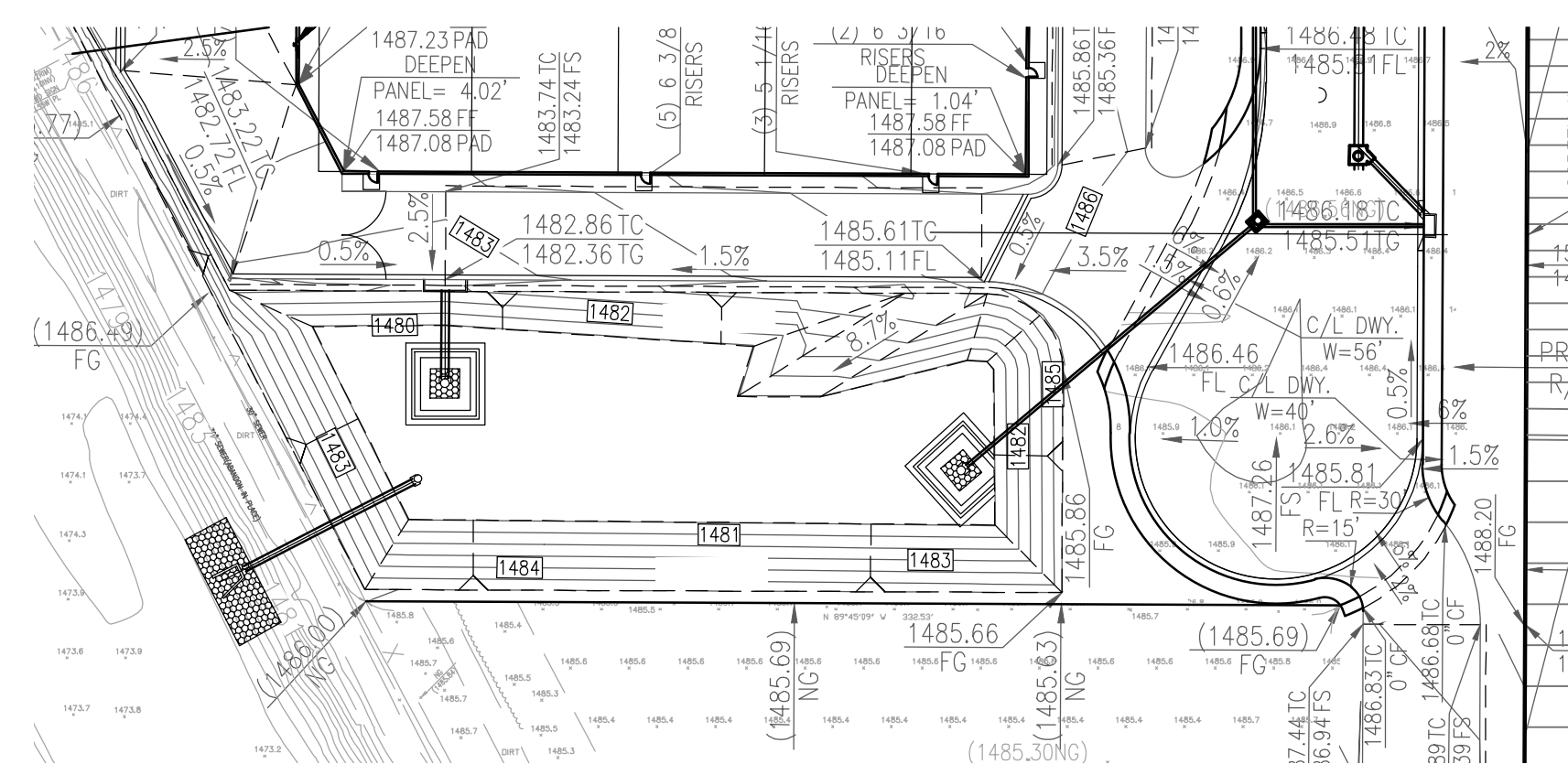
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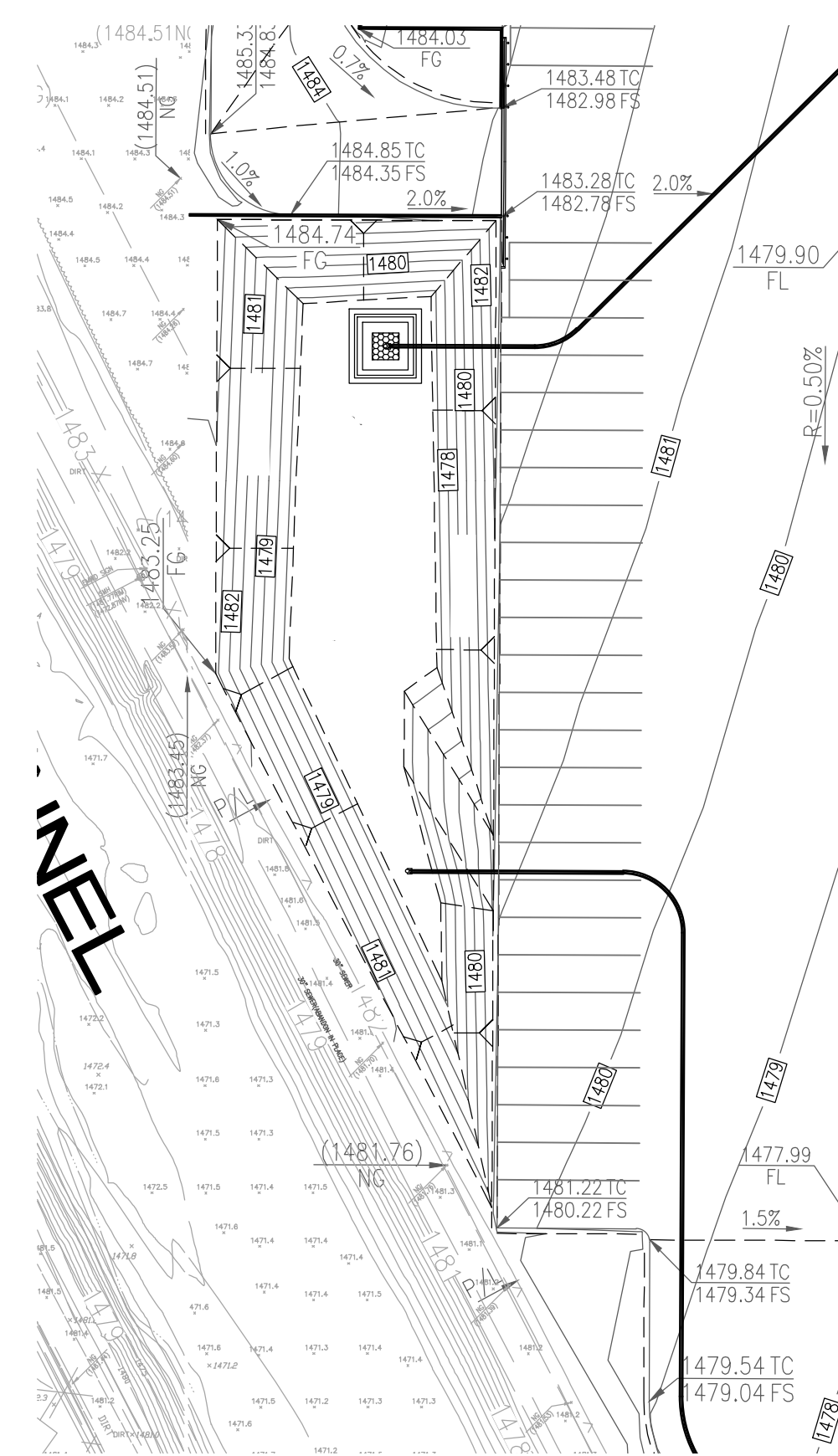
<p>CITY OF MORENO VALLEY PUBLIC WORKS DEPARTMENT</p> <p>WQMP SITE MAP</p> <p>MORENO VALLEY LOGISTICS CENTER</p>		<p>28900/1 OF 2 SHEETS</p>
<p>PREPARED FOR:</p> <p>PROLOGIS, INC. 17777 CENTER COURT DRIVE NORTH, SUITE 100 CERRITOS, CA 90703 PHONE: (562) 345-9200 FAX: (562) 345-9201</p>	<p>Designed by _____ Date _____</p> <p>Checked by _____</p> <p>Designed by _____ Date _____</p> <p>Checked by _____ Date _____</p>	
<p>PREPARED BY:</p> <p>Tai Thienes Engineering, Inc. CIVIL ENGINEERING • LAND SURVEYING 14144 FIRESTONE BOULEVARD LA MIRADA, CALIFORNIA 90638 PH: (714) 521-4811 FAX: (714) 521-4173</p>	<p>Approved by _____ Date _____</p> <p>Public Works Director R.C.E. XXXXX</p> <p>Sheet 1 of 2 Sheets</p>	



