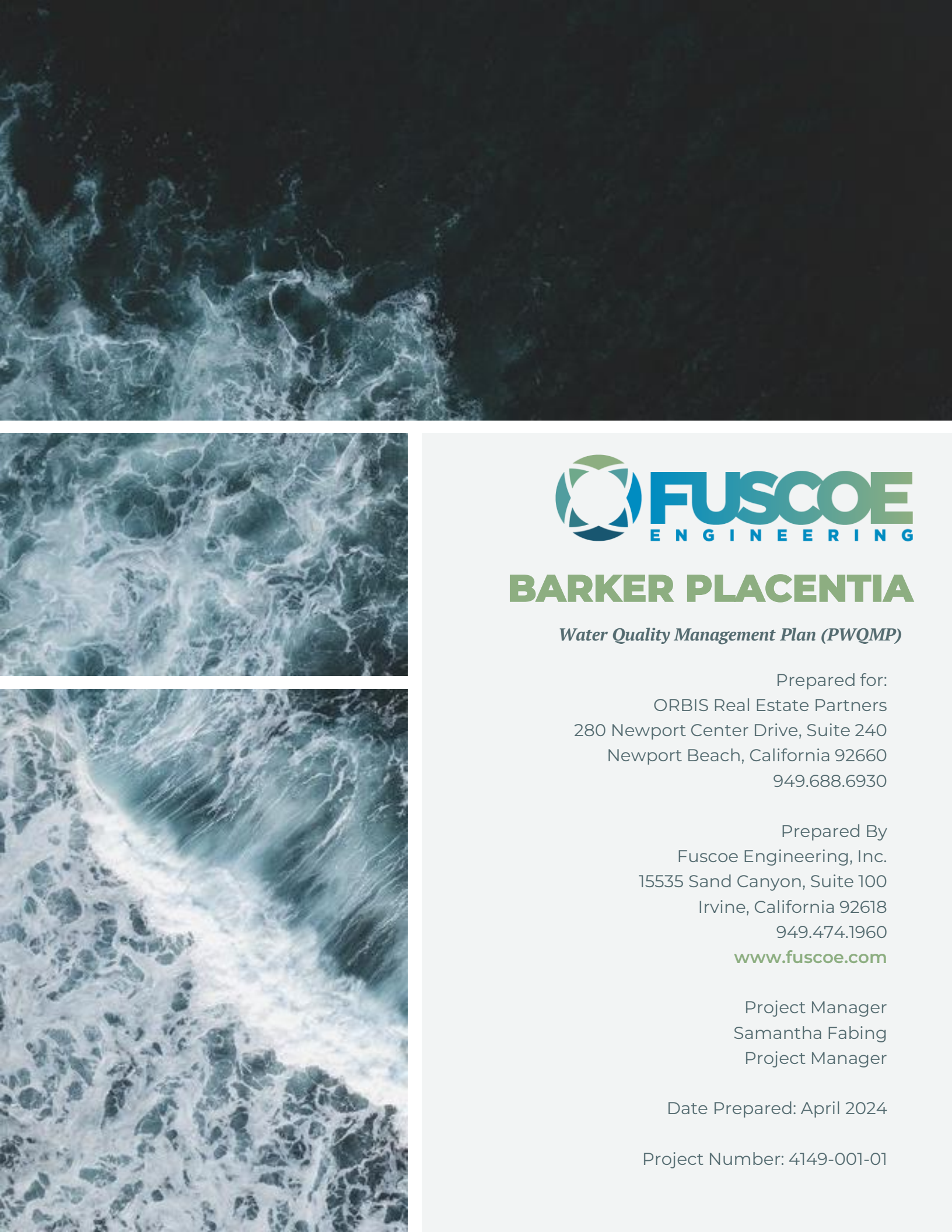




BARKER PLACENTIA

Water Quality Management Plan (PWQMP)

Prepared for:

ORBIS Real Estate Partners
280 Newport Center Drive, Suite 240
Newport Beach, California 92660
949.688.6930

Prepared By

Fuscoe Engineering, Inc.
15535 Sand Canyon, Suite 100
Irvine, California 92618
949.474.1960

www.fuscoe.com

Project Manager
Samantha Fabing
Project Manager

Date Prepared: April 2024

Project Number: 4149-001-01



WATER QUALITY MANAGEMENT PLAN (WQMP)

BARKER PLACENTIA

APRIL 30, 2024



WATER QUALITY MANAGEMENT PLAN (WQMP)

BARKER PLACENTIA

APRIL 30, 2024



WATER QUALITY MANAGEMENT PLAN (WQMP)

BARKER PLACENTIA

APRIL 30, 2024

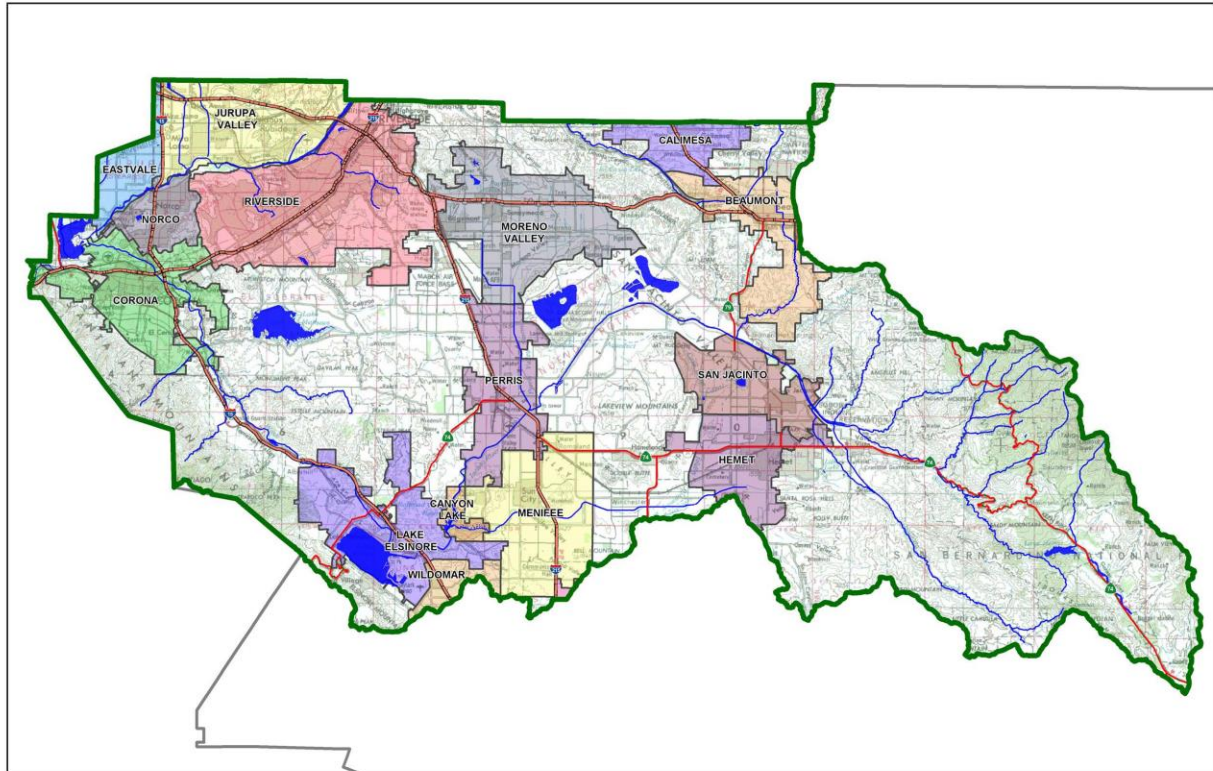
Project Specific Water Quality Management Plan

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

Project Title: Barker Placentia

Development No: Pending

Design Review/Case No: Pending



Contact Information:

Prepared for: ORBIS Real Estate Partners
280 Newport Center Drive, Suite 240
Newport Beach, California 92660
949.688.6930

Prepared by:
Fusco Engineering, Inc.
15535 Sand Canyon, Suite 100
Irvine, CA 92618
949.474.1960
Samantha Fabing, Project Manager

☒ Preliminary
☐ Final

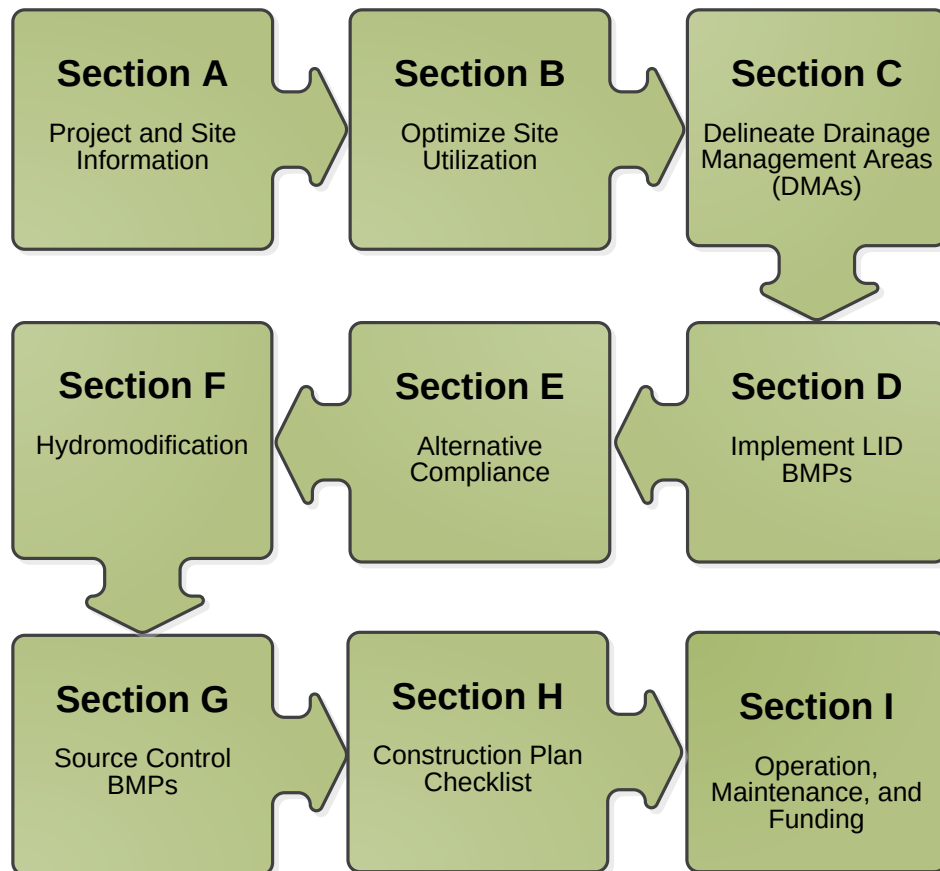
Original Date Prepared: April 30, 2024

Revision Date(s):

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

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 Orbis Real Estate Partners by Fuscoe Engineering, Inc for the Barker Placentia project.