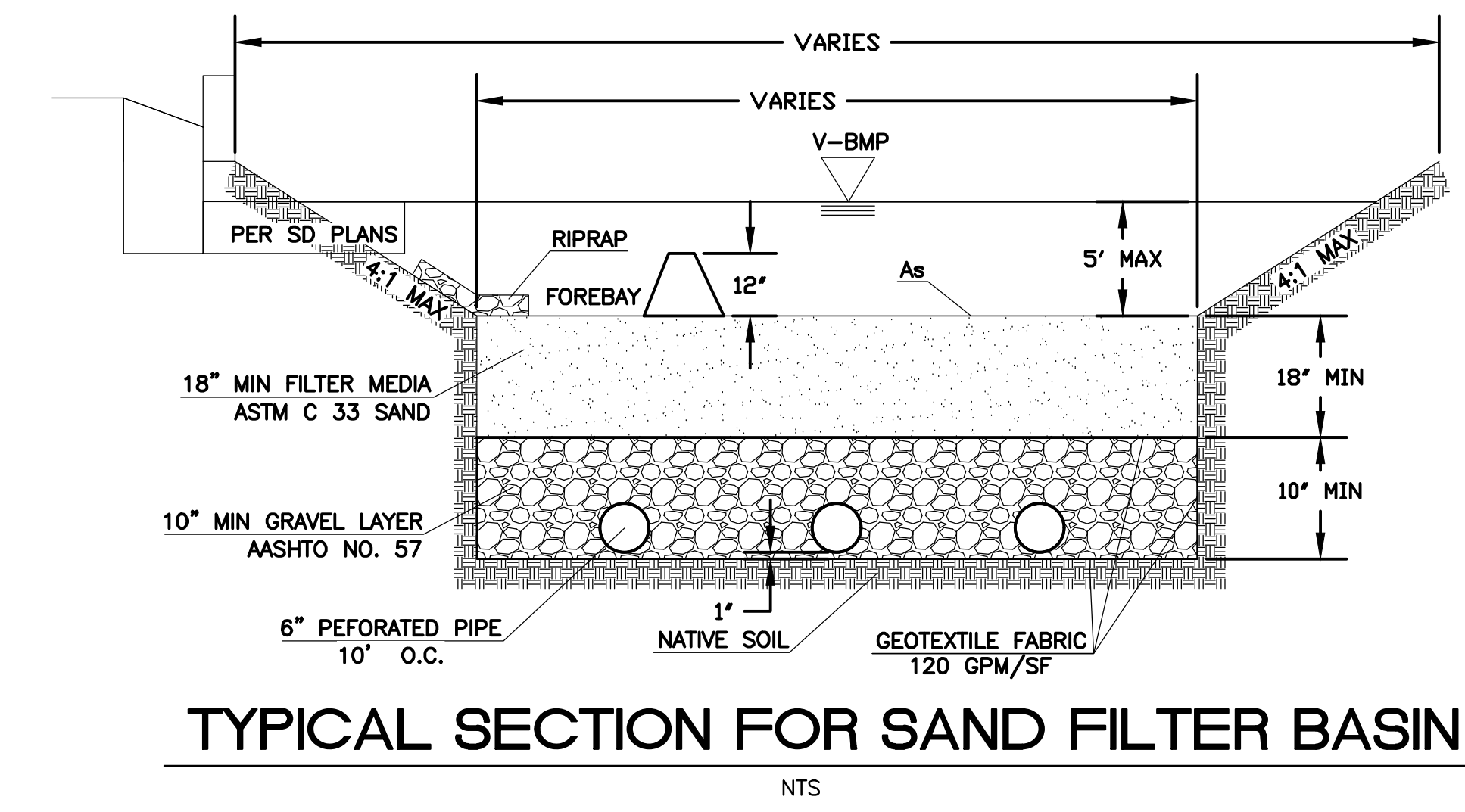
SFB #1



SFB #2

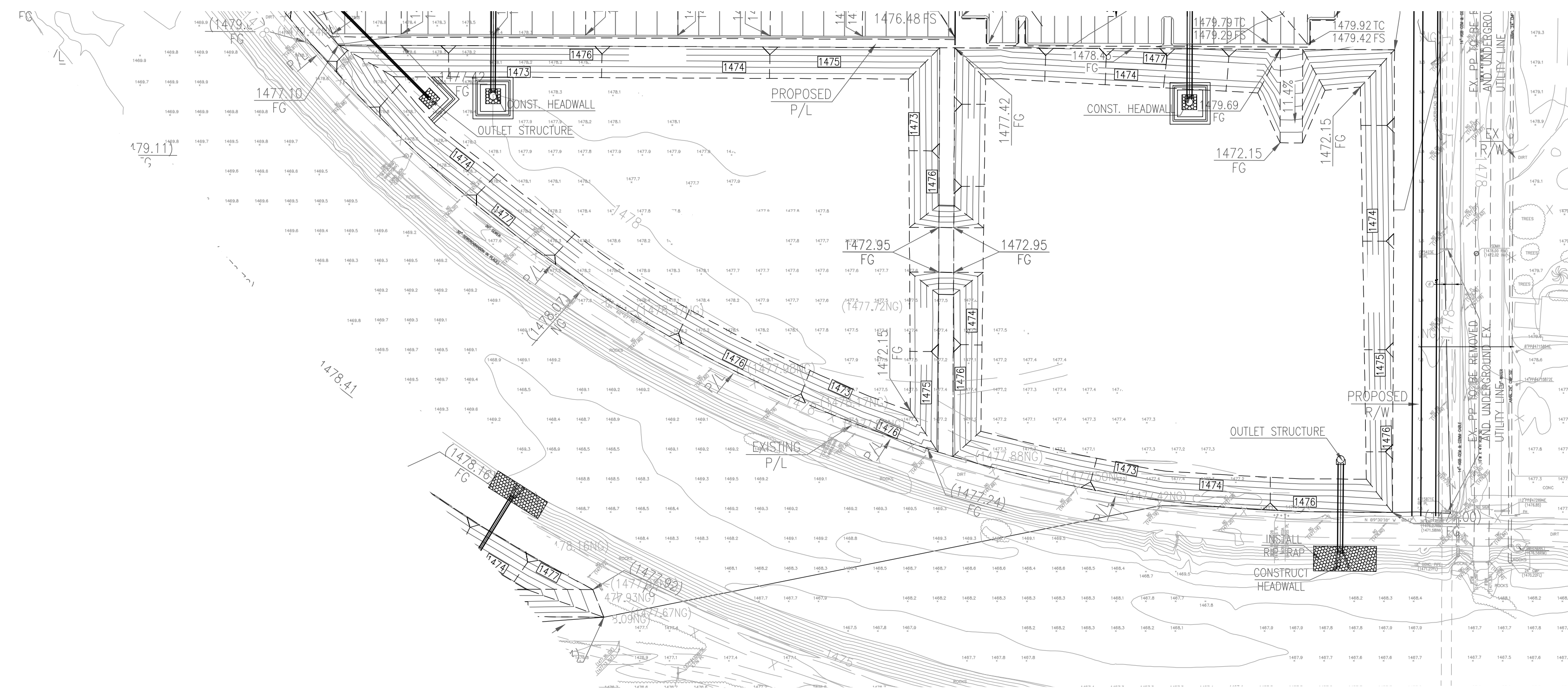


SFB #3

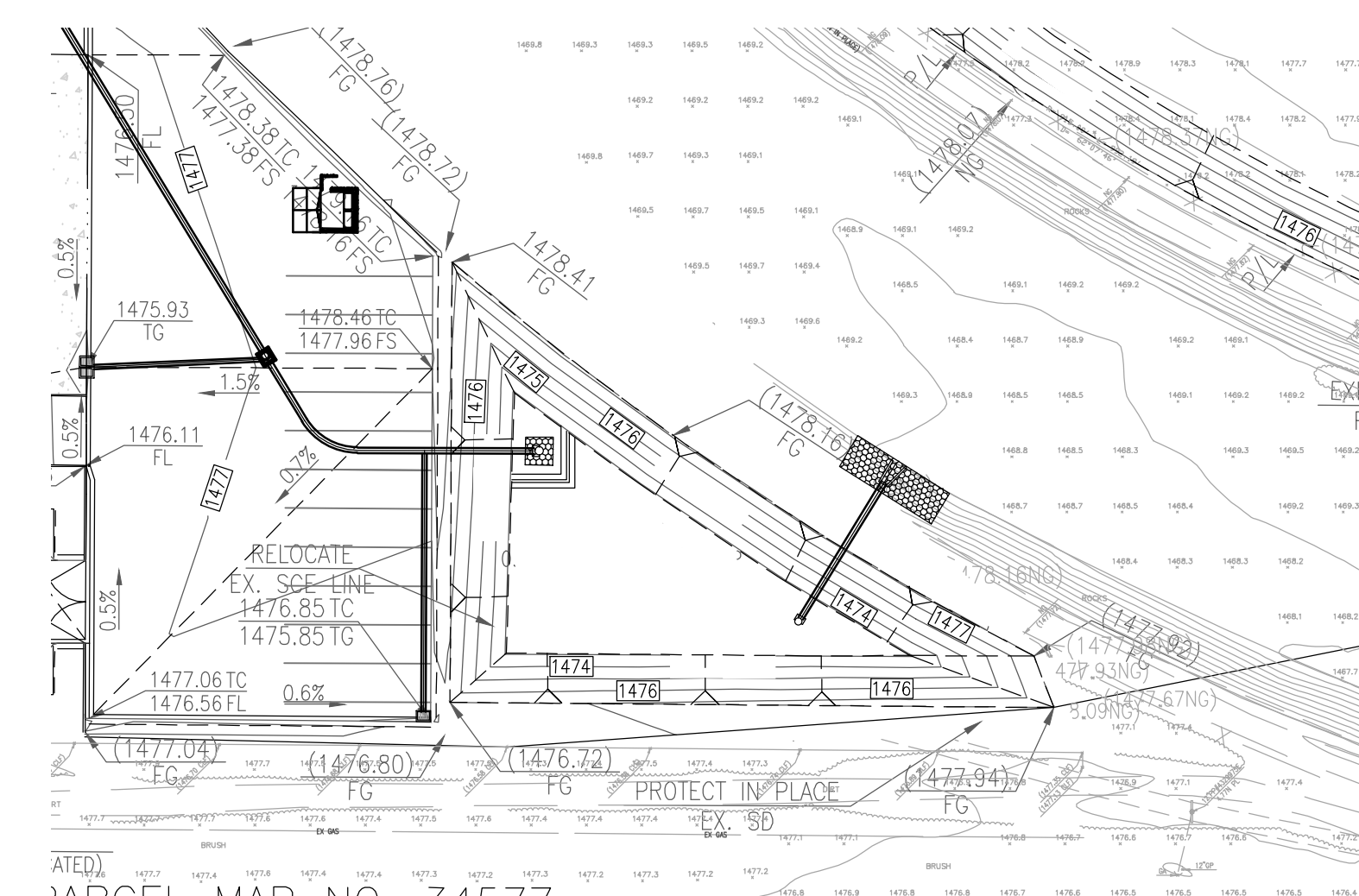


TYPICAL SECTION FOR SAND FILTER BASIN

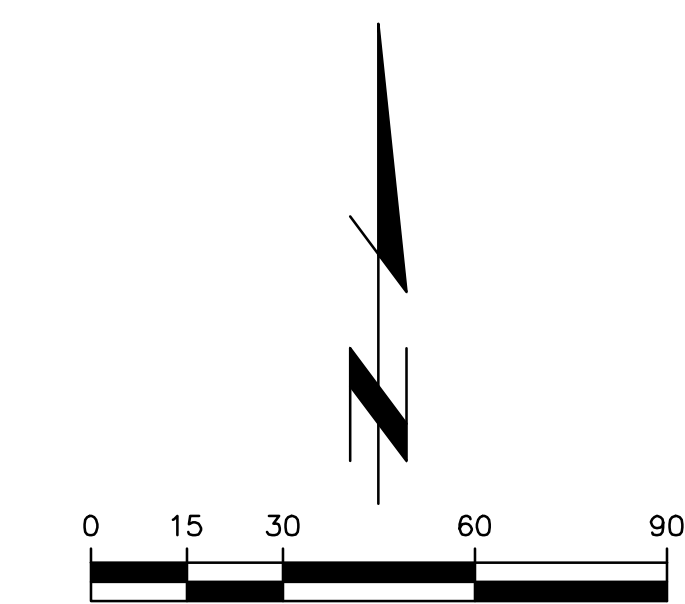
NTS




SFB #4 AND #5



SFB #6



<small>Last Update: 11/9/15 0312800-2890-2890-2890-2890-BMP2ITM.PDF</small>	
CITY OF MORENO VALLEY PUBLIC WORKS DEPARTMENT	
WQMP SITE MAP	
MORENO VALLEY LOGISTICS CENTER	
PREPARED FOR: PROLOGIS, INC. 1777 CENTER COURT DRIVE NORTH, SUITE 100 CERRITOS, CA 90703 PHONE: (562) 345-9200 FAX: (562) 345-9201	Designed by _____ Date _____ Checked by _____ Date _____ Approved by _____ Date _____ Public Works Director R.C.E. XXXXX
PREPARED BY:  Thienes Engineering, Inc. <small>CIVIL ENGINEERING - LAND SURVEYING 14140 FIRESTONE BOULEVARD LA MIRADA, CALIFORNIA 90638 PH: (714) 521-4811 FAX: (714) 521-4173</small>	Date _____ Checked by _____ Sheet 2 of 2 Sheets

Appendix 2: Construction Plans

Grading and Drainage Plans (PROVIDED WITH F-WQMP)

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

July 15, 2014

ProLogis
2817 East Cedar Street, Suite 200
Ontario, California 91761



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Scott Mulkay
Vice President – Regional Development Manager

Project No.: **14G160-2**

Subject: **Results of Infiltration Testing**
Proposed Moreno Valley Logistics Center
SWC Indian Street at Krameria Avenue
Moreno Valley, California

Gentlemen:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in Proposal No. 14P266, dated June 4, 2014. The scope of services included a surface reconnaissance, subsurface exploration, field testing, and geotechnical engineering analysis to determine the infiltration rate of the onsite soils. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located on the west side of Indian Street, southwest of the intersection of Indian Street and Krameria Avenue in Moreno Valley, California. The site is bounded to the north by commercial/industrial buildings under construction, to the east by Indian Street, and to the south and west by the Perris Valley Storm Drain channel and a vacant lot. The Building 2 option is located west of the primary site and is bounded to the north by a vacant lot, to the east by the primary site, to the south by a vacant lot, and to the west by the Perris Valley Storm Drain channel.

The primary site is a roughly triangular-shaped parcel, 58.7 acres in size. The site is currently vacant and undeveloped. Ground surface cover consists of exposed soil with sparse to moderate amounts of native grass and weed growth. Based on the disturbed alluvial soils encountered at the ground surface, it appears that the ground surface has been previously tilled. The Building 2 option site is a trapezoidal-shaped parcel, 6.9± acres in size. This site is vacant and undeveloped. The ground surface cover consists of exposed soil with sparse to moderate amounts of native grass and weed growth and also appears to have been previously tilled.

Detailed topographic information including existing site grades were not available at the time of this report. Based on visual observations made at the time of the subsurface investigation, the overall site topography generally slopes downward to the southwest at an estimated gradient of less than 3± percent.

Proposed Development

Based on the conceptual site plan provided to our office by the client, the primary site will be developed with one (1) commercial/industrial building, 1,333,586± ft² in size. This building will be identified as Building 1. Loading docks will be located along the east, south, and west sides of the building. The building will be surrounded by asphaltic concrete pavements in the automobile parking and drive lanes and Portland cement concrete in the loading dock areas. Landscape planters will be located in limited areas throughout the parking lot.

The Building 2 site will be developed with one (1) commercial/industrial building, 117,660± ft² in size. Loading docks will be located along the west side of the building. The building will be surrounded by asphaltic concrete pavements in the parking and drive lanes and Portland cement concrete pavements in the loading dock area.

Based on the conceptual site plan, the site will utilize an on-site storm water disposal system. The storm water disposal system will consist of an infiltration basin located in the south corner of the primary site. The plan also indicates that an infiltration basin will be constructed in the south area of the Building 2 site. As discussed with the project civil engineer, it is our understanding that the bottom of the infiltration basins will be approximately 6 to 8 feet below the existing site grades. We performed infiltration testing as requested within the proposed infiltration basins for Buildings 1 and 2.

Concurrent Study

SCG is currently conducting a geotechnical feasibility study for the subject site. As a part of this study, a total of fifteen (15) borings were advanced to a depth 30± feet below existing site grades. The results of this study will be published in the geotechnical report, 14G160-1.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for this phase of the project consisted of three (3) backhoe excavated trenches, extending to depths of 6 to 8± feet below existing site grades as requested by the civil engineer. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as I-1, I-2 and I-3) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Disturbed alluvial soils were encountered at all of the infiltration test trench locations extending to depths of 1 to 1½± feet below existing site grades. These soils consist of loose sandy silts with trace amounts of artificial debris. Native alluvial soils were encountered beneath the disturbed alluvium at all of the infiltration trenches extending to the maximum explored depth of 8± feet below existing site grades. The native alluvial soils encountered generally consist of fine sandy silts, clayey silts, fine to coarse sands and fine sandy clays. Free water was not encountered during the excavation of any of the trenches. The Trench Logs, which illustrate the conditions encountered at the trench locations, are included with this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration systems that will be used to store and/or dispose of storm water at the subject site. The infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At each test location, the outer ring was driven 3± inches into the soil at the base of the trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using a ten pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

The infiltration testing was performed at Infiltration Trench Nos. I-1, I-2 and I-3. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4± inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings were maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded. A cap was placed over the rings to minimize the evaporation of water during the test.

The schedule for readings was determined based on the observed soil type at the base of each backhoe excavated trench. Due to the varying silt and clay content of the exposed soils at each infiltration test location, the volumetric measurements were made at increments of 5 to 30 minutes. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for all the tests are calculated in centimeters per hour and then converted to inches per hour. These rates are summarized below:

<u>Infiltration Test No.</u>	<u>Approximate Elevation of Test (ft msl)</u>	<u>Soil Description</u>	<u>Infiltration Rate (inches/hr)</u>
I-1	1471	Clayey fine to medium Sand	0.3
I-2	1473	fine to coarse Sand	14.9
I-3	1475	Silty fine to medium Sand/fine to medium Sandy Silt	2.5

Laboratory Testing

Grain Size Analysis

The grain size distribution of selected soils from the base of each infiltration test trench has been

determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented at the end of this report.

Design Recommendations

A total of three (3) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration locations range from 0.3 to 14.9 inches per hour. The primary reason that the infiltration rates vary is the amount of clay and silt content, which varies at different depths and locations within the native soils throughout the subject site. Higher clay and silt content was observed within the soils exposed at the bottom of Infiltration Trench No. I-1 and I-3, which exhibited slower infiltration rates.

Based on these considerations, the designer of the system may wish to apply a factor of safety to the recommended infiltration rate at his discretion. **Based on the infiltration test results from Infiltration Trench Nos. I-1 and I-2, we recommend a design infiltration rate of 0.3 inches per hour be used in the design of the proposed detention/infiltration basin located at the southeast corner of Building 1.** Please note that a fine to coarse sand stratum was encountered at the base of the Infiltration Test No. I-2. This fine to coarse sand stratum appears to be a localized condition and does not accurately reflect the subsurface conditions throughout the site. The below grade storm water detention/infiltration system should not be designed for a localized stratum that does not represent the on-site subsurface conditions. **Based on the infiltration test results from Infiltration Trench No. I-3, we recommend a design infiltration rate of 2.5 inches per hour be used in the possible proposed detention/infiltration basin located south of Building 2.**

The design of the storm water infiltration systems should be performed by the project civil engineer, in accordance with the city of Moreno Valley and/or Riverside county guidelines. However, it is recommended that the systems be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. It is recommended that the project civil engineer apply an appropriate factor of safety. **The infiltration rates recommended above are based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rates.** It should be noted that the recommended infiltration rates are based on infiltration testing at three (3) discrete locations and the overall infiltration rate of the storm water infiltration systems could vary considerably.

Infiltration versus Permeability

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. The infiltration rates presented herein were determined in accordance with the ASTM Test Method D-3385-03 standard, and are considered valid for the time and place of the actual test. Changes in soil moisture content will affect these infiltration rates. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system

designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Structures and pavements adjacent to the infiltration areas could potentially be damaged due to saturation of subgrade soils.

If possible, all of the proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls. Even with this provision of locating the infiltration systems at least 25 feet from any structures, it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed structures (if any). It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure (if any), depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rates contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between trench locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

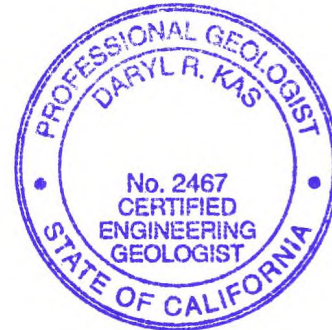
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.



Robert G. Trazo, M.Sc., GE 2655
Principal Engineer

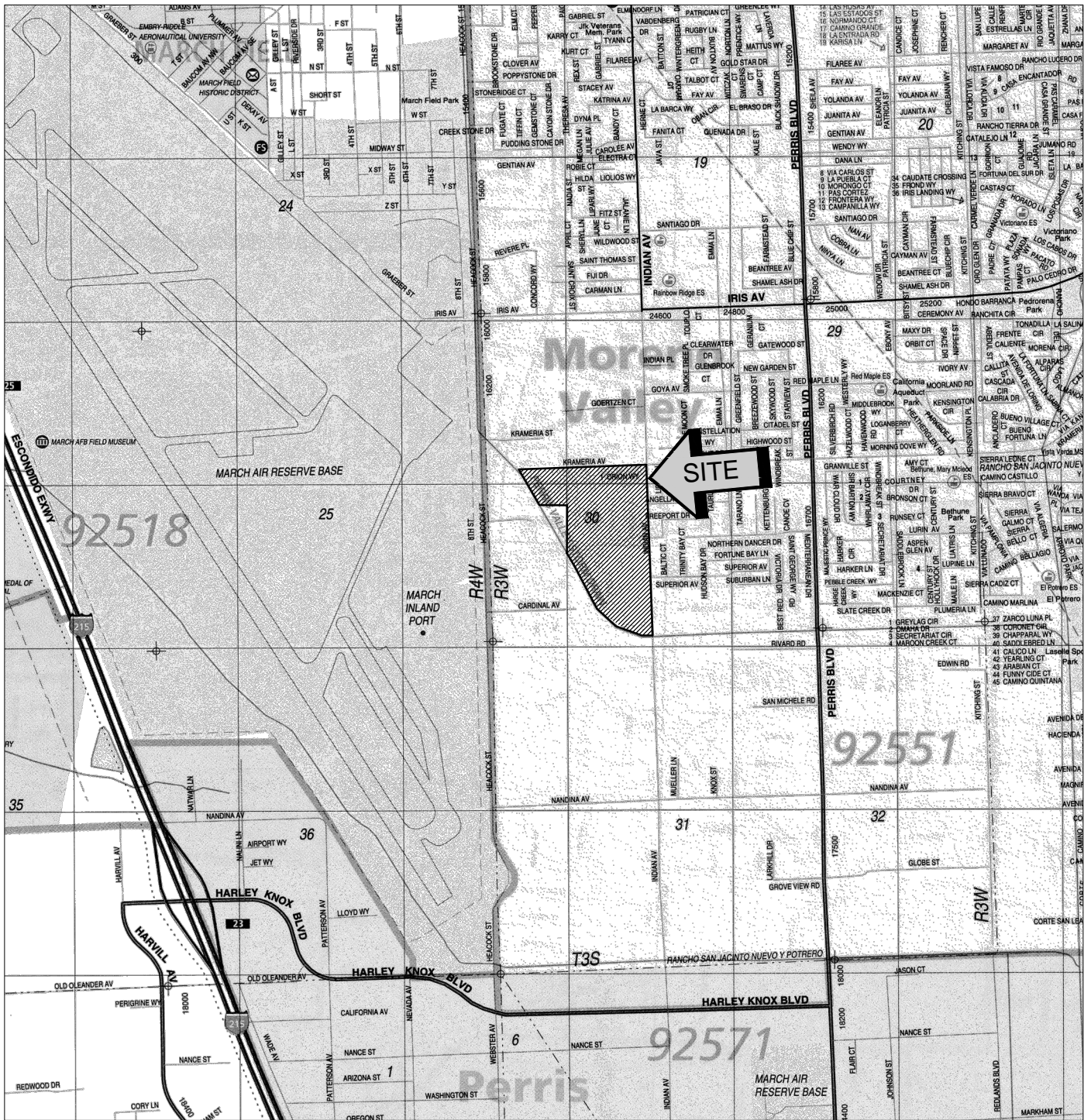


Daryl Kas
Project Geologist



Distribution: (1) Addressee

Enclosures: Plate 1 Site Location Map
Plate 2 Infiltration Test Location Plan
Trench Logs (3 pages)
Infiltration Test Results Spreadsheets (3 pages)
Grain Size Analysis Graphs (3 pages)