This WQMP is intended to comply with the requirements of Perris for (Order No. R8-2010-0033, NPDES Permit No. CAS618033) 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 the City of Perris Water Quality Ordinance (Municipal Code Section 14.22).

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

Owner's Signature

Date

Owner's Printed Name

Owner's Title/Position

PREPARER'S CERTIFICATION

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

Preparer's Signature

Date

Preparer's Printed Name

Preparer's Title/Position

Preparer's Licensure:

Table of Contents

Section A: Project and Site Information.....	6
A.1 Maps and Site Plans.....	6
A.2 Identify Receiving Waters.....	7
A.3 Additional Permits/Approvals required for the Project:	8
Section B: Optimize Site Utilization (LID Principles)	9
Section C: Delineate Drainage Management Areas (DMAs).....	10
Section D: Implement LID BMPs	12
D.1 Infiltration Applicability	12
D.2 Harvest and Use Assessment.....	13
D.3 Bioretention and Biotreatment Assessment	15
D.4 Feasibility Assessment Summaries	16
D.5 LID BMP Sizing	17
Section E: Alternative Compliance (LID Waiver Program)	19
E.1 Identify Pollutants of Concern	20
E.2 Stormwater Credits	21
E.3 Sizing Criteria.....	21
E.4 Treatment Control BMP Selection	22
Section F: Hydromodification	23
F.1 Hydrologic Conditions of Concern (HCOC) Analysis.....	23
F.2 HCOC Mitigation.....	24
Section G: Source Control BMPs	26
Section H: Construction Plan Checklist	29
Section I: Operation, Maintenance and Funding.....	30

List of Tables

Table A.1 Identification of Receiving Waters.....	7
Table A.2 Other Applicable Permits	8
Table C.1 DMA Classifications	10
Table C.2 Type 'A', Self-Treating Areas	10
Table C.3 Type 'B', Self-Retaining Areas	10
Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas.....	10
Table C.5 Type 'D', Areas Draining to BMPs	11
Table D.1 Infiltration Feasibility	12
Table D.2 LID Prioritization Summary Matrix	16
Table D.3 DCV Calculations for LID BMPs	17
Table E.1 Potential Pollutants by Land Use Type.....	20
Table E.2 Water Quality Credits.....	21
Table E.3 Treatment Control BMP Sizing	21
Table E.4 Treatment Control BMP Selection	22
Table F.1 Hydrologic Conditions of Concern Summary	23
Table G.1 Permanent and Operational Source Control Measures	26
Table H.1 Construction Plan Cross-reference	29

List of Appendices

Appendix 1: Maps and Site Plans.....	31
Appendix 2: Construction Plans	32
Appendix 3: Soils Information.....	33
Appendix 4: Historical Site Conditions	34
Appendix 5: LID Infeasibility.....	35
Appendix 6: BMP Design Details	36
Appendix 7: Hydromodification	37
Appendix 8: Source Control	38
Appendix 9: O&M	39
Appendix 10: Educational Materials	40

Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Mixed-Use
Planning Area:	PA 4 – Freeway Business Park
Community Name:	N/A
Development Name:	Business Professional Office & Basin
PROJECT LOCATION	
Latitude & Longitude (DMS): 33.824840, -117.240154	
Project Watershed and Sub-Watershed: Middle & Lower San Jacinto River; Perris Reservoir	
Gross Acres: 25.6	
APN(s): 305-050-051, 305-050-055	
Map Book 305 Page No. 5:	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial/Industrial
Proposed or Potential SIC Code(s)	4225
Area of Impervious Project Footprint (SF)	923,261
Total Area of <u>proposed</u> Impervious Surfaces within the Project Footprint (SF)/or Replacement	923,261
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the Project limits Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	Soil Type C
What is the Water Quality Design Storm Depth for the project?	0.65

A.1 Maps and Site Plans

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

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

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

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
Canyon Lake (Railroad Canyon Reservoir)	Nutrients	AGR, GWR, MUN, REC1, REC2, WARM, WILD	15 Miles
San Jacinto River – Lake Elsinore to Canyon Lake	N/A	AGR, GWR, MUN, REC1, REC2, WARM, WILD	20 Miles
Lake Elsinore	DDT, Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Toxicity	ALL	20 Miles

The project site resides within the jurisdiction of the Santa Ana Regional Water Quality Control Board and the Santa Ana River Watershed (Region 8), San Jacinto River Sub-watershed.

The Santa Ana River Watershed encompasses approximately 2,800 square miles (including San Jacinto River Watershed), which includes natural open space, agricultural and ranching areas, and rural and urban development. The watershed includes much of Orange County, the northwestern portion of Riverside County, the southwestern portion of San Bernardino County and a small portion of Los Angeles County.

The watershed originates primarily from the San Bernardino and San Gabriel Mountains, which consist mainly of snowmelt and storm runoff from the San Bernardino National Forest, and traverses in a southwesterly direction to the Pacific Ocean.

There are no known existing water quality problems associated with the site. Under existing conditions, flows from the site are self-retained. Any high flow runoff from the site is conveyed as sheet flow to the street and then to Perris Valley Storm Drain.

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

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other (please list in the space below as required)		
City of Perris Conditional Use Permit		
City of Perris Design Review		
City of Perris Building Permit		
City of Perris Grading Permit		
City of Perris Construction Permit	☒ Y	☐ N

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

Section B: Optimize Site Utilization (LID Principles)

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?

A hydrology report was prepared to identify and preserve existing drainage patterns. Runoff from the site will continue to flow in a manner similar to existing conditions. Low-flows and first-flush runoff will drain to a biotreatment units for treatment.

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

There is no existing vegetation to preserve.

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

Infiltration LID BMPs are not recommended onsite due to the site having dense to very dense older alluvium and low infiltration rates.

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

Impervious area was minimized by adding vegetation where feasible.

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

Runoff from impervious areas is dispersed to adjacent pervious areas where feasible with the grading constraints and intent of the project.

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) ¹²	Area (Sq. Ft.)	DMA Type
DMA A	Mixed Surface	448,561	D
DMA B	Mixed Surface	217,804	D
DMA C	Mixed Surface	448,712	D

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

²If multi-surface provide back-up

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
NA	NA	NA	NA

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)	Storm Depth (inches)	DMA Name / ID	[C] from Table C.4 = Required Retention Depth (inches)	
		[A]	[B]		[C]	[D]
NA	NA	NA	NA	NA	NA	NA

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

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

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

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

DMA Name or ID	BMP Name or ID
DMA A	Proprietary Biofiltration - Modular Wetland System
DMA B	Proprietary Biofiltration - Modular Wetland System
DMA C	Proprietary Biofiltration - Modular Wetland System
DMA D	Proprietary Biofiltration - Modular Wetland System

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.

Each drainage management area will drain to Modular Wetland Systems for treatment. Modular Wetlands by Contech are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

DMA A

$$Q_{\text{REQUIRED}} = 1.23 \text{ cfs}$$

$$Q_{\text{PROPOSED}} = 1.386 \text{ cfs}$$

$$\text{Three (3) MWS-L-8-16} \quad Q = 0.462 \times 3 = 1.386$$

DMA B

$$Q_{\text{REQUIRED}} = 0.70 \text{ cfs}$$

$$Q_{\text{PROPOSED}} = 0.808 \text{ cfs}$$

$$\text{MWS-L-8-12 \& MWS-L-8-16} = (0.346 \text{ cfs} + 0.462 \text{ cfs}) = 0.808 \text{ cfs}$$

DMA C

$$Q_{\text{REQUIRED}} = 1.34 \text{ cfs}$$

$$Q_{\text{PROPOSED}} = 1.386 \text{ cfs}$$

$$\text{Three (3) MWS-L-8-16} \quad Q = 0.462 \times 3 = 1.386$$

Section D: Implement LID BMPs

D.1 Infiltration Applicability

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

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

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

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

Infiltration Feasibility

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

Table D.1 Infiltration Feasibility

Does the project site...	YES	NO
...have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
...have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
...have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
...have measured in-situ infiltration rates of less than 1.6 inches / hour? <i>The highest rate of measure infiltration onsite was 0.43 in/hr.</i>	X	
If Yes, list affected DMAs:		
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
...geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

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

D.2 Harvest and Use Assessment

Please check what applies:

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

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: 4.4 ac

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

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: 21.2 ac

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: 22.3 ac

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)
22.3 ac	4.4 ac

Not sufficient.

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: 20

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: 21.2 ac

- 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: 3,922

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

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
3,922	20

Not sufficient.

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.

NA

- 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: NA

- 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: NA

- Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: NA

- Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: NA

- Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
NA	NA

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

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

Select one of the following:

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

D.4 Feasibility Assessment Summaries

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

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A	☐	☐	☐	☒	☐
B	☐	☐	☐	☒	☐
C	☐	☐	☐	☒	☐

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.

NA.

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 DMA A

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas $\times$ Runoff Factor	BMP 1		
	[A]		[B]	[C]	[A] $\times$ [C]			
A	448561	Mixed Surface Types	0.80	0.60	268820.8	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
	$A_T = 448561$				$\Sigma = 268820.8$	0.20	1.23	1.386

[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

Table D.4 DCV Calculations for DMA B

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas $\times$ Runoff Factor	BMP 2		
	[A]		[B]	[C]	[A] $\times$ [C]			
B	217804	Mixed Surface Types	0.88	0.70	152852.9	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
	$A_T = 217804$				$\Sigma = 152852.9$	0.20	0.70	0.808

[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

Table D.5 DCV Calculations for DMA C

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas $\times$ Runoff Factor	<i>BMP 3</i>		
	[A]		[B]	[C]	[A] $\times$ [C]			
C	448712	Mixed Surface Types	0.84	0.65	290914.4	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
	$A_T = 448712$				$\Sigma = 290914.4$	0.20	1.34	1.386

[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
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P ⁽²⁾
☒ Commercial/Industrial Development	P ⁽³⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁵⁾	P ⁽¹⁾	P	P
☐ Automotive Repair Shops	N	P	N	N	P ^(4, 5)	N	P	P
☐ Restaurants (>5,000 ft ²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft ²)	P	N	P	P	N	P	P	P
☒ Parking Lots (>5,000 ft ²)	P ⁽⁶⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P ⁽¹⁾	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☒	☐	☐	☒	☐	☒	☒

P = Potential

N = Not Potential

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

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

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

⁽⁴⁾ Specifically petroleum hydrocarbons

⁽⁵⁾ Specifically solvents

⁽⁶⁾ Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage ²
NA	NA
Total Credit Percentage ¹	NA

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 Area x Runoff Factor	Enter BMP Name / Identifier Here			
	[A]		[B]	[C]	[A] x [C]				
NA	NA	NA	NA	NA	NA				
	$\frac{A_T}{\Sigma[A]}$	NA			$\Sigma = [D]$	[E]	$[F] = \frac{[D] \times [E]}{[G]}$	$[F] \times (1 - [H])$	[I]