SOURCE: RIVERSIDE COUNTY
THOMAS GUIDE, 2013

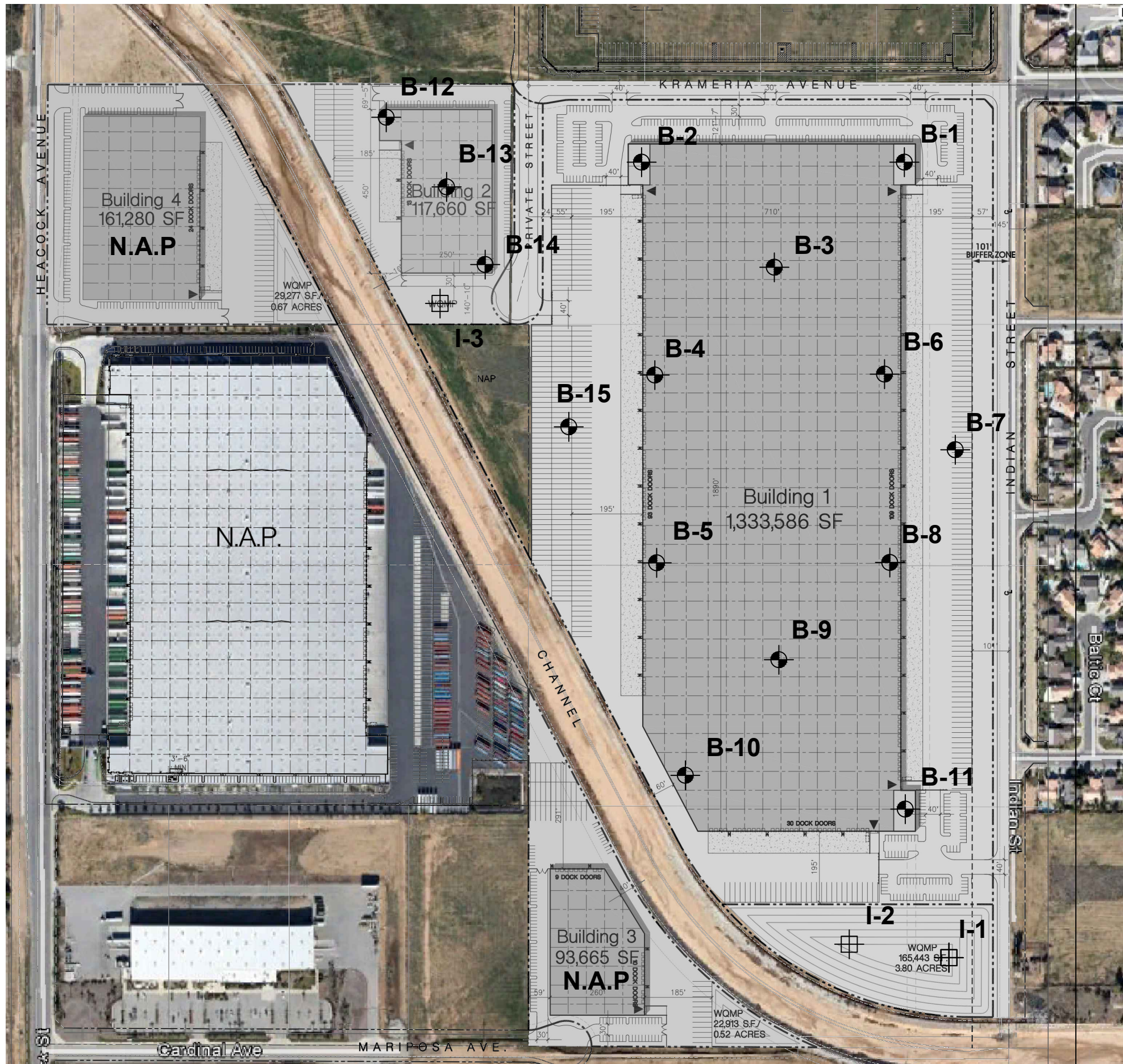


SITE LOCATION MAP
PROPOSED MORENO VALLEY LOGISTICS CENTER
MORENO VALLEY, CALIFORNIA



SCALE: 1" = 2400'
 DRAWN: JSW
 CHKD: RGT
 SCG PROJECT
 14G160-2
PLATE 1




SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

-  APPROXIMATE INFILTRATION TEST LOCATION
-  APPROXIMATE BORING LOCATION (SCG PROJECT NO. 14G160-1)

INFILTRATION TEST LOCATION PLAN	
PROPOSED MORENO VALLEY LOGISTICS CENTER	
MORENO VALLEY, CALIFORNIA	
SCALE: 1" = 300'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JSW	
CHKD: JAS	
SCG PROJECT 14G160-2	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
I-3

JOB NO.: 14G160-2

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Proposed MVLC

LOGGED BY: Jon White

SEEPAGE DEPTH: Dry

LOCATION: Moreno Valley, CA

ORIENTATION: N 75 W

READINGS TAKEN: At Completion

DATE: 06-25-2014

TOP OF TRENCH ELEVATION: 1483.0 feet msl

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
5				<p>A: DISTURBED ALLUVIUM: Light fine Sandy Silt, abundant fine root fibers, rope, loose - dry</p> <p>B: ALLUVIUM: Light Brown fine Sandy Silt, trace Clay, trace fine root fibers, slightly porous, dense - dry</p> <p>C: ALLUVIUM: Brown fine Sandy Silt, trace Clay, trace fine root fibers, moderately porous, dense - damp</p> <p>D: ALLUVIUM: Brown Silty fine to medium sand/ fine to medium sandy silt, trace coarse sand, loose to medium dense - moist</p>	
10				<p>Trench Terminated @ 8 feet</p>	
15					

KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
I-2**

JOB NO.: 14G160-2

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Proposed MVLC

LOGGED BY: Jon White

SEEPAGE DEPTH: Dry

LOCATION: Moreno Valley, CA

ORIENTATION: N 8 W

READINGS TAKEN: At Completion

DATE: 06-25-2014

TOP OF TRENCH ELEVATION: 1479.0 feet msl

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
<div style="text-align: center;">5</div> <div style="text-align: center;">10</div> <div style="text-align: center;">15</div>				<p>A: DISTURBED ALLUVIUM: Light Brown fine Sandy Silt, trace medium sand, some fine root fibers, loose - very dry</p> <p>B: ALLUVIUM: Brown to Dark Brown, fine Sandy Clay, trace Silt, little to some fine root fibers, porous, stiff to very stiff - dry to damp</p> <p>C: ALLUVIUM: Brown, fine to coarse Sand, trace Silt, medium dense - dry to damp</p> <p style="text-align: center;">Trench Terminated @ 6 feet</p>	<p>N 8 W →</p> <p style="text-align: right;">SCALE: 1" = 5'</p>

KEY TO SAMPLE TYPES:
 B - BULK SAMPLE (DISTURBED)
 R - RING SAMPLE 2-1/2" DIAMETER
 (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

**TRENCH NO.
I-1**

JOB NO.: 14G160-2

EQUIPMENT USED: Backhoe

WATER DEPTH: Dry

PROJECT: Proposed MVLC

LOGGED BY: Jon White

SEEPAGE DEPTH: Dry

LOCATION: Moreno Valley, CA

ORIENTATION: N 5 W

READINGS TAKEN: At Completion

DATE: 06-25-2014

TOP OF TRENCH ELEVATION: 1478.0 feet msl

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION	GRAPHIC REPRESENTATION
<div style="text-align: center;">5</div> <div style="text-align: center;">10</div> <div style="text-align: center;">15</div>				<p>A: DISTURBED ALLUVIUM: Light Brown fine Sandy Silt, trace medium to coarse Sand, trace fine to coarse gravel, abundant root fibers, plastic bag, loose - dry</p> <p>B: ALLUVIUM: Brown Clayey Silt, fine to medium sand lensing (2 inches), trace fine root fibers, porous, stiff - dry to damp</p> <p>C: ALLUVIUM: Brown Clayey fine Sand to fine Sandy Clay, trace Silt, trace fine root fibers, moderately porous, dense to stiff - dry to damp</p> <p>D: ALLUVIUM: Brown clayey fine to medium sand, trace coarse Sand, moderate Calcareous veining, mottled, porous, medium dense to dense - damp</p> <p style="text-align: center;">Trench Terminated @ 7 feet</p>	<div style="text-align: right;">SCALE: 1" = 5'</div> <p style="text-align: center;">N 5 W</p> <p style="text-align: center;">Granite rock (9')</p> <p style="text-align: center;">Plastic Bag</p> <p style="text-align: center;">A, B, C, D</p>

KEY TO SAMPLE TYPES:
 B - BULK SAMPLE (DISTURBED)
 R - RING SAMPLE 2-1/2" DIAMETER
 (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

INFILTRATION CALCULATIONS

Project Name	Proposed Moreno Valley Logistics Center
Project Location	Moreno Valley, CA
Project Number	14G160-2
Engineer	Jon White

Infiltration Test No I-1

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:00 AM	30	700	1000	2000	3400	2.74	3.11	1.08	1.22
	Final	9:30 AM	30	1700		5400					
2	Initial	9:34 AM	30	650	500	1600	1900	1.37	1.74	0.54	0.68
	Final	10:04 AM	64	1150		3500					
3	Initial	10:05 AM	30	500	450	1500	1800	1.23	1.64	0.49	0.65
	Final	10:35 AM	95	950		3300					
4	Initial	10:40 AM	30	500	325	2100	1300	0.89	1.19	0.35	0.47
	Final	11:10 AM	130	825		3400					
5	Initial	11:11 AM	30	800	250	2100	1300	0.69	1.19	0.27	0.47
	Final	11:41 AM	161	1050		3400					

INFILTRATION CALCULATIONS

Project Name	Proposed Moreno Valley Logistics Center
Project Location	Moreno Valley, CA
Project Number	14G160-2
Engineer	Jon White

Infiltration Test No I-2

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:40 AM	5	800	2600	1600	8400	42.76	46.05	16.84	18.13
	Final	9:45 AM	5	3400		10000					
2	Initial	9:46 AM	5	850	2500	1900	7900	41.12	43.31	16.19	17.05
	Final	9:51 AM	11	3350		9800					
3	Initial	9:54 AM	5	1100	2450	1700	7400	40.29	40.57	15.86	15.97
	Final	9:59 AM	19	3550		9100					
4	Initial	10:01 AM	5	650	2350	2200	7400	38.65	40.57	15.22	15.97
	Final	10:06 AM	26	3000		9600					
5	Initial	10:07 AM	5	100	3350	1700	7300	55.10	40.02	21.69	15.76
	Final	10:12 AM	32	3450		9000					
6	Initial	10:15 AM	5	700	2350	1900	7100	38.65	38.92	15.22	15.32
	Final	10:20 AM	40	3050		9000					
7	Initial	10:21 AM	5	600	2300	2000	6900	37.83	37.83	14.89	14.89
	Final	10:26 AM	46	2900		8900					

INFILTRATION CALCULATIONS

Project Name	Proposed Moreno Valley Logistics Center
Project Location	Moreno Valley, CA
Project Number	14G160-2
Engineer	Jon White

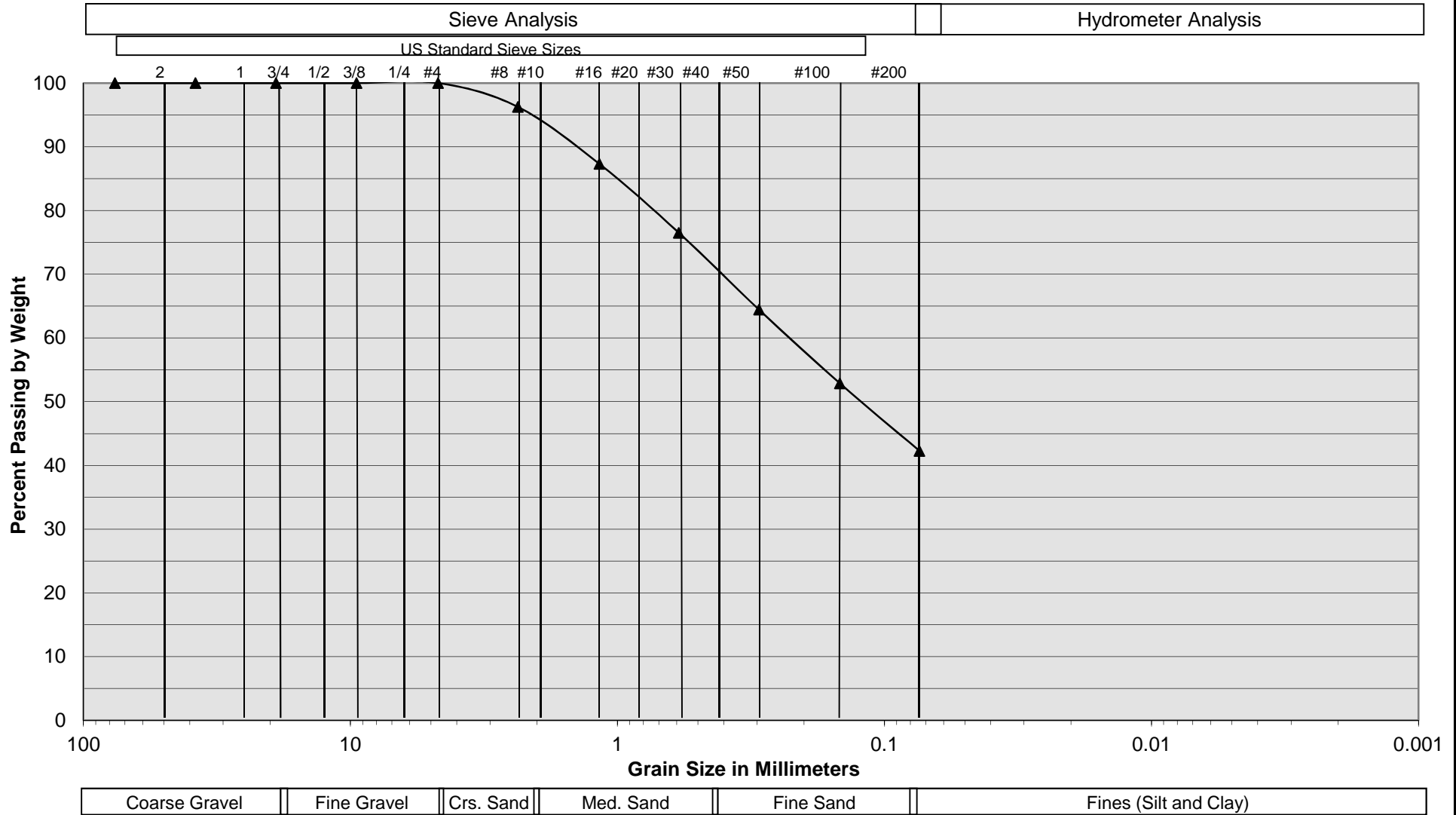
Infiltration Test No I-3

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.79	730
Annular	2	2.36	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Time Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	12:28 PM	30	1150	3050	1700	11100	8.36	10.14	3.29	3.99
	Final	12:58 PM	30	4200		12800					
2	Initial	1:00 PM	20	850	1700	2000	5800	6.99	7.95	2.75	3.13
	Final	1:20 PM	52	2550		7800					
3	Initial	1:21 PM	20	850	1650	1800	5200	6.78	7.13	2.67	2.81
	Final	1:41 PM	73	2500		7000					
4	Initial	1:42 PM	20	950	1600	2150	5050	6.58	6.92	2.59	2.72
	Final	2:02 PM	94	2550		7200					
5	Initial	2:02 PM	20	1000	1550	1900	4700	6.37	6.44	2.51	2.54
	Final	2:22 PM	114	2550		6600					