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

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

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

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

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

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID ¹	Priority Pollutant(s) of Concern to Mitigate ²	Removal Efficiency Percentage ³
NA	NA	NA

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

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

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

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

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

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

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of 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	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

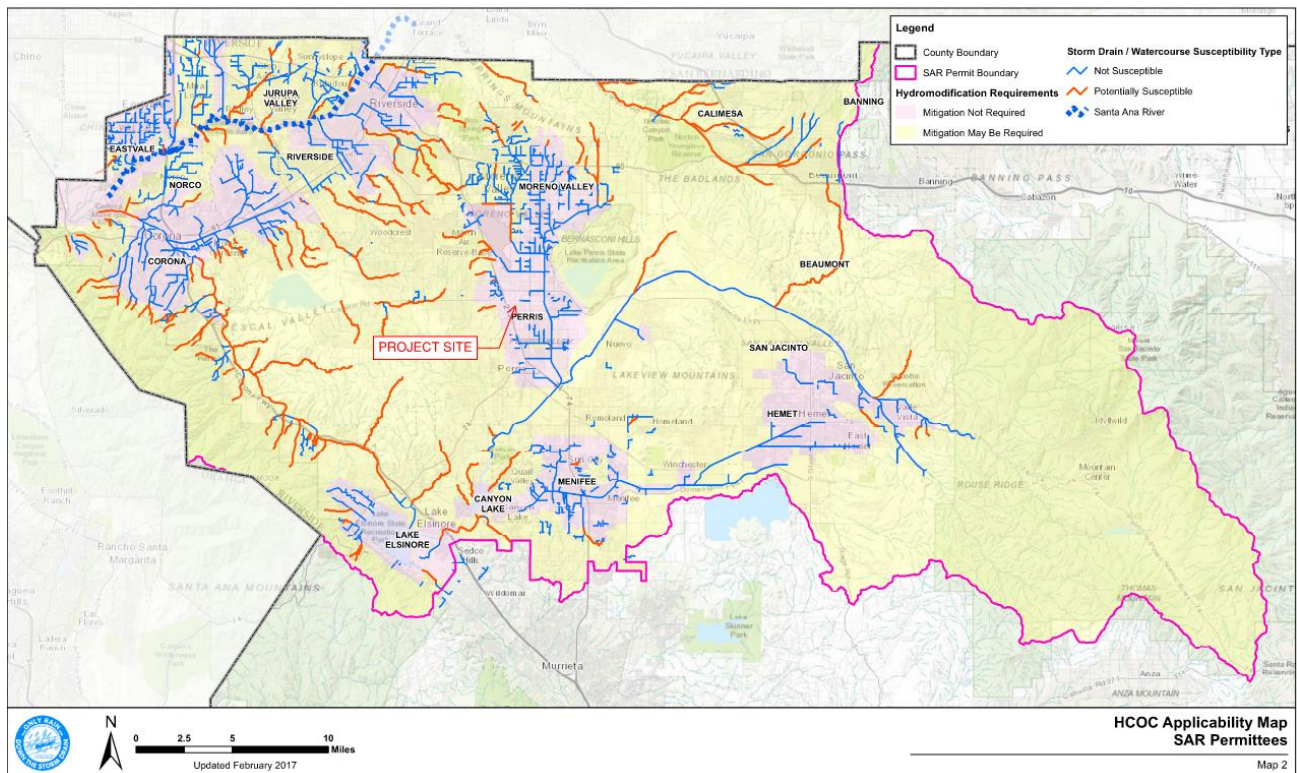
¹ Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

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

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

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

Adequate sump downstream of project: **Lake Elsinore**



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:

- 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.
- The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.
- Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the

post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

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

Section G: Source Control BMPs

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

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

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators. See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the

		CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com 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.
Landscape/ Pesticide Use Outdoor	Landscape Plans shall: Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in “What you should know for.....Landscape and Gardening” at http://www.rcflood.org/stormwater/Downloads/LandscapeGardenBrochure.pdf Provide IPM information to new owners, lessees and operators.
Refuse areas	Signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.	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 .
Industrial processes	All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.	See Fact Sheet SC-10, "NonStormwater 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://www.rcflood.org/stormwater/Downloads/IndustrialCommercialFacilities.pdf
Plazas, sidewalks, and parking lots.		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.

Section H: Construction Plan Checklist

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

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
BMP #1	Modular Wetlands System Three (3) MWS-L-8-16	TBD	TBD
BMP #2	Modular Wetlands System MWS-L-8-12 & MWS-L-8-16	TBD	TBD
BMP #3	Modular Wetlands System Three (3) MWS-L-8-16	TBD	TBD

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: The project site will be funded and maintained by the Owner, Orbis Real Estate

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

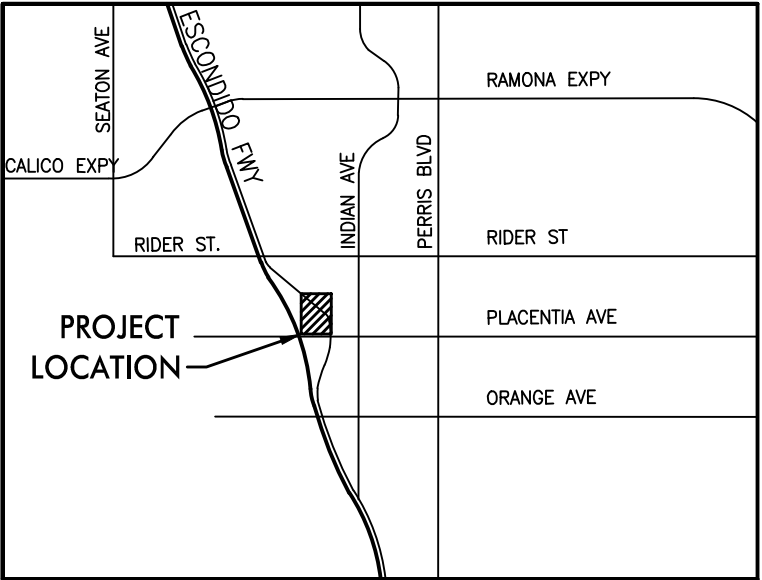
☐ Y

☒ 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



VICINITY MAP
NOT TO SCALE

SITE AREA DETAILS

TOTAL AREA = 25.6 AC
IMPERVIOUS AREA = 19.8 AC
PERVIOUS AREA = 4.9 AC

LEGEND

- PROPERTY LINE / RIGHT OF WAY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- BMP DRAINAGE AREA BOUNDARY
- DRAINAGE MANAGEMENT AREA
- DIRECTION OF SURFACE FLOW
- PROPOSED LANDSCAPING
- PROPOSED DETENTION GALLERY FOR HYDROLOGY
- PROPOSED MODULAR WETLANDS SYSTEM

NON-STRUCTURAL SOURCE CONTROL BMP'S

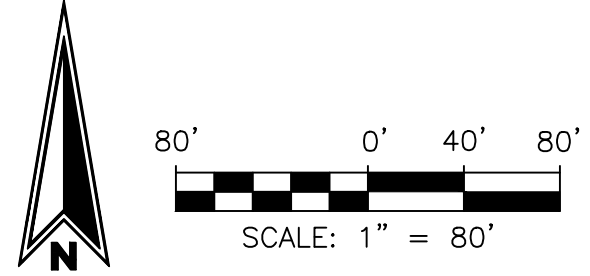
- ACTIVITY RESTRICTIONS
- COMMON AREA LANDSCAPE MANAGEMENT
- BMP MAINTENANCE
- COMMON AREA LITTER CONTROL
- COMMON AREA CATCH BASIN INSPECTION
- STREET SWEEPING PRIVATE STREETS AND PARKING LOTS

STRUCTURAL SOURCE CONTROL BMP'S

- PROVIDE STORM DRAIN SYSTEM STENCILING AND SIGNAGE
- DESIGN AND CONSTRUCT TRASH AND WASTE STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION
- USE EFFICIENT IRRIGATION SYSTEMS & LANDSCAPE DESIGN, WATER CONSERVATION, SMART CONTROLLERS, AND SOURCE CONTROL

MODULAR WETLAND DESIGN SUMMARY

DMA ID	AREA (AC)	% IMP	Q (CFS)	SIZE / MODEL	TREATMENT CAPACITY (CFS)
DMA A	10.3	80%	1.23	(3) THREE MWS-L-8-16	1.386
DMA B	5.0	88%	0.70	MWS-L-8-12 & MWS-L-8-16	0.808
DMA C	10.3	84%	1.34	(3) THREE MWS-L-8-16	1.386



PREPARED FOR:

ORBIS REAL ESTATE PARTNERS
1501 QUAIL STREET, SUITE 250
NEWPORT BEACH, CA 92660
PHONE: (949) 330-7564

PREPARED BY:

FUSCOE
ENGINEERING
15535 Sand Canyon Ave, Suite 100
Irvine, California 92618
949.474.1960
fuscoe.com

CITY OF PERRIS
WQ24-XXXX

PWQMP EXHIBIT
BARKER PLACENTIA
PLACENTIA AVENUE
PERRIS, CA 92571
Exhibit Date: 4/30/24

F:\PROJECTS\1440-001_1_Support Files\SP2023\BARKER PLACENTIA PWQMP.DWG (04-30-24 10:35:55AM) Plotted by: rmcroe



LEGEND

- DRAINAGE BOUNDARY
- NODE
- TIME OF CONCENTRATION FLOW PATH
- FLOW PATH LENGTH
- ELEVATION DIFFERENCE
- LENGTH ALONG FLOW PATH, MEASURED UPSTREAM TO A POINT OPPOSITE THE CENTROID
- DRAINAGE BOUNDARY DESIGNATION
- AREA (ACRES)
- DIRECTION OF FLOW

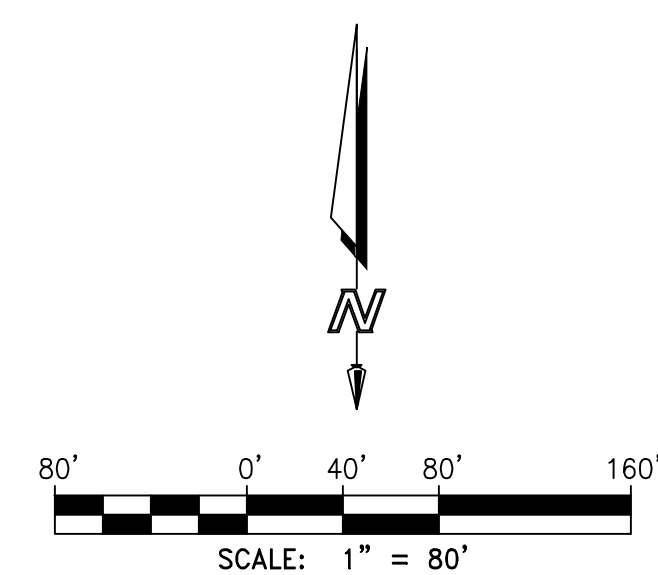
NOTES:
SOIL TYPE C
IMPERVIOUS PERCENTAGE - 0%
LAND USE - VACANT, BASIN

STORM FLOWS & TIME OF CONCENTRATION TABLE

SUBAREA #	AREA (AC)	NODE#	Q ₂ (CFS)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)	FLOOD VOLUME (CF)
A	10.3	11	0.4	3.6	6.0	91428
B	15.3	21	0.6	5.3	9.0	135808
TOTAL	25.6		1.0	8.9	15.0	227236.0

(1471.0 FG) 11
Q₂ = 0.4 CFS
Q₁₀ = 3.6 CFS
Q₁₀₀ = 6.0 CFS

(1469.0 FG) 21
Q₂ = 0.6 CFS
Q₁₀ = 5.3 CFS
Q₁₀₀ = 9.0 CFS

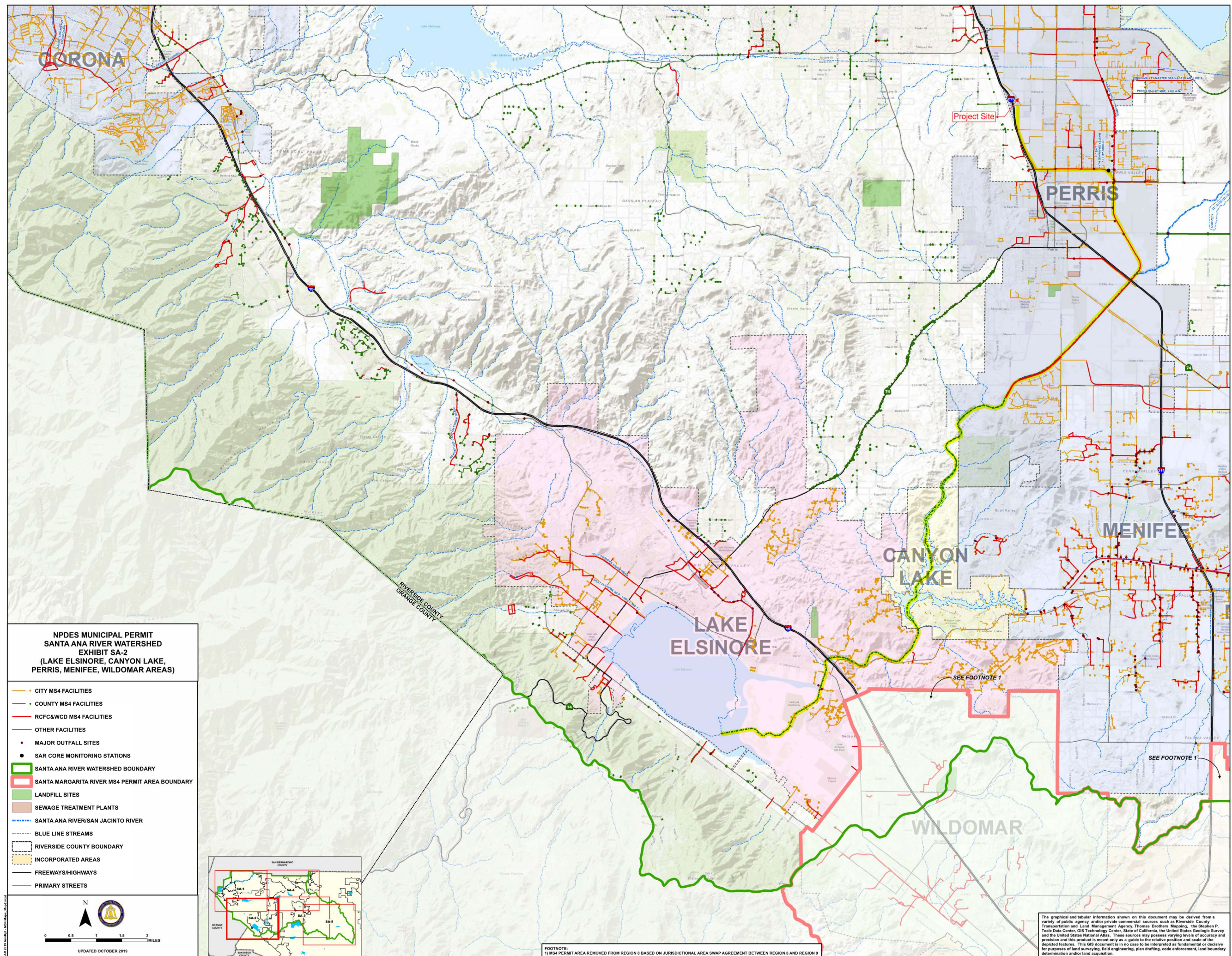


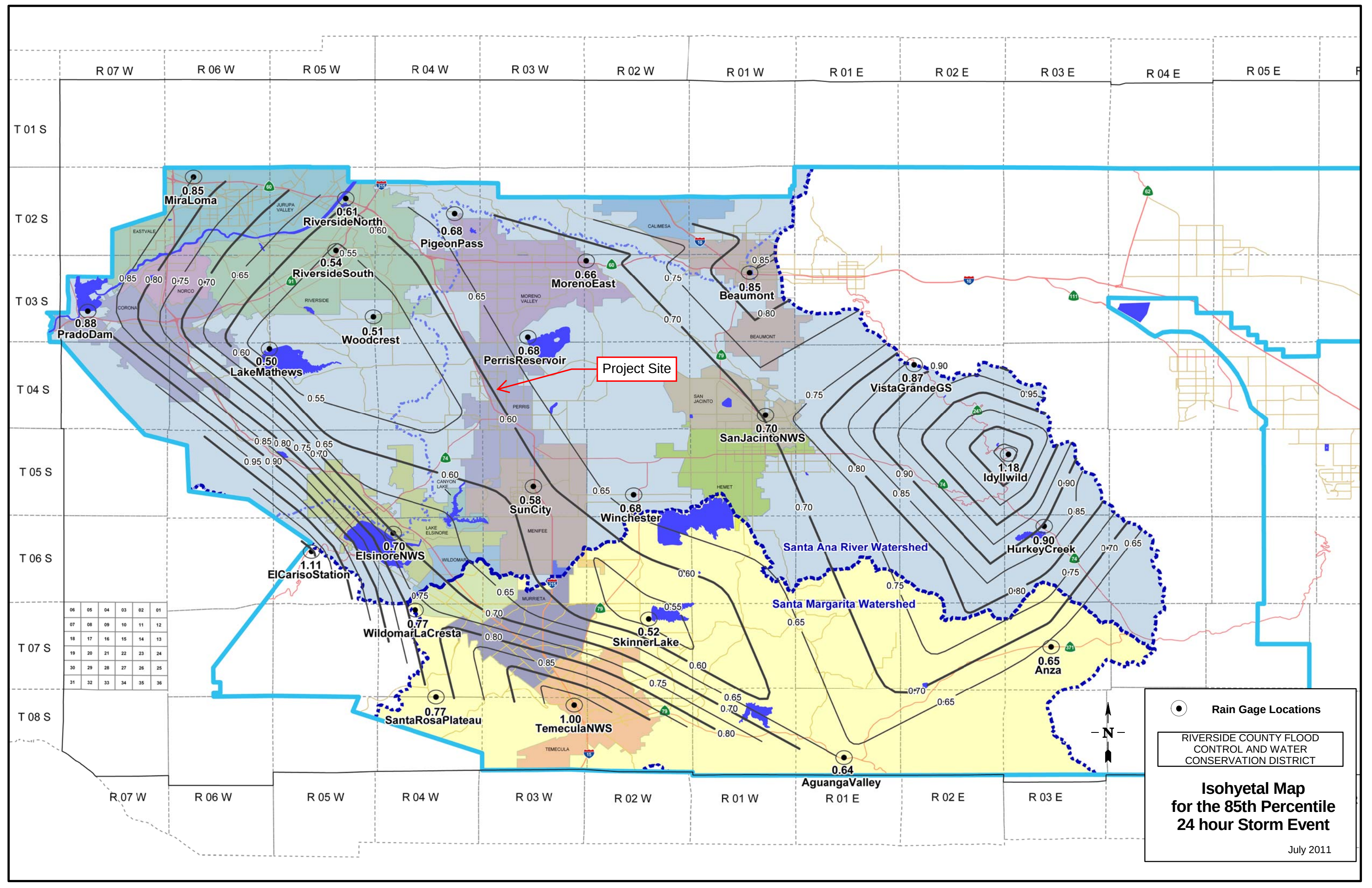
HYDROLOGY STUDY FOR BARKER PLACENTIA
AT PLACENTIA AVENUE & FRONTAGE ROAD

PRE-DEVELOPMENT
HYDROLOGY EXHIBIT

FUSCOE
ENGINEERING
FULL CIRCLE THINKING®
15535 Sand Canyon Ave Suite 100
Irvine, California 92618
949.474.1960
fuscoe.com