Grain Size Distribution



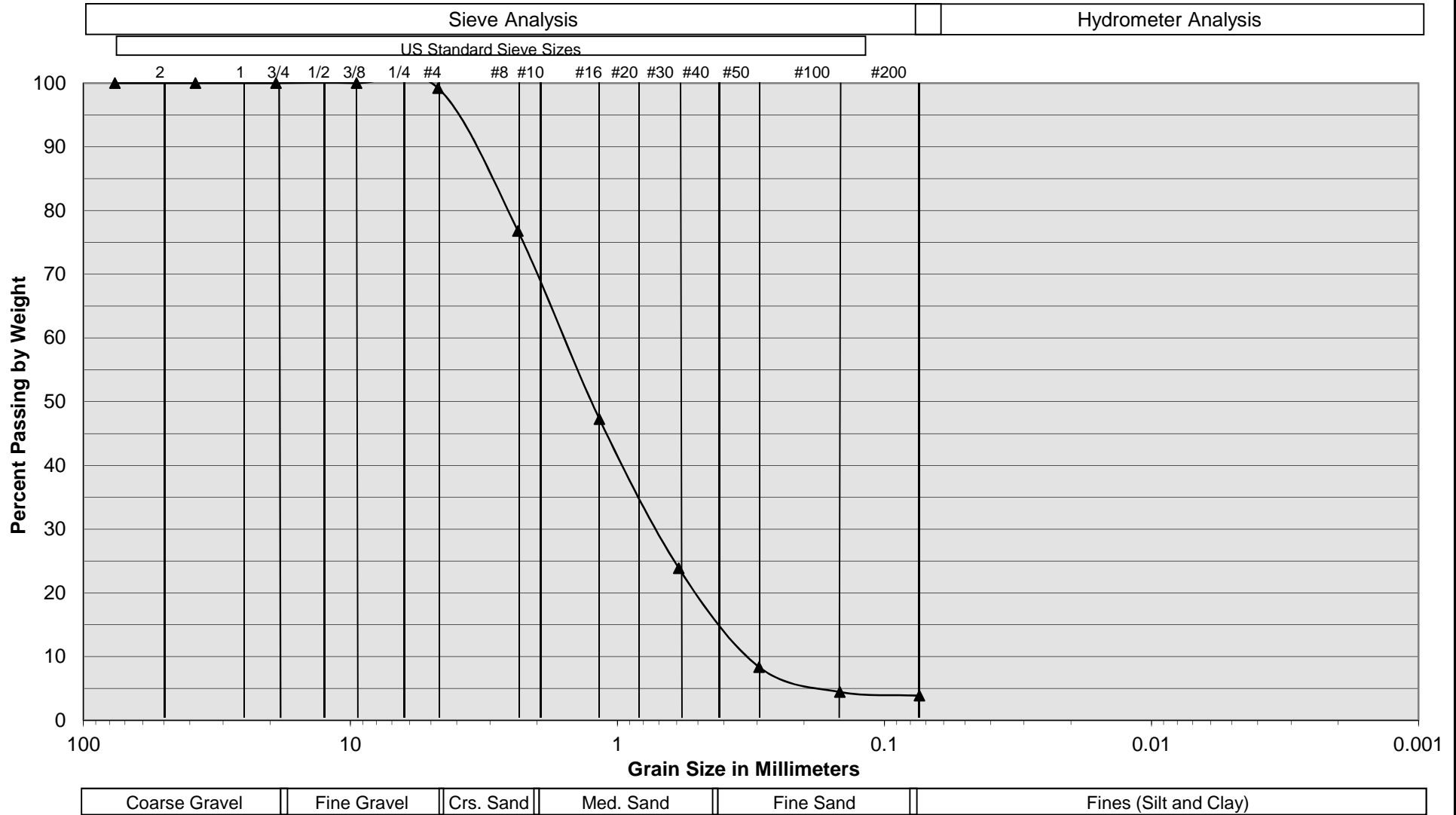
Sample Description	I-1 @ 7'
Soil Classification	Brown Clayey fine to medium Sand, trace coarse Sand

Proposed Moreno Valley Logistics Center
 Moreno Valley, California
 Project No. 14G160-2
PLATE C-1



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



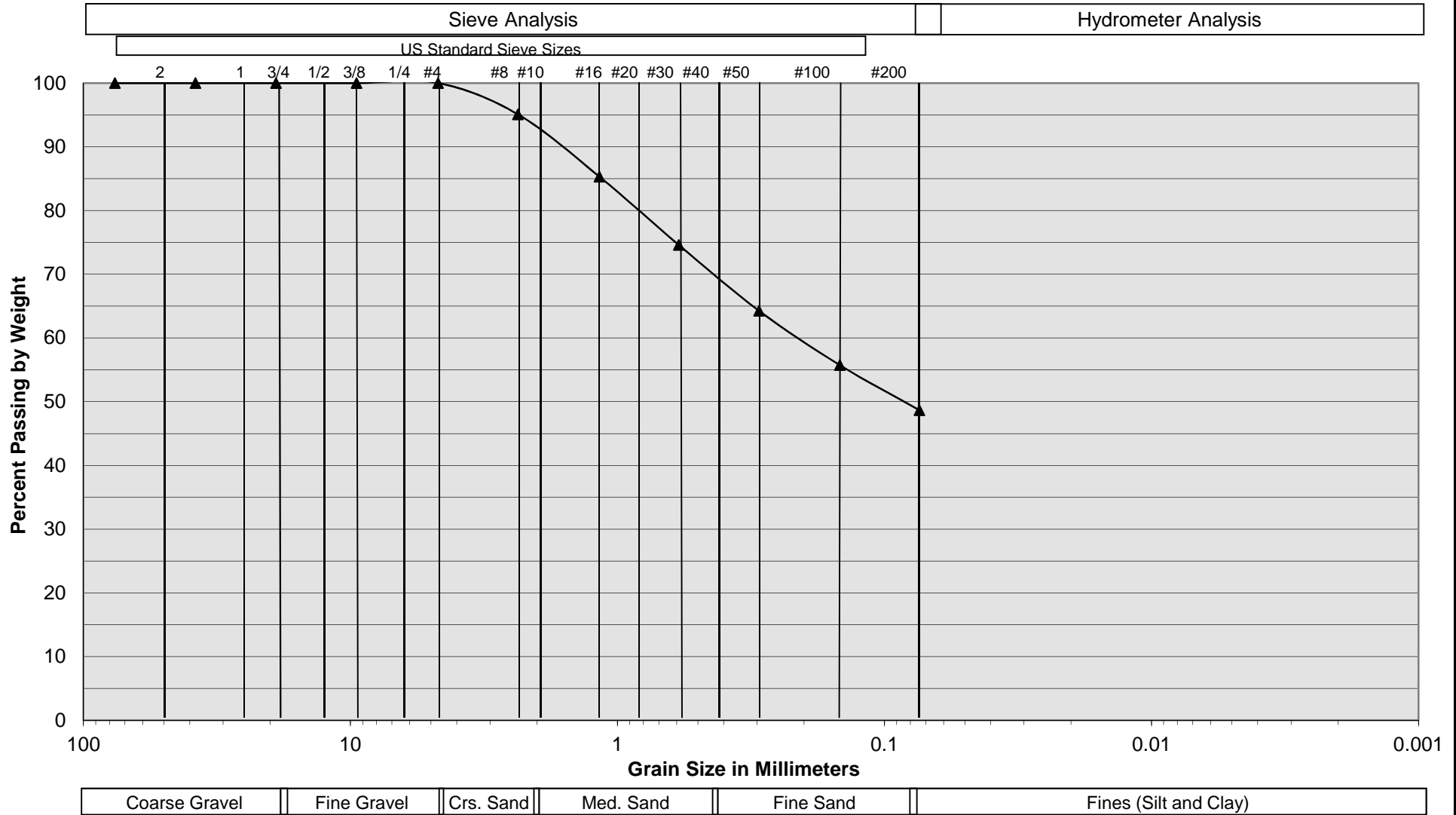
Sample Description	I-2 @ 6'
Soil Classification	Brown fine to coarse Sand, trace Silt

Prologis Moreno Valley Logistics Center
 Moreno Valley, California
 Project No. 14G160-2
PLATE C-2



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-3 @ 8'
Soil Classification	Brown Silty fine to medium Sand, trace coarse Sand

Proposed Moreno Valley Logistics Center
 Moreno Valley, California
 Project No. 14G160-2
PLATE C-3



SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use (NOT APPLICABLE)

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Riverside County SWCT² Stormwater & Water Conservation Tracking Tool

TOC Choose search item from list Enter Value Locate Clear

Clear All Metadata

- Base Maps
 - Topo Map
 - Street Map
 - Aerial Photo
 - USGS Maps
- Base Data
- Stormwater Data
- Groundwater Data
 - SAR Groundwater Management Zones
 - SMR Groundwater Management Zones
 - WWR Groundwater Management Zones
 - Wholesaler (Water Districts)
 - Retailer (Water Districts)
 - Geotracker Locations
 - Ground Water Elevations
 - Soils
 - Plumes
- U.S. Fish and Wildlife Critical Habitat
- WRMShCP Potential Survey Areas
- SKRHCP
- CVMSHCP Survey Data and Conservation Areas

PROJECT SITE

Vicky Li

From: Hoang Nguyen [hoangn@moval.org]
Sent: Wednesday, October 07, 2015 8:31 AM
To: 'Vicky Li'
Subject: RE: PA15-0014 - Moreno Valley Logistics Center

Vicky,

Due to the requirements by the ALUC, the City will accept the use of the SF Basin.

Hoang Nguyen

Associate Engineer

Public Works

City of Moreno Valley

p: 951.413.3216 | e: hoangn@moval.org W: www.moval.org

14177 Frederick St., Moreno Valley, CA 92553



From: Vicky Li [<mailto:vicky@thieneseng.com>]
Sent: Tuesday, October 06, 2015 10:47 AM
To: Hoang Nguyen
Subject: PA15-0014 - Moreno Valley Logistics Center

Hi Hoang,

Per our conversation:

- The project site has six Extended Detention Basins (EDBs) proposed.
- County of Riverside Airport Land Use Commission (ALUC) is restricting water quality management basins to a maximum 48-hour detention period following the conclusion of the storm event. See item#4 on PDF page 4 of 51 of attachment.
- Melanie's redlines from the 1st review tells us that sand filters are treatment control BMPs and that we have bypassed part of the hierarchy.
- The email attached is from you, me, and Melanie about how we decided that EDBs are best for the site since it allows larger tributary areas and nobody is concerned with the small amount of infiltration from an EDB over a plume.
- In order to design an EDB to drawdown 100% of the volume within 48 hours, we are unable to hold 50% of the volume for 24+ hours.

We either need clearance for (1) to allow for these EDBs to drawdown 50% of the volume in less than 24 hours (preliminary numbers are around 10 hours) which kind of defeats the purpose of EDBs since they rely on holding stormwater for longer periods of time, or 2) the project is allowed to bypass this part of the hierarchy and revert to sand filter basins.

Please provide an answer today.. it'd be much appreciated, thank you!

Vicky Li

Design Engineer

THIENES ENGINEERING, INC.

14349 Firestone Blvd. | La Mirada, California | 90638

P: 714.521.4811 ext: 253 F: 714.521.4173

vicky@thieneseng.com

**COUNTY OF RIVERSIDE
AIRPORT LAND USE COMMISSION**

STAFF REPORT

AGENDA ITEM: 3.4

HEARING DATE: October 8, 2015

CASE NUMBER: ZAP1137MA15 – Prologis – Scott Mulkay (Representative:
T&B Planning, Inc. – Grant Henninger)

APPROVING JURISDICTION: City of Moreno Valley

JURISDICTION CASE NO: PA 15-0014 (Plot Plan – Building 1), PA 15-0015 (Plot Plan – Building 2), PA 15-0016 (Plot Plan – Building 3), PA 15-0017 (Plot Plan – Building 4), PA 15-0018 (Tentative Parcel Map No. 36150), P 15-036 (Specific Plan Amendment)

MAJOR ISSUES: None.

RECOMMENDATION: Staff recommends a finding of CONSISTENCY for the Specific Plan Amendment, the Parcel Map, and the Plot Plans, subject to the conditions included herein.

PROJECT DESCRIPTION: The applicant proposes development of Moreno Valley Logistics Center, consisting of four industrial (predominantly warehouse) buildings, on 84.82 net acres:

- Building 1 (PA15-0014) --- 1,351,770 square feet gross floor area, including 30,000 square feet of office space;
- Building 2 (PA15-0015) --- 122,516 square feet gross floor area, including 10,000 square feet of office space;
- Building 3 (PA15-0016) --- 97,222 square feet gross floor area, including 10,000 square feet of office space;
- Building 4 (PA15-0017) --- 166,010 square feet of floor area, including 10,000 square feet of office space.

Tentative Parcel Map No. 36150 (PA15-0018) would divide the portion of the site easterly of the Perris Valley Storm Drain Channel (69.55 acres) into two lots, so that Buildings 1 and 2 would be on separate legal lots. The applicant also proposes to amend (PA15-036) the Moreno Valley Industrial Specific Plan (Specific Plan No. 208) so as to allow the buffer between industrial and residential uses along the portion of the west side of Indian Street southerly of Krameria Avenue and northerly of the Perris Valley Storm Drain Channel to be reduced from 250 feet to 100 feet. (This provision already applies to areas northerly of Krameria Avenue extending north to Iris Avenue.)

CONDITIONS:

1. Any outdoor lighting installed shall be hooded or shielded to prevent either the spillage of lumens or reflection into the sky. Outdoor lighting shall be downward facing.
2. The following uses shall be prohibited:
 - (a) Any use which would direct a steady light or flashing light of red, white, green, or amber colors associated with airport operations toward an aircraft engaged in an initial straight climb following takeoff or toward an aircraft engaged in a straight final approach toward a landing at an airport, other than an FAA-approved navigational signal light or visual approach slope indicator.
 - (b) Any use which would cause sunlight to be reflected towards an aircraft engaged in an initial straight climb following takeoff or towards an aircraft engaged in a straight final approach towards a landing at an airport.
 - (c) Any use which would generate smoke or water vapor or which would attract large concentrations of birds, or which may otherwise affect safe air navigation within the area. (Such uses include landscaping utilizing water features, aquaculture, production of cereal grains, sunflower, and row crops, composting operations, trash transfer stations that are open on one or more sides, recycling centers containing putrescible wastes, construction and demolition debris facilities, fly ash disposal, and incinerators.)
 - (d) Any use which would generate electrical interference that may be detrimental to the operation of aircraft and/or aircraft instrumentation.
 - (e) In Buildings 3 and 4: Children's schools, day care centers, libraries, hospitals, skilled nursing and care facilities, congregate care facilities, noise sensitive outdoor nonresidential uses and hazards to flight.
3. The attached notice shall be given to all prospective purchasers of the property and tenants of the buildings, and shall be recorded as a deed notice.
4. **The proposed detention basins on the site (including water quality management basins) shall be designed so as to provide for a maximum 48-hour detention period following the conclusion of the storm event for the design storm (may be less, but not more), and to remain totally dry between rainfalls. Vegetation in and around the detention basins that would provide food or cover for bird species that would be incompatible with airport operations shall not be utilized in project landscaping.** Trees shall be spaced so as to prevent large expanses of contiguous canopy, when mature. Landscaping in and around the detention

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Vicky Li

From: Hoang Nguyen [hoangn@moval.org]
Sent: Tuesday, August 27, 2013 3:45 PM
To: 'Vicky Li'
Cc: Kent Wegelin
Subject: RE: WQMP - Krameria Ave & Indian Street

Vicky,

The City does not have any objection to allow 30 ac that are tributary to each basin. As far as the separation, the City does not have a criteria. It is up to the engineer of work to determine what works for their situation, is safe and functions properly.