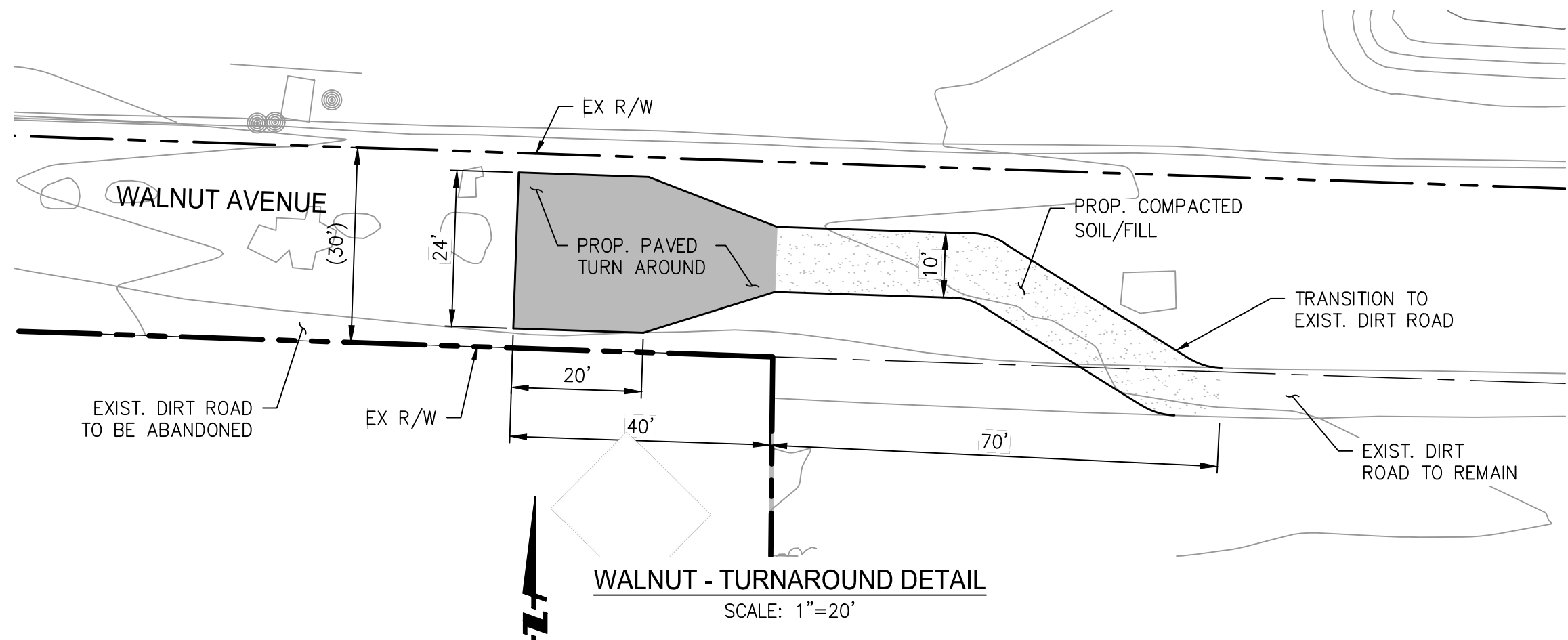
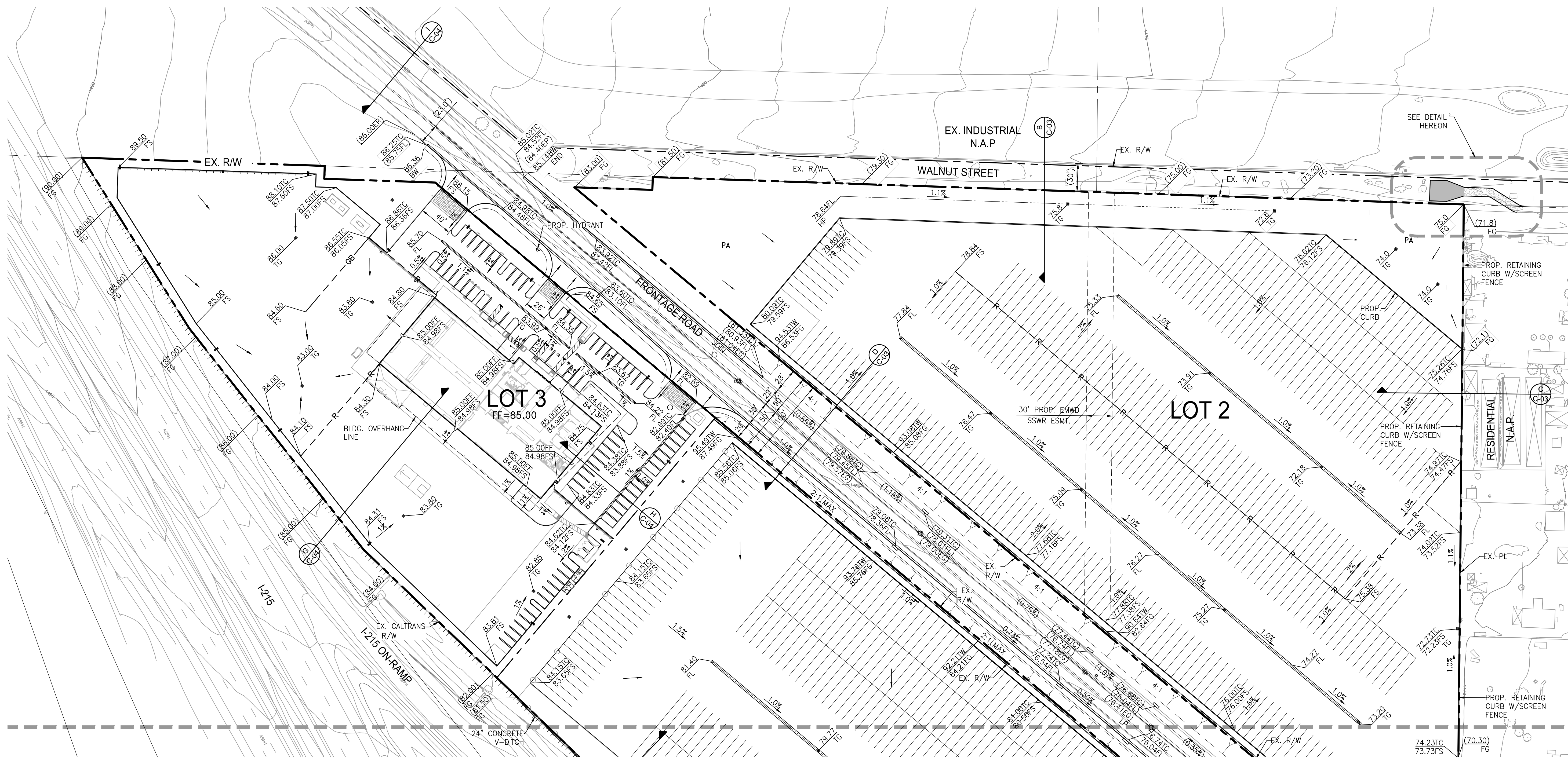
JOB NO.
4149-001
DATE:
04/10/2024
SHEET
1 of 1





Appendix 2: Construction Plans

Grading and Drainage Plans



GENERAL NOTES:

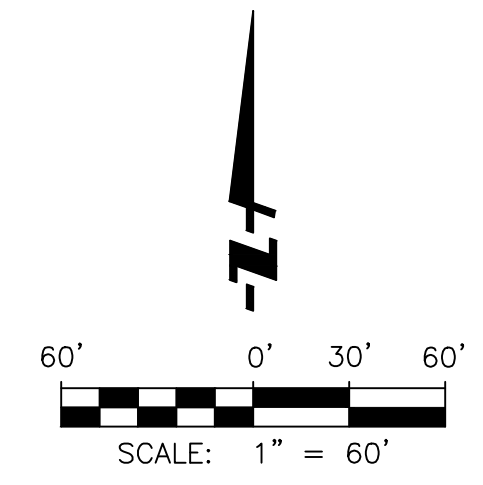
1. ADD 1400'-FT TO ALL DESIGN ELEVATIONS SHOWN, HEREON.
2. FRONTAGE ROAD SPECIFICATIONS PER COUNTY OF RIVERSIDE STANDARD NO. 109 "MAJOR FRONTAGE ROAD", MODIFIED AS NOTED HEREON AND AS DEPICTED IN APPLICABLE SECTIONS. ROADWAY DESIGN PER COUNTY OF RIVERSIDE STANDARD NO. 114 (INDUSTRIAL COLLECTOR MODIFIED) AND PROJECT SPECIFIC GEOTECHNICAL REPORT.
3. ALL DRIVEWAY APPROACHES PER COUNTY OF RIVERSIDE STANDARD NO. 207A UNLESS NOTED OTHERWISE WITH CROSS GUTTER AND SPANDREL PER COUNTY OF RIVERSIDE STANDARD NO. 209.

ABBREVIATIONS:

(XX.XX) EXISTING ELEVATION
XX.XX PROPOSED ELEVATION (SEE NOTE)
EX. EXISTING
EG. EDGE OF GUTTER
FF. FINISHED FLOOR
FG. FINISHED GROUND
FL. FLOWLINE
FS. FINISHED SURFACE
GB. GRADE BREAK
HP. HIGH POINT
LP. LOW POINT
N.A.P. NOT APART
PA. PLANTING AREA
PL. PROPERTY LINE
PROP. PROPOSED
ROW. RIGHT-OF-WAY
SSWR. SEWER
TC. TOP OF CURB
TG. TOP OF GRATE
TW. TOP OF WALL

LEGEND:

--- EXIST RIGHT OF WAY
--- PROPOSED LOT LINE
--- EASEMENT LINE
--- STREET CENTERLINE
--- FLOWLINE
--- MATCHLINE
---R---R---R--- RIDGE
▲ FIRE HYDRANT
□ CATCH BASIN
■ AREA DRAIN INLET



hpa, inc.
18831 bardeen avenue - ste.
#100 irvine, ca
92612
tel: 949-863-1770
email: hpa@hparchs.com



1501 QUAIL STREET, SUITE 250
Newport Beach, CA 92660
tel: 949-330-7564

Project:

BARKER PLACENTIA
Perris, CA

Consultants:

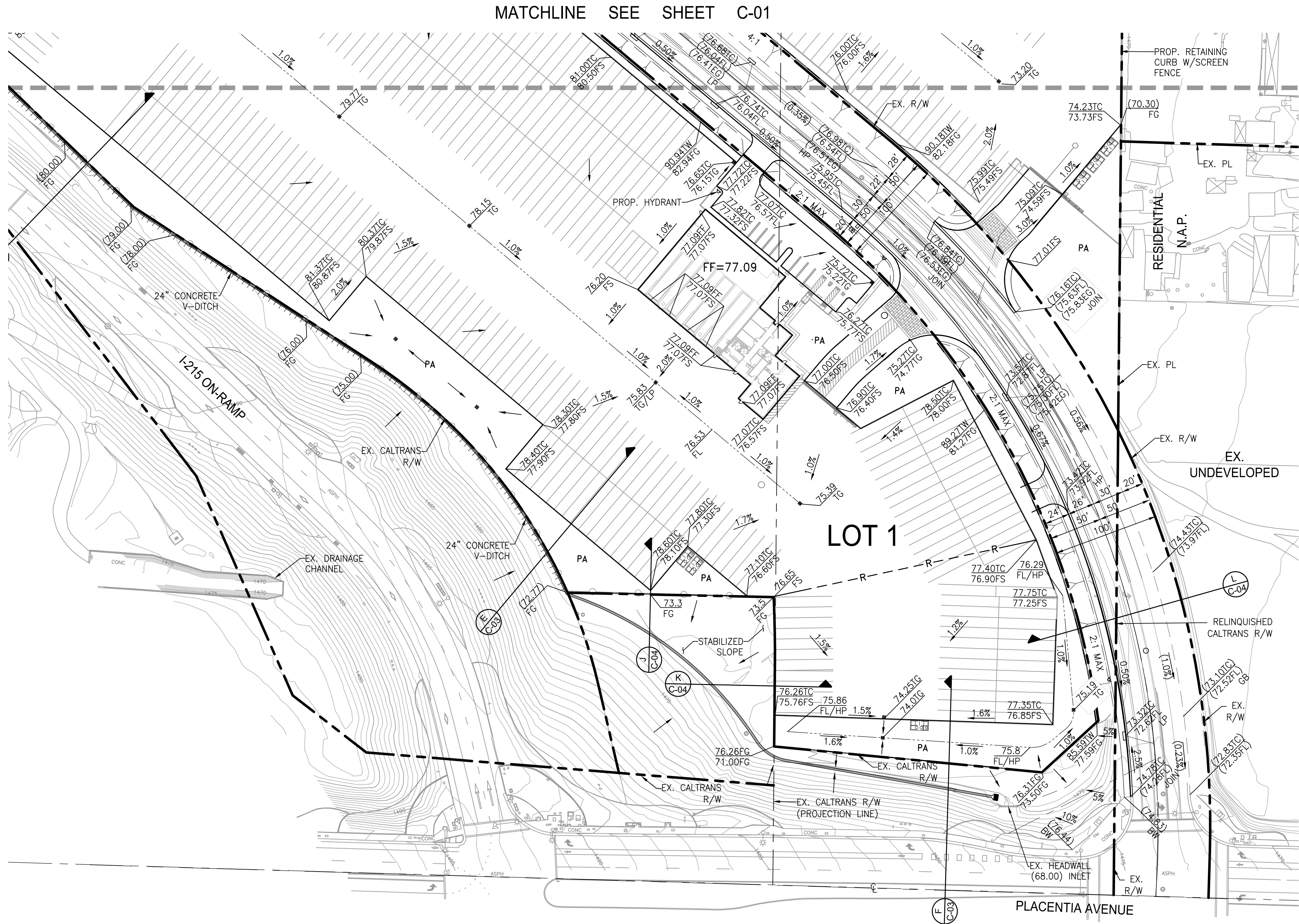
Civil: -
Structural: -
Mechanical: -
Plumbing: -
Electrical: -
Landscape: -
Fire Protection: -
Soils Engineer: -

Title: CONCEPTUAL GRADING PLAN

Project Number: 4149-001
Drawn by: SF, MK, AH
Date: 4/29/2024
Revision:

Sheet: C-01

F:\Projects\4149\001\Plans\Entitlements\Conceptual Grading\Plan\4149-001\cg02a.dwg (J/29/2024 11:11 AM) Plotted by: May Kyi



GENERAL NOTES:

1. ADD 1400-FT TO ALL DESIGN ELEVATIONS SHOWN, HEREON.

2. FRONTAGE ROAD SPECIFICATIONS PER COUNTY OF RIVERSIDE STANDARD NO. 109 "MAJOR FRONTAGE ROAD", MODIFIED AS NOTED HEREON AND AS DEPICTED IN APPLICABLE SECTIONS. ROADWAY DESIGN PER COUNTY OF RIVERSIDE STANDARD NO. 114 (INDUSTRIAL COLLECTOR MODIFIED) AND PROJECT SPECIFIC GEOTECHNICAL REPORT.

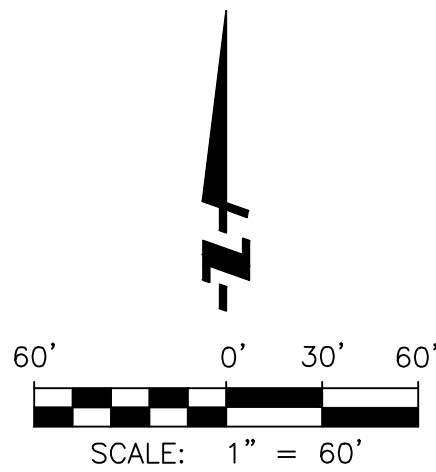
3. ALL DRIVEWAY APPROACHES PER COUNTY OF RIVERSIDE STANDARD NO. 207A UNLESS NOTED OTHERWISE WITH CROSS GUTTER AND SPANDREL PER COUNTY OF RIVERSIDE STANDARD NO. 209.

ABBREVIATIONS:

(XX.XX) EXISTING ELEVATION
XX.XX PROPOSED ELEVATION (SEE NOTE)
EX. EXISTING
EG. EDGE OF GUTTER
FF. FINISHED FLOOR
FG. FINISHED GROUND
FL. FINISHED SURFACE
FS. GRADE BREAK
GB. HIGH POINT
HP. LOW POINT
LP. NOT APART
N.A.P. PLANTING AREA
PA. PROPERTY LINE
PL. PROPOSED
PROP. RIGHT-OF-WAY
ROW. SEWER
SSWR. TOP OF CURB
TC. TOP OF GRATE
TG. TOP OF WALL
TW.

LEGEND:

EXIST RIGHT OF WAY
PROPOSED LOT LINE
EASEMENT LINE
STREET CENTERLINE
FLOWLINE
MATCHLINE
RIDGE
FIRE HYDRANT
CATCH BASIN
AREA DRAIN INLET



hpa, inc.
18831 bardeen avenue - ste.
#100 irvine, ca
92612
tel: 949-863-1770
email: hpa@hparchs.com



OWNER



1501 QUAIL STREET, SUITE 250
Newport Beach, CA 92660

tel: 949-330-7564

Project:

BARKER PLACENTIA

Perris, CA

Consultants:

Civil: -
Structural: -
Mechanical: -
Plumbing: -
Electrical: -
Landscape: -
Fire Protection: -
Soils Engineer: -