Hoang Nguyen
Associate Engineer, P.E.
City of Moreno Valley
14177 Frederick St.
Moreno Valley, Ca 92552-0805
T: 951.413.3216
F: 951.413.3158
E: hoangn@moval.org
W: www.moval.org

From: Vicky Li [<mailto:vicky@thieneseng.com>]
Sent: Monday, August 26, 2013 8:54 AM
To: Hoang Nguyen
Cc: Kent Wegelin
Subject: WQMP - Krameria Ave & Indian Street

Morning Hoang,

Hope you've been well. We have a ~63 acre project site along the S/W corner of Krameria Avenue and Indian Street intersection. It's the property immediately south of PA13-0022. Being under the same circumstances, nearby air force contamination and infiltration rates well below the 1.6 in/hr minimum, we are choosing to use sand filter basins (SFBs) again. The site's existing and proposed drainage flows from northerly to southerly.

We are proposing the use of two SFBs each taking in approximately 30 acres, however, the LID handbook states a maximum of 25 acres of tributary area per SFB. Will you allow an additional 5 acres of tributary area per basin? Also, these SFBs will be next to each other. What is the minimum separation you would like to see between the SFBs?

Your assistance is greatly appreciated.

Thank you,
Vicky Li, EIT, QSP
Design Engineer
Thienes Engineering, Inc.
14349 Firestone Blvd.
La Mirada, Ca 90638
Phone 714-521-4811 x253
Fax 714-521-4173
vicky@thieneseng.com

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 1)**

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} = **0.64** 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)
1A	307098	Roofs	1	0.89	273931.4			
1B	69696	Ornamental Landscaping	0.1	0.11	7698.5			
	376794				281629.9	0.64	15020.3	18774

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 1		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date:	11/9/2015
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area		$A_{TRIB} =$	<u>8.65</u> ac
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$	<u>15,021</u> ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)		$z =$	<u>4</u> :1
Proposed basin depth (see Figure 1)		$d_B =$	<u>1.6</u> ft
Depth of freeboard (if used)		$d_{fb} =$	<u>2.83</u> ft
Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$)		$A_s =$	<u>9388.13</u> ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)		$d_{req} =$	<u>6.6</u> ft
Proposed Surface Area			<u>9,600</u> ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})		Volume =	<u>75.105</u> ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)		Depth =	<u>1</u> ft
Forebay surface area (minimum)		Area =	<u>75.105</u> ft ²
Full height notch-type weir		Width (W) =	<u>1.50</u> in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth, $df =$	<u>18</u> inches		
Underdrains			
Diameter of perforated underdrain			<u>6</u> in
Spacing of underdrains (maximum 20 feet on center)		OK	<u>10</u> ft
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #1

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1481.76	0.00	9600			
			3307	3307	0.076
1482.09	0.33	10445			
			3705	7013	0.161
1482.43	0.67	11350			
			3896	10908	0.250
1482.76	1.00	12260			
			4199	15107	0.347
1483.09	1.33	13190			
			3667	18774	0.431
1483.36	1.60	13970			
			9555	28329	0.650
1484.00	2.24	15890			
			17483	45812	1.052
1485.00	3.24	19075			
			20783	66594	1.529
1486.00	4.24	22490			
			4344	70939	1.629
1486.19	4.43	23240			

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 2)**

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} = **0.64** 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)
2A	297515	Roofs	1	0.89	265383.4			
2B	50094	Ornamental Landscaping	0.1	0.11	5533.3			
	347609				270916.7	0.64	14448.9	17466

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 2		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date:	11/9/2015
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area		$A_{TRIB} =$	<u>8.18</u> ac
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$	<u>14,500</u> ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)		$z =$	<u>4</u> :1
Proposed basin depth (see Figure 1)		$d_B =$	<u>1.2</u> ft
Depth of freeboard (if used)		$d_{fb} =$	<u>1.71</u> ft
Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$)		$A_s =$	<u>12083.3</u> ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)		$d_{req} =$	<u>5.08</u> ft
Proposed Surface Area			<u>12,490</u> ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})		Volume =	<u>72.5</u> ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)		Depth =	<u>1</u> ft
Forebay surface area (minimum)		Area =	<u>72.5</u> ft ²
Full height notch-type weir		Width (W) =	<u>1.50</u> in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth,	$df =$	<u>18</u>	inches
Underdrains			
Diameter of perforated underdrain			<u>6</u> in
Spacing of underdrains (maximum 20 feet on center)		OK	<u>10</u> ft
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #2

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1479.95	0.00	12490			
			4257	4257	0.098
1480.28	0.33	13310			
			4671	8928	0.205
1480.62	0.67	14165			
			2884	11812	0.271
1480.82	0.87	14675			
			1182	12994	0.298
1480.90	0.95	14880			
			747	13741	0.315
1480.95	1.00	15010			
			3725	17466	0.401
1481.15	1.20	22235			
			2476	19942	0.458
1481.28	1.33	15865			
			12105	32047	0.736
1482.00	2.05	17760			
			16258	48305	1.109
1482.86	2.91	20050			

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 3)**

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} = **0.64** 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)
3A	609840	Roofs	1	0.89	543977.3			
3B	50094	Ornamental Landscaping	0.1	0.11	5533.3			
	659934				549510.6	0.64	29307.2	41361

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 3		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date:	11/9/2015
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area		$A_{TRIB} =$	<u>15.15</u> ac
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$	<u>29,307</u> ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)		$z =$	<u>4</u> :1
Proposed basin depth (see Figure 1)		$d_B =$	<u>3.1</u> ft
Depth of freeboard (if used)		$d_{fb} =$	<u>1.76</u> ft
Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$)		$A_s =$	<u>9453.87</u> ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)		$d_{req} =$	<u>7.03</u> ft
Proposed Surface Area			<u>9,470</u> ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})		Volume =	<u>146.535</u> ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)		Depth =	<u>1</u> ft
Forebay surface area (minimum)		Area =	<u>146.535</u> ft ²
Full height notch-type weir		Width (W) =	<u>1.50</u> in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth,	$df =$	<u>18</u>	inches
Underdrains			
Diameter of perforated underdrain			<u>6</u> in
Spacing of underdrains (maximum 20 feet on center)		OK	<u>10</u> ft
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #3

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1476.45	0.00	9470			
			3253	3253	0.075
1476.78	0.33	10245			
			3512	6765	0.155
1477.11	0.66	11040			
			3778	10543	0.242
1477.44	0.99	11855			
			4050	14593	0.335
1477.77	1.32	12690			
			4327	18920	0.434
1478.10	1.65	13535			
			4610	23530	0.540
1478.43	1.98	14405			
			4900	28429	0.653
1478.76	2.31	15290			
			5194	33624	0.772
1479.09	2.64	16190			
			5490	39114	0.898
1479.42	2.97	17085			
			2247	41361	0.950
1479.55	3.10	17480			
			3553	44914	1.031
1479.75	3.30	18050			
			6115	51029	1.171
1480.08	3.63	19010			
			6434	57463	1.319
1480.41	3.96	19985			
			6758	64221	1.474
1480.74	4.29	20975			
			7088	71310	1.637
1481.07	4.62	21985			
			5994	77304	1.775
1481.31	4.86	27965			

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 4)**

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} = **0.64** 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)
4A	1078110	Roofs	1	0.89	961674.1			
4B	113256	Ornamental Landscaping	0.1	0.11	12510			
	1191366		Total		974184.1	0.64	51956.5	56063

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 4		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date:	11/9/2015
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area	Tributary area may not exceed 25 acres	$A_{\text{TRIB}} =$	<u>27.35</u> ac
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{\text{BMP}} =$	<u>51,957</u> ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)		$z =$	<u>4</u> :1
Proposed basin depth (see Figure 1)		$d_{\text{B}} =$	<u>0.85</u> ft
Depth of freeboard (if used)		$d_{\text{fb}} =$	<u>4</u> ft
Minimum bottom surface area of basin ($A_{\text{S}} = V_{\text{BMP}}/d_{\text{B}}$)		$A_{\text{S}} =$	<u>61125.9</u> ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)		$d_{\text{req}} =$	<u>7.02</u> ft
Proposed Surface Area			<u>63,905</u> ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})		Volume =	<u>259.785</u> ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)		Depth =	<u>1</u> ft
Forebay surface area (minimum)		Area =	<u>259.785</u> ft ²
Full height notch-type weir		Width (W) =	<u>1.50</u> in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth, $d_{\text{f}} =$	<u>18</u> inches		
Underdrains			
Diameter of perforated underdrain			<u>6</u> in
Spacing of underdrains (maximum 20 feet on center)	OK		<u>10</u> ft
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #4

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1472.15	0.00	63905			
			21349	21349	0.490
1472.48	0.33	65485			
			22545	43895	1.008
1472.82	0.67	67135			
			8092	51986	1.193
1472.94	0.79	67725			
			4077	56063	1.287
1473.00	0.85	68165			
			10259	66322	1.523
1473.15	1.00	68615			
			59844	126166	2.896
1474.00	1.85	72195			
			74328	200493	4.603
1475.00	2.85	76460			
			78620	279113	6.408
1476.00	3.85	80780			
			82985	362098	8.313
1477.00	4.85	85190			

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 5)**

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} = **0.64** 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)
5A	609840	Roofs	1	0.89	543977.3			
5B	115434	Ornamental Landscaping	0.1	0.11	12750.6			
	725274				556727.9	0.64	29692.2	32886

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 5		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date: 11/9/2015	
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area			$A_{TRIB} = 16.65$ ac
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} = 29,692$ ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)			$z = 4$:1
Proposed basin depth (see Figure 1)			$d_B = 0.7$ ft
Depth of freeboard (if used)			$d_{fb} = 4.15$ ft
Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$)			$A_s = 42417.1$ ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)			$d_{req} = 7.02$ ft
Proposed Surface Area			$45,355$ ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})			Volume = 148.46 ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)			Depth = 1 ft
Forebay surface area (minimum)			Area = 148.46 ft ²
Full height notch-type weir			Width (W) = 1.50 in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth, $df =$	18	inches	
Underdrains			
Diameter of perforated underdrain			6 in
Spacing of underdrains (maximum 20 feet on center)	OK	10 ft	
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #5

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1472.15	0.00	45355			
			15219	15219	0.349
1472.48	0.33	46880			
			15242	30461	0.699
1472.80	0.65	48385			
			969	31430	0.722
1472.82	0.67	48480			
			1456	32886	0.755
1472.85	0.70	48620			
			7344	40230	0.924
1473.00	0.85	49300			
			51350	91580	2.102
1474.00	1.85	53400			
			55498	147078	3.376
1475.00	2.85	57595			
			59738	206815	4.748
1476.00	3.85	61880			
			64070	270885	6.219
1477.00	4.85	66260			

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 **Thienes Engineering, Inc.**

Date **11/9/2015**

Designed by **Luis Prado**

Case No

Company Project Number/Name

Moreno Valley Logistics Center

BMP Identification

BMP NAME / ID **Sand Filter Basin (DMA 6)**

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} = **0.64** 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)
6A	226512	Roofs	1	0.89	202048.7			
6B	45738	Ornamental Landscaping	0.1	0.11	5052.1			
	272250				207100.8	0.64	11045.4	13860

Notes:

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	DMA 6		Calculated Cells
Company Name:	Thienes Engineering Inc.	Date:	11/9/2015
Designed by:	Luis Prado	County/City Case No.:	
Design Volume			
Total Tributary area		$A_{TRIB} =$	<u>6.25</u> ac
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$	<u>11,045</u> ft ³
Basin Geometry			
Basin side slopes (no steeper than 4:1)		$z =$	<u>4</u> :1
Proposed basin depth (see Figure 1)		$d_B =$	<u>1.7</u> ft
Depth of freeboard (if used)		$d_{fb} =$	<u>2.12</u> ft
Minimum bottom surface area of basin ($A_s = V_{BMP}/d_B$)		$A_s =$	<u>6497.06</u> ft ²
Minimum total depth required (includes freeboard, filter media and subdrains)		$d_{req} =$	<u>5.99</u> ft
Proposed Surface Area			<u>6,575</u> ft ²
Forebay			
Forebay volume (minimum 0.5% V_{BMP})		Volume =	<u>55.225</u> ft ³
Forebay depth (height of berm/splashwall. 1 foot min.)		Depth =	<u>1</u> ft
Forebay surface area (minimum)		Area =	<u>55.225</u> ft ²
Full height notch-type weir		Width (W) =	<u>1.50</u> in
Filter Media			
Description of filter media			
<input checked="" type="checkbox"/>	Sand (ASTM C-33)		
<input type="checkbox"/>	Other (Clarify in "Notes" below)		
Media depth,	$df =$	<u>18</u>	inches
Underdrains			
Diameter of perforated underdrain			<u>6</u> in
Spacing of underdrains (maximum 20 feet on center)		OK	<u>10</u> ft
Notes:			

MORENO VALLEY LOGISTICS CENTER, INDIAN STREET, MORENO VALLEY
BASIN #6

Elevation	Depth (feet)	Area (s.f.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1472.90	0.00	6575			
			2265	2265	0.052
1473.23	0.33	7155			
			2461	4726	0.109
1473.56	0.66	7760			
			2666	7392	0.170
1473.89	0.99	8395			
			2878	10270	0.236
1474.22	1.32	9050			
			915	11186	0.257
1474.32	1.42	9255			
			2184	13370	0.307
1474.55	1.65	9740			
			490	13860	0.318
1474.60	1.70	9845			
			2841	16701	0.383
1474.88	1.98	10450			
			3571	20272	0.465
1475.21	2.31	11190			
			3819	24091	0.553
1475.54	2.64	11955			
			4075	28166	0.647
1475.87	2.97	12745			
			4341	32507	0.746
1476.20	3.30	13565			
			4615	37122	0.852
1476.53	3.63	14405			
			3042	40164	0.922
1476.72	3.82	17615			

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Riverside County **SWCT²**
Stormwater & Water Conservation Tracking Tool

TOC Choose search item from list Enter Value Locate Clear

Clear All Metadata

- Base Maps
 - Topo Map
 - Street Map
 - Aerial Photo
 - USGS Maps
- Base Data
- Stormwater Data
 - Hydromodification Susceptibility Mapping
 - 2010 - 303d/TMDL
 - Hydromodification Exemption Areas
 - Potentially Not Exempt
 - Potentially Exempt
 - District Facilities
 - District Facilities
 - Proposed District Facilities
 - Basin
 - Detention Basin
 - Retention Basin
 - Debris Basin
 - Dam
 - Levee
 - Spreading Grounds
 - Other
 - Permit Areas
 - Hydrologic Unit Codes (HUC)
 - Topographic Drainage Boundary
 - Drainage Area Boundaries
 - City Storm Drains
 - WQMP 85% Design Isohyetal Map
 - CRP (Control Release Point)
 - FEMA Flood Plain
 - Flood Plain - Other Special Studies

Identify Features
Click on map to view data.

1211 (Fema Flood Zones)

OBJECTID	1131
FLOOD ID	1211
FLOOD_ZONE	AO
FLOODWAY	

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1 on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> A. On-site storm drain inlets	<input type="checkbox"/> Locations of inlets.	<input type="checkbox"/> Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	<input type="checkbox"/> Maintain and periodically repaint or replace inlet markings. <input type="checkbox"/> Provide stormwater pollution prevention information to new site owners, lessees, or operators. <input type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com <input type="checkbox"/> Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”
<input type="checkbox"/> B. Interior floor drains and elevator shaft sump pumps		<input type="checkbox"/> State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input type="checkbox"/> C. Interior parking garages		<input type="checkbox"/> State that parking garage floor drains will be plumbed to the sanitary sewer.	<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> D1. Need for future indoor & structural pest control		<input type="checkbox"/> Note building design features that discourage entry of pests.	<input type="checkbox"/> Provide Integrated Pest Management information to owners, lessees, and operators.
<input type="checkbox"/> D2. Landscape/ Outdoor Pesticide Use	<input type="checkbox"/> Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. <input type="checkbox"/> Show self-retaining landscape areas, if any. <input type="checkbox"/> Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	<p>State that final landscape plans will accomplish all of the following.</p> <input type="checkbox"/> Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. <input type="checkbox"/> Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. <input type="checkbox"/> Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. <input type="checkbox"/> Consider using pest-resistant plants, especially adjacent to hardscape. <p>To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</p>	<input type="checkbox"/> Maintain landscaping using minimum or no pesticides. <input type="checkbox"/> See applicable operational BMPs in “What you should know for.....Landscape and Gardening” at http://rcflood.org/stormwater/Error! <small>Hyperlink reference not valid.</small> <input type="checkbox"/> Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> E. Pools, spas, ponds, decorative fountains, and other water features.	<input type="checkbox"/> Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	<input type="checkbox"/> See applicable operational BMPs in “Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain” at http://rcflood.org/stormwater/
<input type="checkbox"/> F. Food service	<input type="checkbox"/> For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. <input type="checkbox"/> On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	<input type="checkbox"/> Describe the location and features of the designated cleaning area. <input type="checkbox"/> Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	<input type="checkbox"/> See the brochure, “The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries” at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
<input type="checkbox"/> G. Refuse areas	<input type="checkbox"/> Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. <input type="checkbox"/> If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. <input type="checkbox"/> Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	<input type="checkbox"/> State how site refuse will be handled and provide supporting detail to what is shown on plans. <input type="checkbox"/> State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.	<input type="checkbox"/> State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> H. Industrial processes.	<input type="checkbox"/> Show process area.	<input type="checkbox"/> If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	<input type="checkbox"/> See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure “Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities” at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<p><input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)</p>	<p><input type="checkbox"/> Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.</p> <p><input type="checkbox"/> Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.</p> <p><input type="checkbox"/> Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.</p>	<p>Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.</p> <p>Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:</p> <ul style="list-style-type: none"> ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank <p>www.cchealth.org/groups/hazmat/</p>	<p><input type="checkbox"/> See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials ” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com</p>

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<p><input type="checkbox"/> J. Vehicle and Equipment Cleaning</p>	<p><input type="checkbox"/> Show on drawings as appropriate:</p> <p>(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.</p> <p>(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).</p> <p>(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.</p> <p>(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.</p>	<p><input type="checkbox"/> If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.</p>	<p>Describe operational measures to implement the following (if applicable):</p> <p><input type="checkbox"/> Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to “Outdoor Cleaning Activities and Professional Mobile Service Providers” for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/</p> <p><input type="checkbox"/> Car dealerships and similar may rinse cars with water only.</p>

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<p><input type="checkbox"/> K. Vehicle/Equipment Repair and Maintenance</p>	<p><input type="checkbox"/> Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.</p> <p><input type="checkbox"/> Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.</p> <p><input type="checkbox"/> Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.</p>	<p><input type="checkbox"/> State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.</p> <p><input type="checkbox"/> State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.</p> <p><input type="checkbox"/> State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.</p>	<p>In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:</p> <p><input type="checkbox"/> No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.</p> <p><input type="checkbox"/> No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.</p> <p><input type="checkbox"/> No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.</p> <p>Refer to “Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations”. Brochure can be found at http://rcflood.org/stormwater/</p> <p>Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/</p>

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> L. Fuel Dispensing Areas	<input type="checkbox"/> Fueling areas ⁶ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. <input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area ¹ .] The canopy [or cover] shall not drain onto the fueling area.		<input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> See the Fact Sheet SD-30 , “Fueling Areas” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

⁶ The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> M. Loading Docks	<input type="checkbox"/> Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. <input type="checkbox"/> Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. <input type="checkbox"/> Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		<input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible. <input type="checkbox"/> See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> N. Fire Sprinkler Test Water		<input type="checkbox"/> Provide a means to drain fire sprinkler test water to the sanitary sewer.	<input type="checkbox"/> See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
<p>O. Miscellaneous Drain or Wash Water or Other Sources</p> <input type="checkbox"/> Boiler drain lines <input type="checkbox"/> Condensate drain lines <input type="checkbox"/> Rooftop equipment <input type="checkbox"/> Drainage sumps <input type="checkbox"/> Roofing, gutters, and trim. <input type="checkbox"/> Other sources		<input type="checkbox"/> Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. <input type="checkbox"/> Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. <input type="checkbox"/> Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. <input type="checkbox"/> Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. Include controls for other sources as specified by local reviewer.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> P. Plazas, sidewalks, and parking lots.			<input type="checkbox"/> Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Operation and Maintenance Plan

Project Title: Moreno Valley Logistics Center

Original Date Prepared: November 9, 2015

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Contact Information:

Prepared for:

Prologis, Inc.
17777 Center Court Drive North, Suite 100
Cerritos, CA 90703
(562) 345-9200
CONTACT: Scott Mulkey

Prepared by:

THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
(714) 521-4811
CONTACT: Luis Prado (luisp@thieneseng.com)
JOB NO. 2890d

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- Appendix 7: Manufacturer Information
- Appendix 8: Service Agreement Information

III. Introduction

Proposed improvements to the site consist of the construction of four commercial type buildings ranging from 94,000 to 1,334,000 square feet.

The overall project property encompasses approximately 84.9 acres (an additional 1.28 acres for Cosmo Street). There will be truck yards and vehicle parking lots adjacent to each building. There will be several water quality / detention basins. The existing Cosmos Street will be extended southerly between Buildings 2 and 3. The remainder of the project site will be reserved for landscaping.

Existing Conditions

The project site consists of several undeveloped dirt lots. Runoff generally surface drains south-easterly and into the Perris Valley Storm Drain Channel.

Proposed Conditions

Building 1 Lot:

Runoff from the east half of Building 1, the building's easterly truck yard, and the east half of the northerly parking lot drains to catch basins in the easterly truck yard. It is then conveyed southerly via a proposed storm drain to Basin #4.

Runoff from the west half of Building 1, the building's southerly and westerly truck yards, and the west half of the northerly parking lot drains to catch basins in the southerly truck yard. It is then conveyed southerly via a proposed storm drain to Basin #5. Basin #5 also accepts runoff from Basin #3 and the offsite dirt lot to the west.

Basin #5 discharges to Basin #4, which discharges into the Perris Valley Storm Drain Channel via a proposed storm drain at the Building 1 Lot's southeast corner.

The landscape areas fronting Indian Street, Krameria Avenue and the southern extension of Cosmos Street surface drain to their respective streets.

Building 2 Lot:

Runoff from Building 2, the building's westerly truck yard, easterly parking lot, and the southerly drive aisle drains to a catch basin in the southerly drive aisle. It is then conveyed southerly via a proposed storm drain to Basin #2. Basin #2 discharges into the Perris Valley Storm Drain Channel via a proposed storm drain at the Building 2 Lot's southwest corner.

The landscape area at the Building 2 Lot's northwest corner surface drains to the Perris Valley Storm Drain Channel.

Building 3 Lot:

Runoff from Building 3, the building's northerly and easterly truck yards, and the building's southerly and westerly parking lots drains to catch basins in the truck yards and parking lots. It is then conveyed easterly via a proposed storm drain to Basin #6. Basin #6 discharges into the Perris Valley Storm Drain Channel via a proposed storm drain at the Building 3 Lot's southeast corner.

The landscape area at the north end of the Building 3 Lot surface drains to the Perris Valley Storm Drain Channel. The landscape area adjacent to the southerly property line of the Building 3 Lot surface drains to Cardinal Avenue.

Building 4 Lot:

Runoff from Building 4, the building's easterly truck yard, northerly and southerly parking lots drains to catch basins in the truck yard. It is then conveyed easterly to Basin #1. Basin #1 discharges into the Perris Valley Storm Drain Channel via a proposed storm drain at the Building 4 Lot's southeast corner. The landscape area fronting Heacock Avenue surface drains to Heacock Avenue.

IV. Responsibility for Maintenance

IV.A General

Funding will be provided by the owner:

Moorpark Country Properties, a California Corporation
18912 Blackhawk Street
Northridge, CA 91326
(818) 491-0638
Contact: Harry Muranaka, President

C-R Cousins, Inc. Money Purchase Plan
18912 Blackhawk Street
Northridge, CA 91326
(818) 491-0638
Contact: Harry Muranaka, Trustee
Contact: Roy Muranaka, Trustee

Prologis, Inc.
17777 Center Court Drive North, Suite 100
Cerritos, CA 90703
(562) 345-9200
Contact: Scott Mulkey

A copy of the Covenant Agreement will be attached in Appendix 3 of this O&M Plan.

IV.B Staff Training Program

Staff training records and descriptions will be inserted in Appendix 4 of this O&M Plan.

IV.C Records

Maintenance records are to be inserted chronologically in Appendix 1 of this O&M Plan.

IV.D Safety

All maintenance procedures shall comply with the latest OSHA standards.

V. Summary of Drainage Management Areas and Stormwater BMPs

V.A Drainage Areas

See Appendix 5 of this O&M Plan for WQMP site map.

DMA Name or ID	Surface Type(s) ¹	Area (Sq. Ft.)	Area (Acres)	DMA Type
1A	Roofs/Conc/Asphalt	307,098	7.05	Type D
1B	Ornamental Landscaping	69,696	1.60	Type D
2A	Roofs/Conc/Asphalt	297,515	6.83	Type D
2B	Ornamental Landscaping	50,094	1.15	Type D
3A	Roofs/Conc/Asphalt	609,840	14.00	Type D
3B	Ornamental Landscaping	50,094	1.15	Type D
4A	Roofs/Conc/Asphalt	1,078,110	24.75	Type D
4B	Ornamental Landscaping	113,256	2.60	Type D
5A	Roofs/Conc/Asphalt	609,840	14.00	Type D
5B	Ornamental Landscaping	115,434	2.65	Type D
6A	Roofs/Conc/Asphalt	226,512	5.20	Type D
6B	Ornamental Landscaping	45,738	1.05	Type D
7	Ornamental Landscaping	180,774	4.15	Type A

Geo-location of the BMPs using latitude and longitude coordinates.

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	Latitude	Longitude
A	On-site storm drain inlets	WQMP Site Map	---	---
B	Interior floor drains and elevator shaft sump pumps	N/A	---	---
D2	Landscape / Outdoor Pesticide Use	On-site Landscape Improvement Plans	---	---
G	Refuse Areas	WQMP Site Map	---	---
H	Industrial processes	WQMP Site Map (indoors, if any)	---	---
M	Loading Docks	WQMP Site Map	---	---
P	Plazas, sidewalks, and parking lots (only parking lots applicable)	WQMP Site Map	---	---
SFB #1	Sand Filter Basin #1	WQMP Site Map	33.879526	-117.241517
SFB #2	Sand Filter Basin #2	WQMP Site Map	33.879490	-117.239725
SFB #3	Sand Filter Basin #3	WQMP Site Map	33.877148	-117.238674
SFB #4	Sand Filter Basin #4	WQMP Site Map	33.874716	-117.235509
SFB #5	Sand Filter Basin #5	WQMP Site Map	33.874725	-117.236625
SFB #6	Sand Filter Basin #6	WQMP Site Map	33.873985	-117.237762

V.B Structural Post-Construction BMPs

See Appendix 5 of this O&M Plan for WQMP site map.

Additional BMP details are available in Appendix 10 of the WQMP.

V.C Self-Retaining Areas or Other

DMA 7 is a self-treating area that flows off-site.

VI. Stormwater BMP Design Documentation

VI.A “As-Built” Drawings of each Stormwater BMP

See Appendix 6 of this O&M Plan for “as-built” drawings.

VI.B Manufacturer’s Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

VI.C Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

VII.A Maintenance Schedule

Schedule (Sand Filter Basin)	Inspection and Maintenance Activity (Sand Filter Basin)
Semi-monthly including just before the annual storm season and following rainfall events.	<ul style="list-style-type: none"> • Routine maintenance and inspection. • Remove debris and litter from the entire basin to minimize filter clogging and to improve aesthetics. • Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water. • Check for erosion and sediment laden areas in the basins. Repair as needed. Clean forebay of debris, litter, sediment, etc upon discovery. • Revegetate side slopes where needed.
Annually. Schedule these inspections within 72 hours after a significant rainfall and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inches or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	<ul style="list-style-type: none"> • Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element. • Check side slopes and embankments for erosion, slumping and overgrowth. • Inspect the sand media at the filter drain to verify it is allowing acceptable infiltration. Scarify the top 3 inches by raking the filter drain's sand surface annually. • Check the filter drain underdrains for damage or clogging. Repair as needed. • Repair basin inlets, outlets, forebays, and energy dissipaters whenever damage is discovered. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.
Every 5 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin).	<ul style="list-style-type: none"> • Remove the top 3 inches of sand from the filter drain and backfill with 3 inches of new sand to return the sand layer to its original depth. When scarification or removal of the top 3 inches of sand is no longer effective, remove and replace sand filter layer.

VII.B Service Agreement Information

See Appendix 8 of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix 1: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

Appendix 2: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

Appendix 3: Maintenance Mechanism

Copy of Covenant Agreement

Establishing Notification Process And Responsibility

For Water Quality Management Plan Implementation And Maintenance

Notification Process and Responsibility

1. **Name:** _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) Routine inspections to evaluate BMP effectiveness.
- (2) Identifying when BMPs require maintenance.
- (3) Working with qualified contractors to maintain the BMP.
- (4) Recordkeeping of inspections and maintenance activities.

2. **Name:** _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) Cleaning, repairing, servicing, and maintenance of BMP.

3. **Name:** _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) In event of failure, and with City Engineer's authorization, modify or replace with an upgraded BMP to prevent future failure.
- (2) Notify successors of BMPs and maintenance requirements.

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

CITY CLERK
CITY OF MORENO VALLEY
PO BOX 88005
14177 FREDERICK STREET
MORENO VALLEY, CA 92552-0805

EXEMPT FROM FEE PER G.C. Section 6103

SPACE ABOVE THIS LINE FOR RECORDER'S USE

STORMWATER TREATMENT DEVICE AND CONTROL MEASURE ACCESS AND
MAINTENANCE COVENANT

Assessor's Parcel Number(s) 316-100-028, -030, -048, -051 and 052

THIS INSTRUMENT is made and entered into this _____ day of _____ 2016, by and between MOORPARK COUNTRY PROPERTIES, A CALIFORNIA CORPORATION, AS TO AN UNDIVIDED 90% INTEREST; AND C-R COUSINS, INC., MONEY PURCHASE PLAN AS TO AN UNDIVIDED 10% INTEREST hereinafter referred to as "Owner," and the City of Moreno Valley, a municipal corporation, hereinafter referred to as "City."

RECITALS

WHEREAS, the Owner owns real property ("Property") in the City specifically described in Exhibit "A," which is attached hereto and incorporated herein by this reference; and

WHEREAS, at the time of approval of the development project known as MORENO VALLEY LOGISTICS CENTER (the "Project") for the Property, the City required the Project to employ on-site storm water and non-storm water control measures to mitigate the Project impacts to water quality and minimize pollutants in urban storm water runoff; and

WHEREAS, the City and Owner, its successors, and assigns, agree that the health, safety and welfare of the residents of the City, require that on-site storm water and non-storm water management control measures be constructed and implemented and adequately maintained on the Property; and

WHEREAS, the Owner has chosen to install SIX (6) SAND FILTER BASINS, hereinafter referred to as the "Device" and other control measures all as described in the Final Water Quality Management Plan (WQMP) to minimize pollutants in urban storm water and non-storm water runoff; and

WHEREAS, the Device and other control measures have been installed and/or implemented in accordance with the WQMP, project plans and specifications approved by the City; and

WHEREAS, the Device and other control measures, being installed on private property and draining only private property are private facilities with all maintenance or replacement therefore being the sole responsibility of the Owner; and

WHEREAS, the Owner is aware that periodic and continuous maintenance including, but not necessarily limited to, filter material replacement and sediment removal is required to assure discharges from the Device, other control measures and the Project are in compliance with the City's Municipal Code for storm water and non-storm water discharges and that such maintenance activity will require compliance with all Federal, State and local laws and

regulations, including those pertaining to confined space and waste disposal methods in effect at the time such maintenance occurs;

NOW, THEREFORE, in consideration of City's approval of the Project and the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the City and Owner agree as follows:

1. The Owner hereby provides the City and its designees with full right of access to the Device and other control measures and the immediate vicinity of the property at any time, upon reasonable notice; or in the event of emergency, as determined by City's Public Works Director/City Engineer or designees, no advance notice; for the purpose of inspection, sampling and testing of the Device and other control measures, and in cases of emergency, where the public health, safety, or welfare is compromised, such emergency shall be declared a "nuisance" as defined in the Municipal Code. Such conditions that created the emergency shall be abated as provided for in the Municipal Code and at the Owner's expense as provided for in Section 3, below.