Title: CONCEPTUAL GRADING PLAN

Project Number: 4149-001

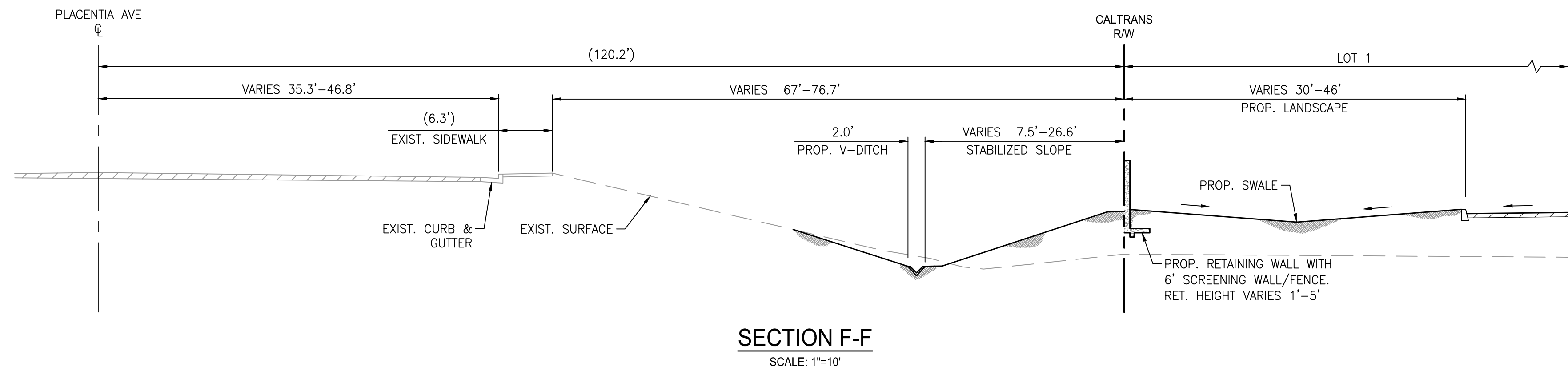
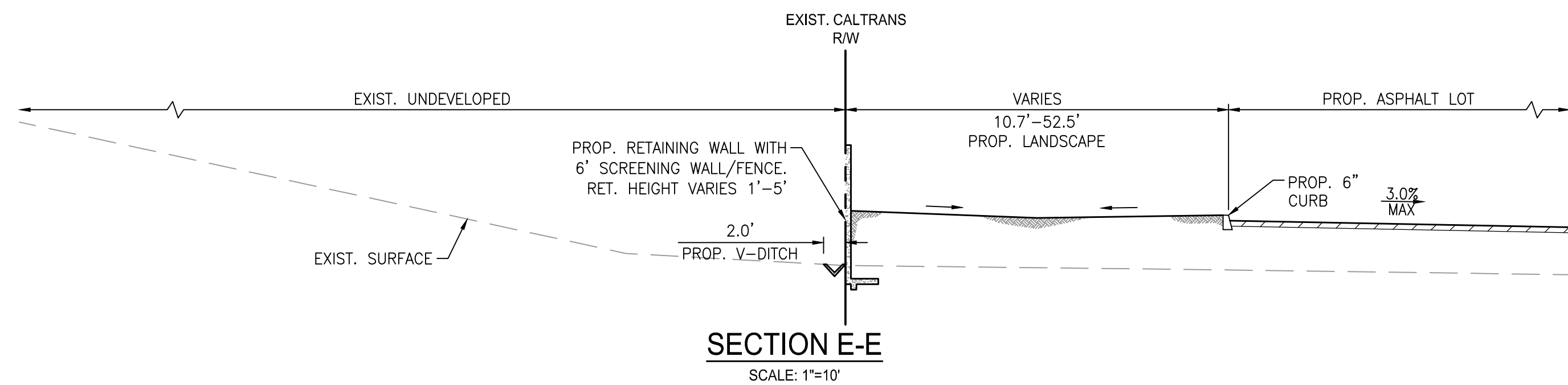
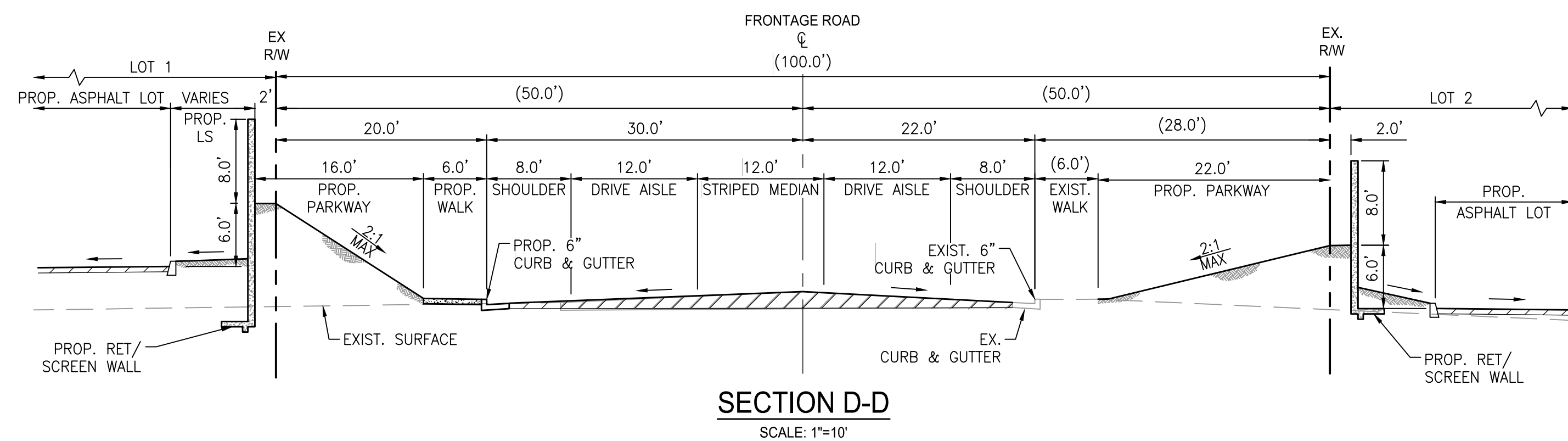
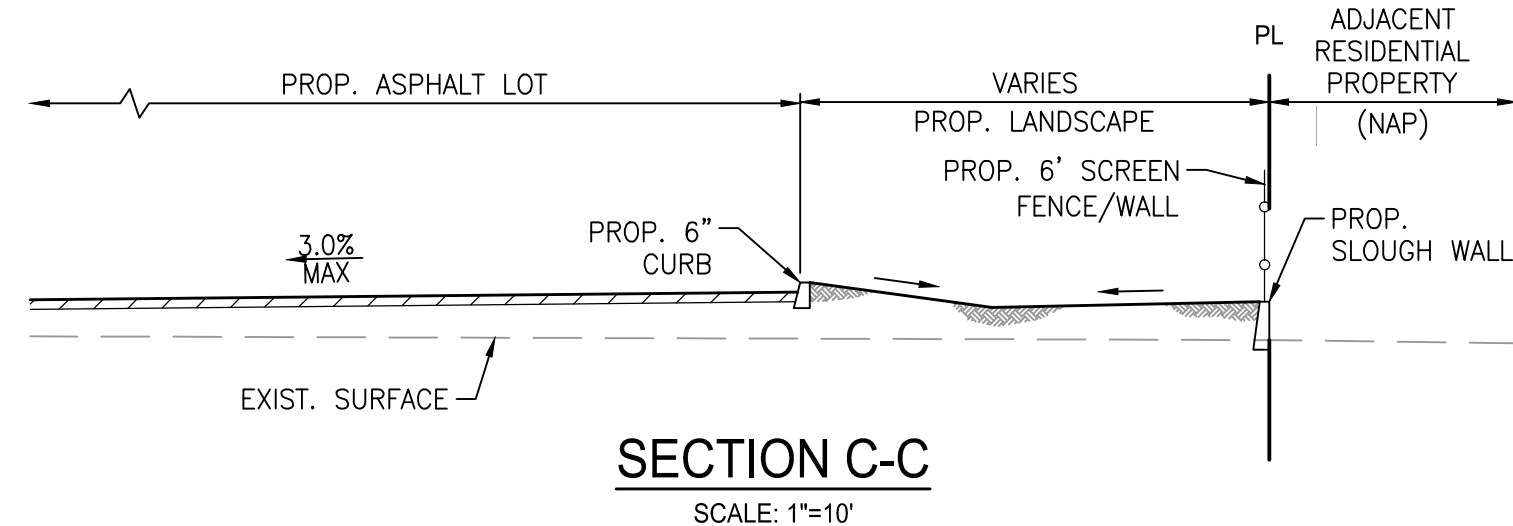
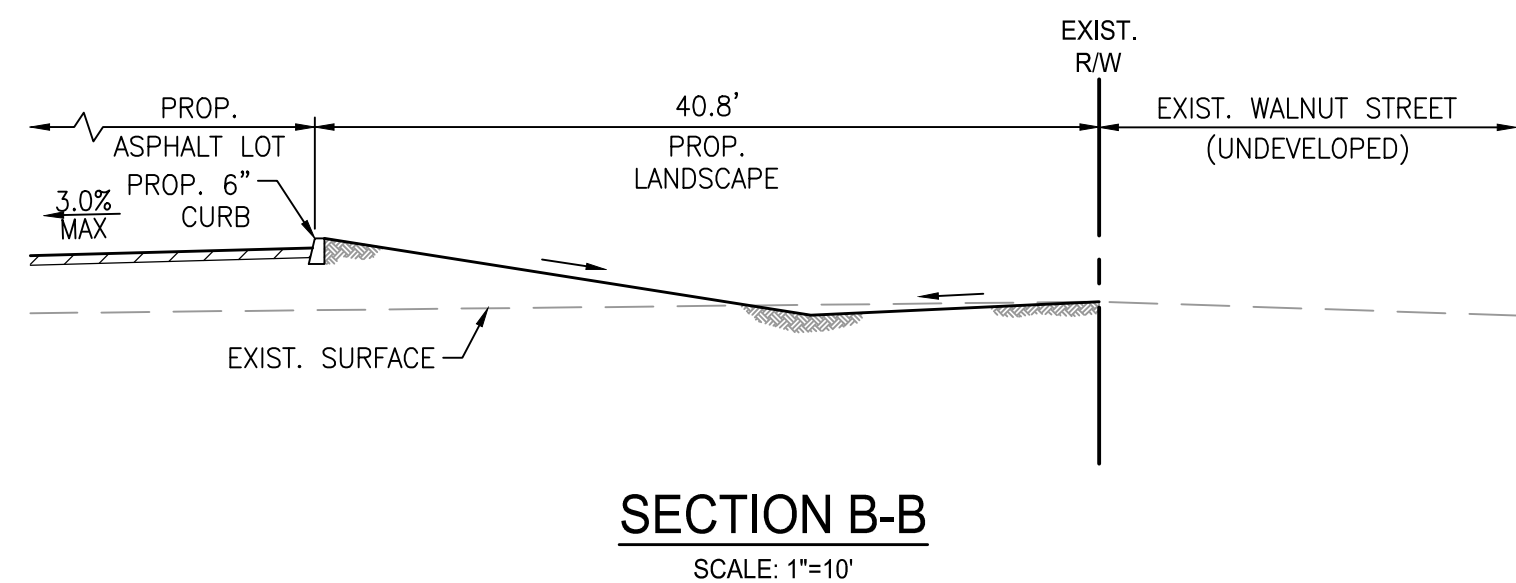
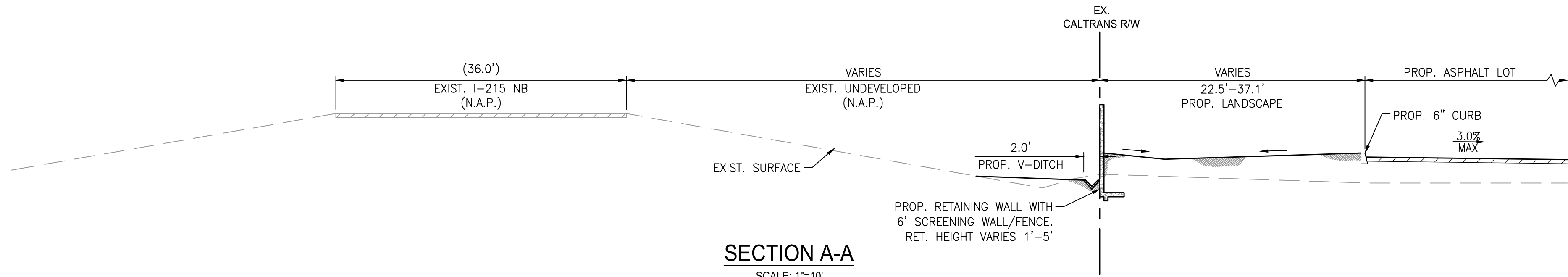
Drawn by: SF, MK, AH

Date: 4/29/2024

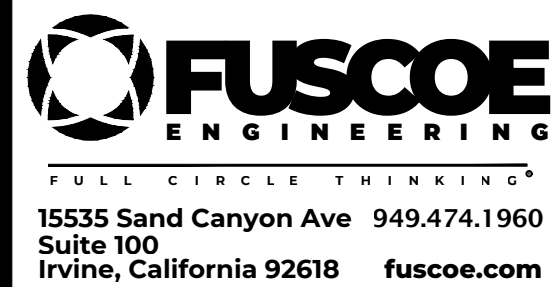
Revision:

Sheet:

C-02



hpa, inc.
18831 bardeen avenue - ste.
#100 irvine, ca
92612
tel: 949-863-1770
email: hpa@hparchs.com



OWNER



1501 QUAIL STREET, SUITE 250
Newport Beach, CA 92660
tel: 949-330-7564

Project:

BARKER PLACENTIA
Perris, CA

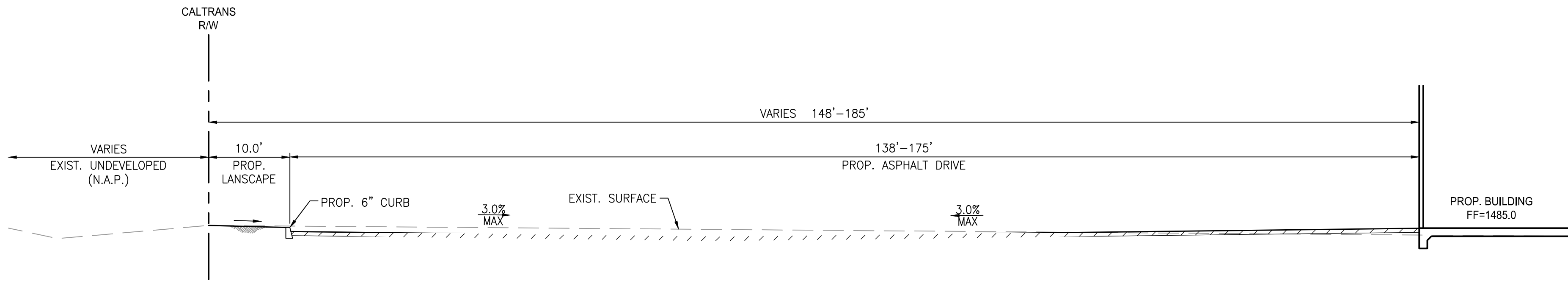
Consultants:

Civil:	-
Structural:	-
Mechanical:	-
Plumbing:	-
Electrical:	-
Landscape:	-
Fire Protection:	-
Soils Engineer:	-