2. The Owner shall diligently maintain the Device and other control measures in a manner assuring all discharges from the Device, other control measures and the Project are in compliance with the Municipal Code for storm water and non-storm water discharges at all times. All reasonable precautions shall be exercised by the Owner and the Owner's representatives in the removal and extraction of materials from the Device and other control measures, and the ultimate disposal of the

materials in a manner consistent with all applicable laws. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the materials removed, the quantity and the recycle or disposal destinations, as appropriate.

3. In the event the Owner fails to perform the necessary maintenance contemplated by this Instrument, within five (5) days of being given written notice by the City, the lack of maintenance shall be considered a public health and safety concern and declared a “nuisance”, the City shall take all necessary actions as provided in the Municipal Code, to abate the nuisance and charge the entire cost and expense to the Owner, including administrative costs, attorneys' fees and interest thereon at the maximum rate authorized by law from the date of the notice of expense until paid in full. Additionally, any discharge as a result from the lack of maintenance prescribed herein from the Device to the City’s maintained Municipal Separate Storm Sewer System shall be considered an illegal discharge and considered a violation of the Municipal Code and shall cease immediately. Such cessation may include a yellow or red tag issued to the Project.

4. This Instrument shall be recorded in the Official Records of the County of Riverside at the expense of the Owner and shall constitute notice to all successors and assigns to the title to the Property of the obligations herein set forth. This Instrument shall also constitute a lien against the Property in such amount as will fully reimburse the City, including interest as herein above set forth, subject to

foreclosure in event of default in payment.

5. It is the intent of the Owner that the burdens and benefits herein undertaken shall constitute covenants that run with the Property and shall constitute a lien against the Property.
6. This covenant imposes no liability of any kind whatsoever on the City and the Owner agrees to hold the City harmless from any liability in the event the Device and other control measures fail to operate in accordance with the plans and specification submitted to the City.
7. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the Owner hereto. The term "Owner" shall include not only the Owner, but also its heirs, successors, executors, administrators, lessees and assigns. The Owner shall notify any successor to title of all or part of the Property about the existence of this Instrument. The Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. The Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.
8. Time is of the essence in the performance of this Instrument.

9. Any notice to a party required or called for in this Instrument shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change notice address only by providing written notice thereof to the other party.

CITY:
Public Works Director/City Engineer
City of Moreno Valley

PO Box 88005
14177 Frederick Street
Moreno Valley, CA 92552-0805

OWNER:
Harry Muranaka, President
Moorpark Country Properties, a California
Corporation
18912 Blackhawk Street
Northridge, CA 91326

OWNER:
Harry Muranaka, Trustee
C-R Cousins, Inc. Money Purchase Plan
18912 Blackhawk Street
Northridge, CA 91326

OWNER:
Roy Muranaka, Trustee
C-R Cousins, Inc. Money Purchase Plan
18912 Blackhawk Street
Northridge, CA 91326

10. This Instrument represents the entire Covenant of the parties hereto as to the matters contained herein and supersedes any and all prior written or verbal agreements between the parties as to the subject matter hereof.
11. This Instrument shall be governed by and construed in accordance with the laws of the State of California.
12. No amendment to this Instrument shall be made without prior written approval by the City.

APPROVED AS TO FORM:

OWNER:

Suzanne Bryant, City Attorney

Harry Muranaka, President
Moorpark Country Properties, a California
Corporation

CITY OF MORENO VALLEY

OWNER:

By:

Name: Michelle Dawson, City Manager

Harry Muranaka, Trustee
C-R Cousins, Inc. Money Purchase Plan

OWNER:

Roy Muranaka, Trustee
C-R Cousins, Inc. Money Purchase Plan

Appendix 4: Training Records

Insert Training Records with Brief Discussion Here

Appendix 5: Site Plan and Details

WQMP Site Map and BMP Details

Appendix 6: “As-Built” Drawings

Insert “As-Builts” Here When Available

Appendix 7: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix 8: Service Agreement Information

Insert Contractor Information (if any)

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

3.7 Sand Filter Basin

Type of BMP	Treatment
Treatment Mechanisms	Filtration, Biofiltration
Maximum Tributary Area	25 acres
Other Names	Sand Filter, Media Filter, Pocket Filter

Description

The Sand Filter Basin (SFB) is a basin where the entire invert is constructed as a stormwater filter, using a sand bed above an underdrain system. Stormwater enters the SFB at its forebay where trash and sediment accumulate or through overland sheet flow. Overland sheet flow into the Sand Filter Basin is biofiltered through the vegetated side slopes or other pre-treatment. Flows pass into the sand filter surcharge zone and are gradually filtered through the underlying sand bed. The underdrain gradually dewateres the sand bed and discharges the filtered runoff to a nearby channel, swale, or storm drain.



The primary advantage of the SFB is its effectiveness in removing pollutants where infiltration into the underlying soil is not practical, and where site conditions preclude the use of a Bioretention Facility . The primary disadvantage is a potential for clogging if silts and clays are allowed to flow into the SFB. In addition, this BMP’s performance relies heavily on its being regularly and properly maintained.

While this BMP is not currently considered an LID BMP, when designed in accordance with this manual, a Sand Filter Basin is considered to be a highly effective Treatment Control BMP.

Siting Considerations

SFBs should be avoided where onsite configurations include a base flow and/or where this BMP would be put into operation while construction, grading or major landscaping activities are taking place in the tributary catchment. **This BMP has a flat surface area**, so it may be challenging to incorporate into steeply sloping terrain. SFBs should be set away from areas that could discharge fine sediments into the basin such as at the bottom of a slope. **See Section 1 of Riverside County Flood Control and Water Conservation District’s “Basin Guidelines” (Appendix C) for additional requirements** (i.e., fencing, maintenance access, etc.) or other guidelines issued by the Engineering Authority (EA)¹.

¹ The Engineering Authority (EA) may choose to alter these guidelines and may have different/additional requirements. These entities, along with the District, will be referred to as the EA.

SAND FILTER BASIN BMP FACT SHEET

Setbacks

The bottom of the sand filter should remain above the seasonal high groundwater level. Always consult your geotechnical engineer for additional site specific recommendations.

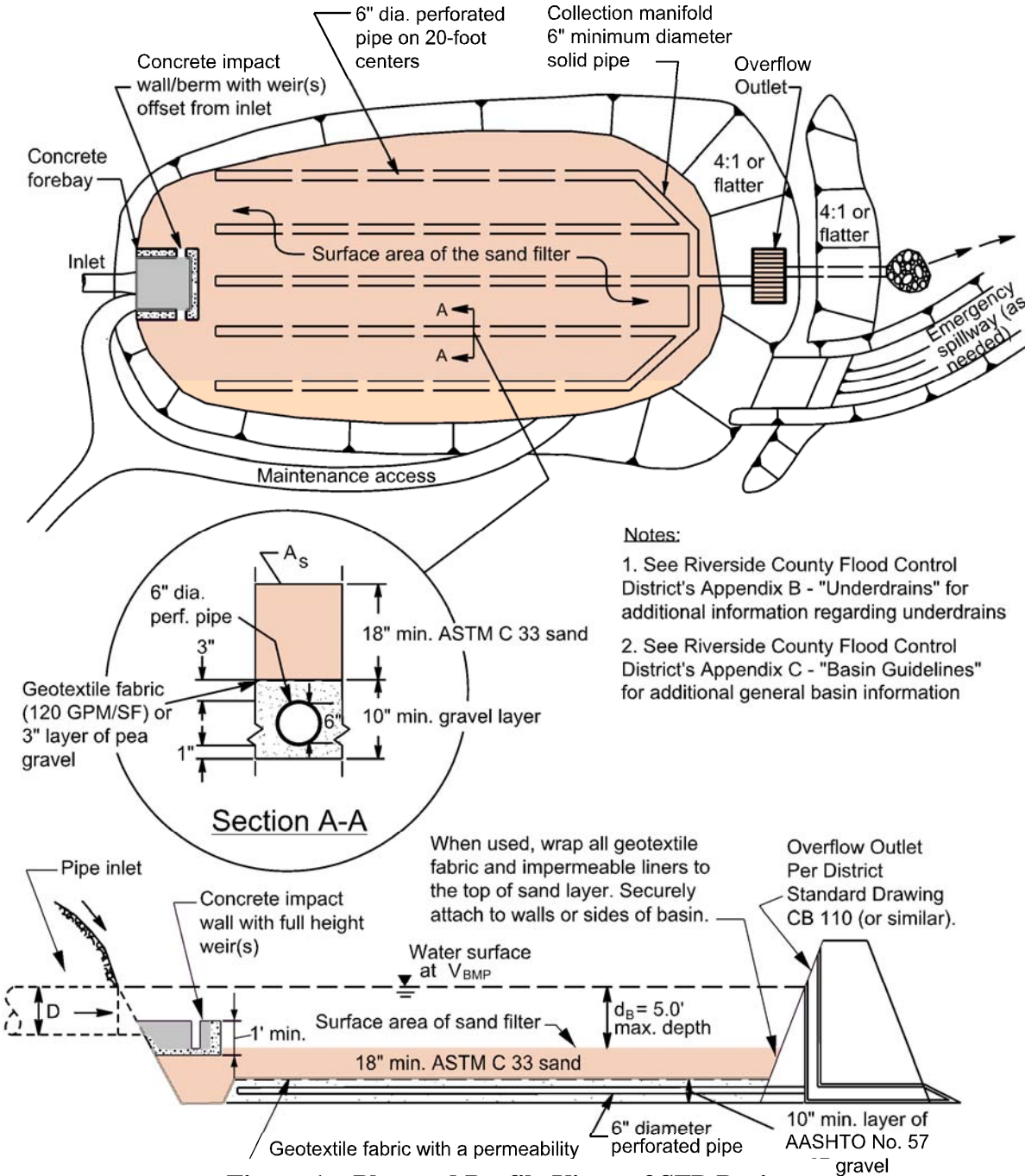


Figure 1 – Plan and Profile Views of SFB Basin

SAND FILTER BASIN BMP FACT SHEET

Forebay

A concrete forebay shall be provided to reduce sediment clogging and to reduce erosion. The forebay shall have a design volume of at least 0.5% V_{BMP} and a minimum 1 foot high concrete splashwall. Full height notch-type weir(s), offset from the line of flow from the basin inlet to prevent short circuiting shall be used to outlet the forebay. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 1).

Underdrains

Underdrain piping shall consist of a manifold (collector) pipe with perforated lateral branching. The lateral branching conveys the filtered water to the manifold where it is discharged into the outlet structure. See Appendix B for additional information.

Overflow Structure

An overflow must be provided to drain volume in excess of V_{BMP} or to help drain the system if clogging were to occur. Overflows shall flow to an acceptable discharge point such as a downstream conveyance system. Overflows must be placed above the water quality capture volume and near the outlet of the system. The overflow structure shall be similar to the District's Standard Drawing CB 110.

SAND FILTER BASIN BMP FACT SHEET

Recommended Maintenance

Table 1 - Recommended Inspection and Maintenance Activities for SFBs

Schedule	Inspection and Maintenance Activity
<p>Semi-monthly including just before the annual storm season and following rainfall events.</p>	<ul style="list-style-type: none"> • Routine maintenance and inspection. • Remove debris and litter from the entire basin to minimize filter clogging and to improve aesthetics. • Check for obvious problems especially filter clogging and signs of long term ponding. Repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water. • Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed. • Revegetate side slopes where needed.
<p>Annually. If possible, schedule these inspections within 72 hours after a significant rainfall.</p>	<ul style="list-style-type: none"> • Inspection of hydraulic and structural facilities. Examine the overflow outlet for clogging, the embankment and spillway integrity, and damage to any structural element. • Check side slopes and embankments for erosion, slumping and overgrowth. • Inspect the sand media at the filter drain to verify it is allowing acceptable infiltration. Scarify the top 3 inches by raking the filter drain's sand surface annually. • Check the filter drain underdrains for damage or clogging. Repair as needed. • Repair basin inlets, outlets, forebays, and energy dissipaters whenever damage is discovered. • No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.
<p>Every 5 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin).</p>	<ul style="list-style-type: none"> • Remove the top 3 inches of sand from the filter drain and backfill with 3 inches of new sand to return the sand layer to its original depth. When scarification or removal of the top 3 inches of sand is no longer effective, remove and replace sand filter layer.

SAND FILTER BASIN BMP FACT SHEET

Table 2 - Design and Sizing Criteria for SFBs

Design Parameter	Extended Detention Basin
Maximum tributary area	25 acres ²
Basin design volume	100% of V _{BMP}
Maximum basin depth	5 feet
Forebay volume	0.5 % of V _{BMP}
Longitudinal Slope	0%
Transverse Slope (min.)	0%
Outlet erosion control	Energy dissipaters to reduce velocities ¹
1. Ventura County's Technical Guidance Manual for Stormwater Quality Control Measures 2. CA Stormwater BMP Handbook for New Development and Significant Redevelopment	

Note: The information contained in this BMP Factsheet is intended to be a summary of design considerations and requirements. Additional information which applies to all detention basins may be found in the District's "Basin Guidelines" (Appendix C). In addition, information herein may be superseded by other guidelines issued by the EA.

Design Procedure

1. Enter the Tributary Area, A_{TRIB}
2. Enter the Design Capture Volume, V_{BMP}, determined from Section 2.1 of this Handbook
3. SFB Geometry

Determine the minimum sand filter area required. The filtration bed surface shall be flat with the maximum depth for the reservoir design volume no greater than 5 feet*. The reservoir design volume does not include the volume of the sand filter. No credit is given for voids in the sand layer toward the reservoir volume since the sand is part of the water quality filter and not a reservoir layer. The design storage volume shall equal 100 percent of V_{BMP}. The minimum sand filter area (A_s) of the basin's bottom shall be determined using the equation:

$$A_s = (V_{BMP} / d_B)$$

Where:

$$V_{BMP} = \text{Design Volume, ft}^3$$

$$d_B = \text{proposed basin depth (5 feet maximum), ft}$$

Once the basin side slopes, proposed basin depth and depth of freeboard are entered, the spreadsheet will calculate the minimum total depth required to use this BMP. This is the depth from the top of the basin (including freeboard) down to the bottom of the underdrain gravel layer. This depth can be used to determine if enough vertical separation is available between the BMP and its outlet destination.

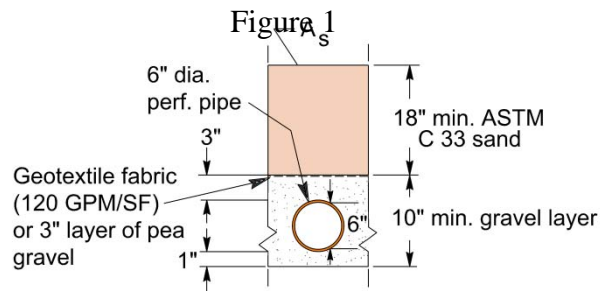
SAND FILTER BASIN BMP FACT SHEET

*Note: The 5 foot maximum depth equates to a minimum filter media infiltration rate of 0.83 inches per hour with a 72 hour drawdown time. Studies have shown that while initially most filter media will infiltrate at a much higher rate, it is not uncommon for that rate to decrease significantly over a very short period of time. (Urbonas, 1996)

4. Enter the proposed surface area of the basin.

5. Forebay

Provide a concrete forebay. Its volume shall be at least 0.5% V_{BMP} with a minimum 1 foot high concrete splashwall. Full-height notch-type weir(s) shall be used to outlet the forebay. The weir(s) must be offset from the line of flow from the basin inlet. It is recommended that two weirs be used and that they be located on opposite sides of the forebay (see Figure 1). Notches shall not be less than 1.5 inches in width.



6. Filter Media

Provide, as a minimum, an 18-inch layer of filter media (ASTM C-33 sand). Other filter media may be considered with sufficient supporting documentation. Where a medium level of removal efficiency is desired for nutrients, the depth of the sand layer must be increased to 36 inches.

5. Underdrains

Underdrains shall be provided per the guidelines outlined in Appendix B.



Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
“Only Rain Down the Storm Drain”

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County “Only Rain Down the Storm Drain” Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.



...Only Rain Down ...the Storm Drain

*What you should know for...
Landscape and Gardening*

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators



Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.



Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



- Consider recycling your green waste and adding “nature’s own fertilizer” to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.

- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:

- ◆ **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
- ◆ **Biological Controls** - Use predatory insects to control harmful pests.
- ◆ **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.

- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.



Art Credit: Margie Winter

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓



Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
 - pH paper or meter
 - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
 - Sample jars
 - Sample collection pole
 - A tool to remove access hole covers
- Laboratory Analysis
 - Sample cooler
 - Ice
 - Sample jars and labels
 - Chain of custody forms
- Documentation
 - Camera
 - Notebook
 - Pens
 - Notice of Violation forms
 - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of “as-built” piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the “as-built” piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post “No Dumping” signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a “non-stormwater” discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State’s General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility’s SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California’s Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>

Spill Prevention, Control & Cleanup SC-11



Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental or illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills.

Approach

Pollution Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- Develop a Spill Prevention Control and Countermeasure (SPCC) Plan. The plan should include:

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



SC-11 Spill Prevention, Control & Cleanup

- Description of the facility, owner and address, activities and chemicals present
- Facility map
- Notification and evacuation procedures
- Cleanup instructions
- Identification of responsible departments
- Identify key spill response personnel
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Suggested Protocols (including equipment needs)

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- If consistent illegal dumping is observed at the facility:
 - Post “No Dumping” signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
 - Landscaping and beautification efforts may also discourage illegal dumping.
 - Bright lighting and/or entrance barriers may also be needed to discourage illegal dumping.
- Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collects runoff from the storage tank area.
- Routine maintenance:
 - Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.
 - Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
 - Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain.*

Spill Prevention, Control & Cleanup SC-11

- Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.
- Label all containers according to their contents (e.g., solvent, gasoline).
- Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- Identify key spill response personnel.

Spill Control and Cleanup Activities

- Follow the Spill Prevention Control and Countermeasure Plan.
- Clean up leaks and spills immediately.
- Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste. Physical methods for the cleanup of dry chemicals include the use of brooms, shovels, sweepers, or plows.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour).
- Report spills to local agencies, such as the fire department; they can assist in cleanup.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - Types and quantities (in some cases) of wastes
 - Patterns in time of occurrence (time of day/night, month, or year)

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- Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

Training

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
 - The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
 - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

Other Considerations (Limitations and Regulations)

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan (Health & Safety Code Chapter 6.67).
- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.
- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including capital and operation & maintenance)

- Will vary depending on the size of the facility and the necessary controls.
- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including administrative and staffing)

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

Spill Prevention, Control & Cleanup SC-11

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of BMPs. A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Aboveground Tank Leak and Spill Control

Accidental releases of materials from aboveground liquid storage tanks present the potential for contaminating stormwater with many different pollutants. Materials spilled, leaked, or lost from

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tanks may accumulate in soils or on impervious surfaces and be carried away by stormwater runoff.

The most common causes of unintentional releases are:

- Installation problems
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- External corrosion and structural failure
- Spills and overfills due to operator error
- Leaks during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Practices listed below should be employed to enhance the code requirements:

- Tanks should be placed in a designated area.
- Tanks located in areas where firearms are discharged should be encapsulated in concrete or the equivalent.
- Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
- Liquid materials should be stored in UL approved double walled tanks or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain.
- For used oil or dangerous waste, a dead-end sump should be installed in the drain.
- All other liquids should be drained to the sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Accumulated stormwater in petroleum storage areas should be passed through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:

- Check for external corrosion and structural failure.
- Check for spills and overfills due to operator error.
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

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- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Frequently relocate accumulated stormwater during the wet season.
- Periodically conduct integrity testing by a qualified professional.

Vehicle Leak and Spill Control

Major spills on roadways and other public areas are generally handled by highly trained Hazmat teams from local fire departments or environmental health departments. The measures listed below pertain to leaks and smaller spills at vehicle maintenance shops.

In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Immediately drain all fluids from wrecked vehicles.
- Store wrecked vehicles or damaged equipment under cover.
- Place drip pans or absorbent materials under heavy equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down the spill.
- Remove the adsorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.

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- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- Design the fueling area to prevent the run-on of stormwater and the runoff of spills:
 - Cover fueling area if possible.
 - Use a perimeter drain or slope pavement inward with drainage to a sump.
 - Pave fueling area with concrete rather than asphalt.
- If dead-end sump is not used to collect spills, install an oil/water separator.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Discourage “topping-off” of fuel tanks.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly.
- Carry out all Federal and State requirements regarding underground storage tanks, or install above ground tanks.
- Do not use mobile fueling of mobile industrial equipment around the facility; rather, transport the equipment to designated fueling areas.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

For the purposes of developing a spill prevention and response program to meet the stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook, for specific activities. The program should:

- Integrate with existing emergency response/hazardous materials programs (e.g., Fire Department)
- Develop procedures to prevent/mitigate spills to storm drain systems
- Identify responsible departments
- Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures
- Address spills at municipal facilities, as well as public areas

Spill Prevention, Control & Cleanup SC-11

- Provide training concerning spill prevention, response and cleanup to all appropriate personnel

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Stormwater Managers Resource Center <http://www.stormwatercenter.net/>



Photo Credit: Geoff Brosseau

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of material to rainfall whenever possible.
- Prevent stormwater run-on.
- Check equipment regularly for leaks.

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



Suggested Protocols***Loading and Unloading – General Guidelines***

- Develop an operations plan that describes procedures for loading and/or unloading.
- Conduct loading and unloading in dry weather if possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- Consider placing a seal or door skirt between delivery vehicles and building to prevent exposure to rain.
- Design loading/unloading area to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading/unloading areas.
- Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a deadend.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g., fork lift operators) and contractors on proper spill containment and cleanup.
- Have employees trained in spill containment and cleanup present during loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
- Make sure forklift operators are properly trained on loading and unloading procedures.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Contain leaks during transfer.
- Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all and ensure that employees are familiar with the site's spill control plan and proper spill cleanup procedures.
- Have an emergency spill cleanup plan readily available.
- Use drip pans or comparable devices when transferring oils, solvents, and paints.

Other Considerations (Limitations and Regulations)

- Space and time limitations may preclude all transfers from being performed indoors or under cover.
- It may not be possible to conduct transfers only during dry weather.

Requirements

Costs

Costs should be low except when covering a large loading/unloading area.

Maintenance

- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Conduct regular broom dry-sweeping of area.

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

Loading or unloading of liquids should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
 - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
 - The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.

- The transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer. A positive control valve should be installed on the drain.
- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
 - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.
 - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Approach

Pollution Prevention

- Perform the activity during dry periods.
- Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

- Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
- Cover the work area with a permanent roof if possible.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention). If possible, connect process equipment area to public sewer or facility wastewater treatment system. Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- Dry clean the work area regularly.

Training

- Train employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.
- Train employee and contractors in proper techniques for spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



SC-32 Outdoor Equipment Operations

- Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.
- Inspect storage areas regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.

Other Considerations

- Providing cover may be expensive.
- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Requirements

Costs

Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.

Maintenance

- Conduct routine preventive maintenance, including checking process equipment for leaks.
- Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

If stormwater becomes polluted, it should be captured and treated. If you do not have your own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

Industries that generate large volumes of process wastewater typically have their own treatment system and corresponding permit. These industries have the discretion to use their wastewater treatment system to treat stormwater within the constraints of their permit requirements for process treatment. It may also be possible for the industry to discharge the stormwater directly to an effluent outfall without treatment as long as the total loading of the discharged process

water and stormwater does not exceed the loading had a stormwater treatment device been used. This could be achieved by reducing the loading from the process wastewater treatment system. Check with your Regional Water Quality Control Board or local sewerage agency, as this option would be subject to permit constraints and potentially regular monitoring.

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Stormwater Managers Resource Center <http://www.stormwatercenter.net>



Photo Credit: Geoff Brosseau

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Pollution Prevention

- Accomplish reduction in the amount of waste generated using the following source controls:
 - Production planning and sequencing
 - Process or equipment modification
 - Raw material substitution or elimination
 - Loss prevention and housekeeping
 - Waste segregation and separation
 - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓



Suggested Protocols*General*

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g., sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers and protect them from vandalism.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Stencil or demarcate storm drains on the facility's property with prohibitive message regarding waste disposal.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

Inspection

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.

- Repair leaking equipment including valves, lines, seals, or pumps promptly.

Training

- Train staff in pollution prevention measures and proper disposal methods.
- Train employees and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- Ensure that vehicles transporting waste have spill prevention equipment that can prevent spills during transport. Spill prevention equipment includes:
 - Vehicles equipped with baffles for liquid waste
 - Trucks with sealed gates and spill guards for solid waste

Other Considerations (Limitations and Regulations)

Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.

Requirements***Costs***

Capital and O&M costs for these programs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

Maintenance

- None except for maintaining equipment for material tracking program.

Supplemental Information***Further Detail of the BMP******Land Treatment System***

Minimize runoff of polluted stormwater from land application by:

- Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, and there is a closed drainage system

- Avoiding application of waste to the site when it is raining or when the ground is saturated with water
- Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site
- Maintaining adequate barriers between the land application site and the receiving waters (planted strips are particularly good)
- Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins
- Performing routine maintenance to ensure the erosion control or site stabilization measures are working

Examples

The port of Long Beach has a state-of-the-art database for identifying potential pollutant sources, documenting facility management practices, and tracking pollutants.

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

Solid Waste Container Best Management Practices – Fact Sheet On-Line Resources – Environmental Health and Safety. Harvard University. 2002.

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). <http://www.basmaa.org>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



- Procedures
 - Standard operating procedures (SOPs)
 - Purchasing guidelines and procedures
 - Bid packages (services and supplies)
- Materials
 - Preferred or approved product and supplier lists
 - Product and supplier evaluation criteria
 - Training sessions and manuals
 - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements***Cost Considerations***

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Refined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment
(www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products
(http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety
(www.nema.org)

Sustainable Conservation (www.suscon.org)

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (<http://dioxin.abag.ca.gov/>)



Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	



SC-41 Building & Grounds Maintenance

- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

SC-41 Building & Grounds Maintenance

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). <http://www.basmaa.org/>

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). <http://www.basmaa.org/>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>



Description

Modifications are common particularly at large industrial sites. The activity may vary from minor and normal building repair to major remodeling, or the construction of new facilities. These activities can generate pollutants including solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos installation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

Approach

Pollution Prevention

- Recycle residual paints, solvents, lumber, and other materials to the maximum extent practical.
- Buy recycled products to the maximum extent practical.
- Inform on-site contractors of company policy on these matters and include appropriate provisions in their contract to ensure certain proper housekeeping and disposal practices are implemented.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Recycle

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



SC-42 Building Repair and Construction

- Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.

Suggested Protocols

Repair & Remodeling

- Follow BMPs identified in Construction BMP Handbook.
- Maintain good housekeeping practices while work is underway.
- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep the area.
- Cover materials of particular concern that must be left outside, particularly during the rainy season.
- Do not dump waste liquids down the storm drain.
- Dispose of wash water, sweepings, and sediments properly.
- Store materials properly that are normally used in repair and remodeling such as paints and solvents.
- Sweep out the gutter or wash the gutter and trap the particles at the outlet of the downspout if when repairing roofs, small particles have accumulated in the gutter. A sock or geofabric placed over the outlet may effectively trap the materials. If the downspout is tight lined, place a temporary plug at the first convenient point in the storm drain and pump out the water with a vacuum truck, and clean the catch basin sump where you placed the plug.
- Properly store and dispose waste materials generated from construction activities. See Construction BMP Handbook.
- Clean the storm drain system in the immediate vicinity of the construction activity after it is completed.

Painting

- Enclose painting operations consistent with local air quality regulations and OSHA.
- Local air pollution regulations may, in many areas of the state, specify painting procedures which if properly carried out are usually sufficient to protect water quality.
- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- Mix paint indoors before using so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100% effective.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.

- Do not transfer or load paint near storm drain inlets.
- Plug nearby storm drain inlets prior to starting painting and remove plugs when job is complete when there is significant risk of a spill reaching storm drains.
- Cover nearby storm drain inlets prior to starting work if sand blasting is used to remove paint.
- Use a ground cloth to collect the chips if painting requires scraping or sand blasting of the existing surface. Dispose the residue properly.
- Cover or enclose painting operations properly to avoid drift.
- Clean the application equipment in a sink that is connected to the sanitary sewer if using water based paints.
- Capture all cleanup-water and dispose of properly.
- Dispose of paints containing lead or tributyl tin and considered a hazardous waste properly.
- Store leftover paints if they are to be kept for the next job properly, or dispose properly.
- Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.

Training

Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employees can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Clean up spills immediately.
- Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.

Limitations

- This BMP is for minor construction only. The State's General Construction Activity Stormwater Permit has more requirements for larger projects. The companion "Construction Best Management Practice Handbook" contains specific guidance and best management practices for larger-scale projects.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Be certain that actions to help stormwater quality are consistent with Cal- and Fed-OSHA and air quality regulations.

SC-42 Building Repair and Construction

Requirements

Costs

These BMPs are generally low to modest in cost.

Maintenance

N/A

Supplemental Information

Further Detail of the BMP

Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the Construction Best Management Practice Handbook. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated or Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If because of the remodeling a new drainage system is to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective “in-line” treatment devices. See Treatment Control Fact Sheet TC-20 Wet Pond/Basin in Section 5 of the New Development and Redevelopment Handbook regarding design criteria. Include in the catch basin a “turn-down” elbow or similar device to trap floatables.

References and Resources

California’s Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>

Parking/Storage Area Maintenance SC-43



Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓



SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
 - Block the storm drain or contain runoff.
 - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
 - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
 - Clean oily spots with absorbent materials.
 - Use a screen or filter fabric over inlet, then wash surfaces.

Parking/Storage Area Maintenance SC-43

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). <http://www.basmaa.org/>

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net/>



Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
 - Immediate repair of any deterioration threatening structural integrity.
 - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
 - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	



SC-44 Drainage System Maintenance

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Stream or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
 - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - Illegal dumping hot spots
 - Types and quantities (in some cases) of wastes
 - Patterns in time of occurrence (time of day/night, month, or year)
 - Mode of dumping (abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, accidents/spills)
 - Responsible parties
- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
 - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using “dry” methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements***Costs***

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:
 - Purchase and installation of signs.
 - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.
 - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.
 - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vacuor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents “plug flow” discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

SC-44 Drainage System Maintenance

References and Resources

California's Nonpoint Source Program Plan <http://www.swrcb.ca.gov/nps/index.html>

Clark County Storm Water Pollution Control Manual
<http://www.co.clark.wa.us/pubworks/bmpman.pdf>

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual <http://dnr.metrokc.gov/wlr/dss/spcm.htm>

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program <http://www.scvurppp.org>

The Storm Water Managers Resource Center <http://www.stormwatercenter.net>

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.



- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
 - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
 - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
 - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
 - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Design Objectives

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Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING



– DRAINS TO OCEAN” and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of “redevelopment”, then the requirements stated under “designing new installations” above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner’s association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

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Design Objectives

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Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

Appropriate applications include commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for vehicle maintenance and repair are governed by Building and Fire Codes, and by current local agency ordinances, and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).



- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.
- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.
- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.
- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.
- Other features may be comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey



- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

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