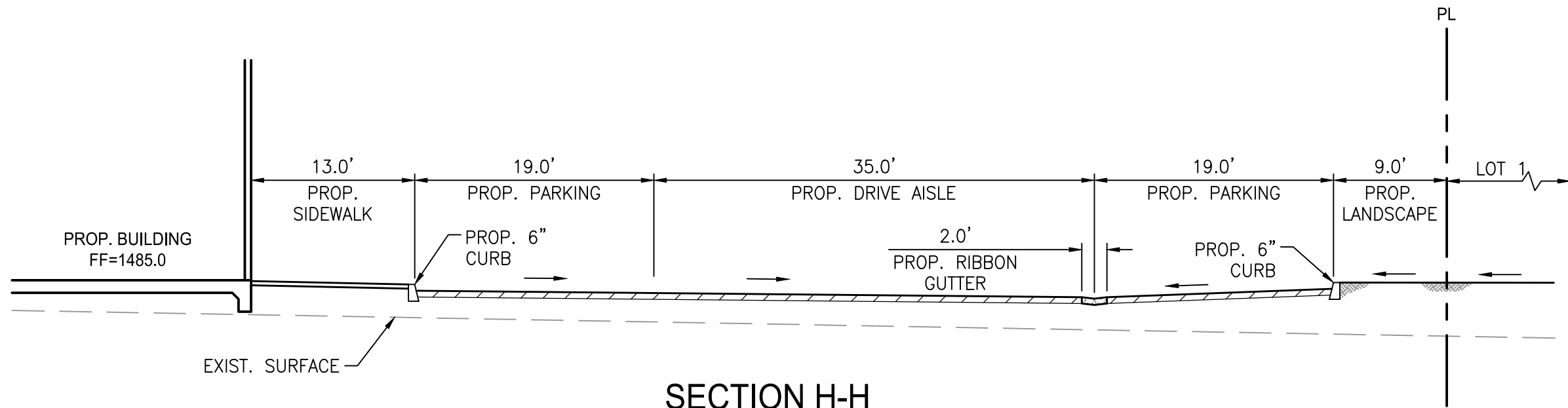
Title: SECTIONS

Project Number: 4149-001
Drawn by: SF, MK, AH
Date: 4/29/2024
Revision:

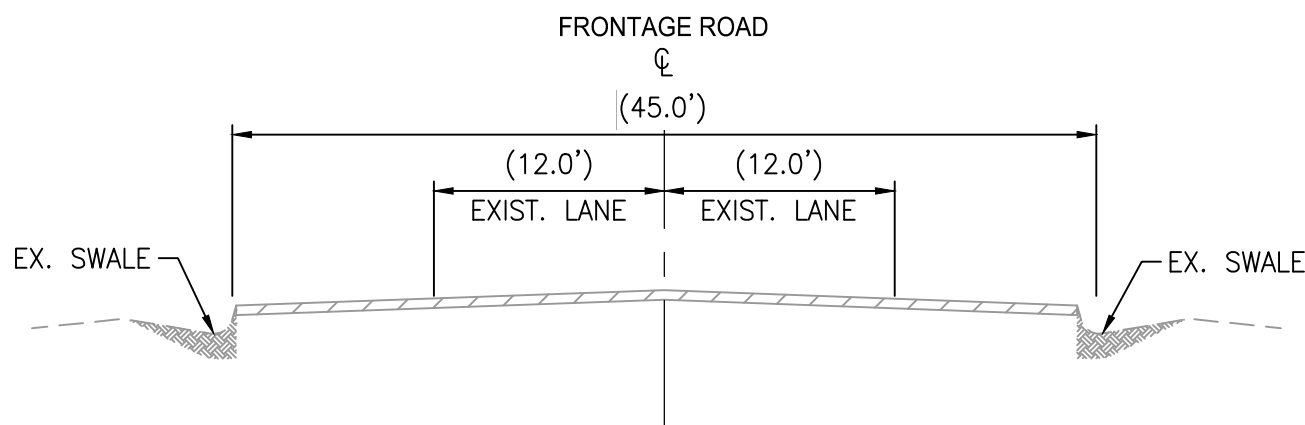
Sheet: C-03



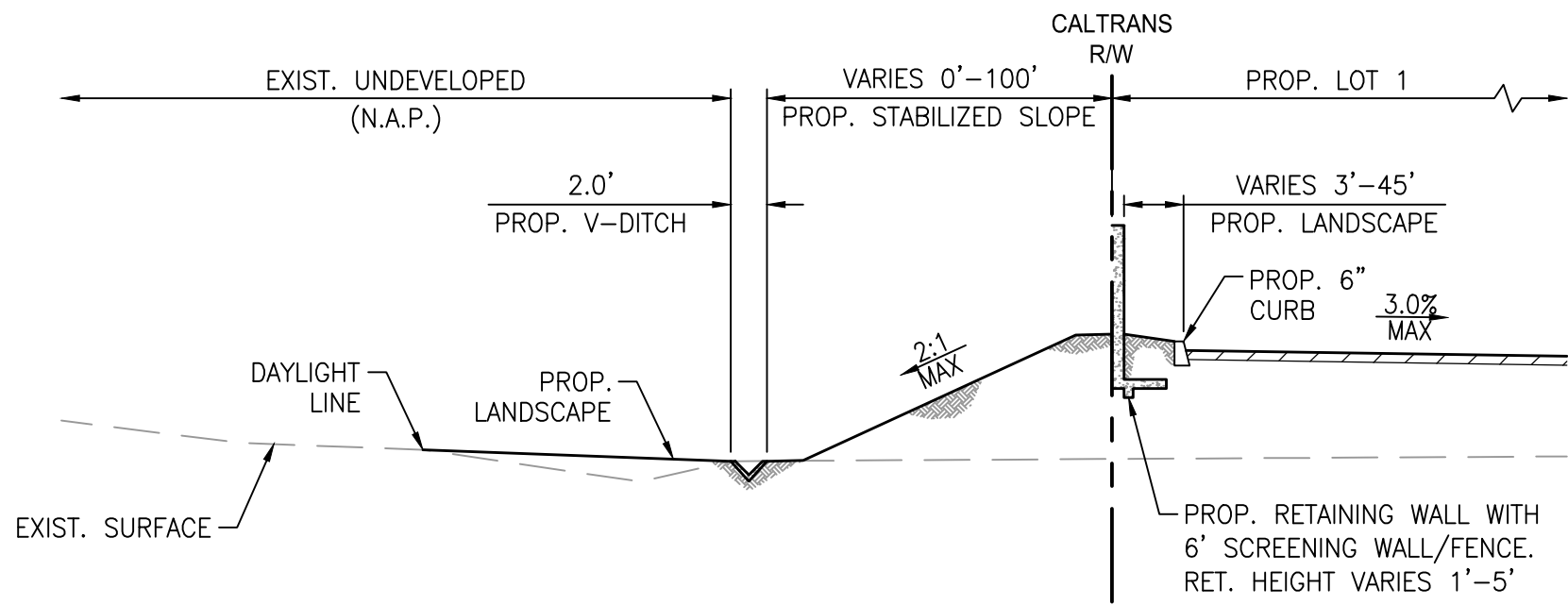
SECTION G-G
SCALE: 1"=10'



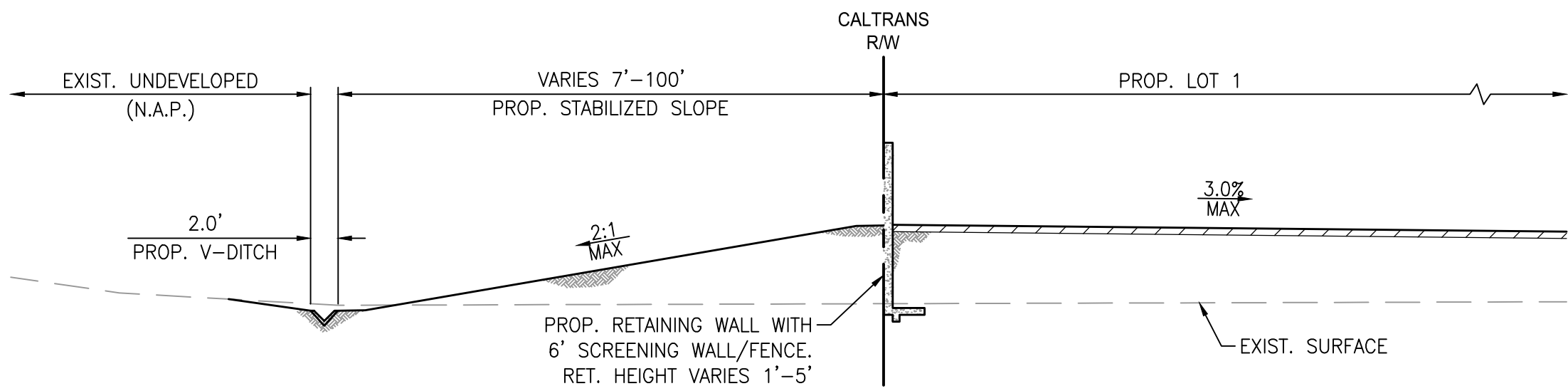
SECTION H-H
SCALE: 1"=10'



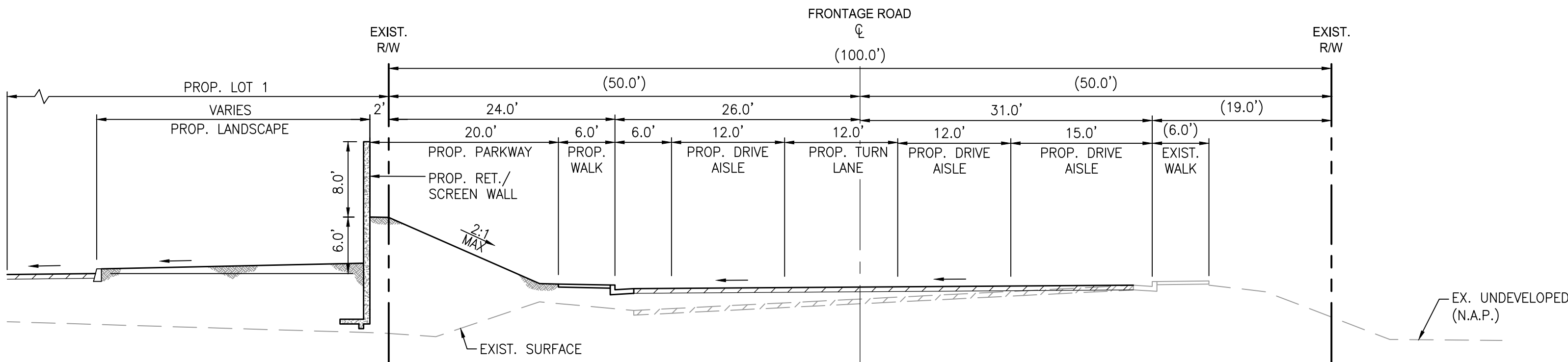
SECTION I-I
SCALE: 1"=10'



SECTION J-J
SCALE: 1"=10'



SECTION K-K
SCALE: 1"=10'



SECTION L-L
SCALE: 1"=10'



hpa, inc.
18831 bardeen avenue - ste.
#100 irvine, ca
92612
tel: 949-863-1770
email: hpa@hparchs.com



OWNER



1501 QUAIL STREET, SUITE 250
Newport Beach, CA 92660
tel: 949-330-7564

Project:

BARKER PLACENTIA
Perris, CA

Consultants:

Civil: -
Structural: -
Mechanical: -
Plumbing: -
Electrical: -
Landscape: -
Fire Protection: -
Soils Engineer: -

Title: SECTIONS

Project Number: 4149-001

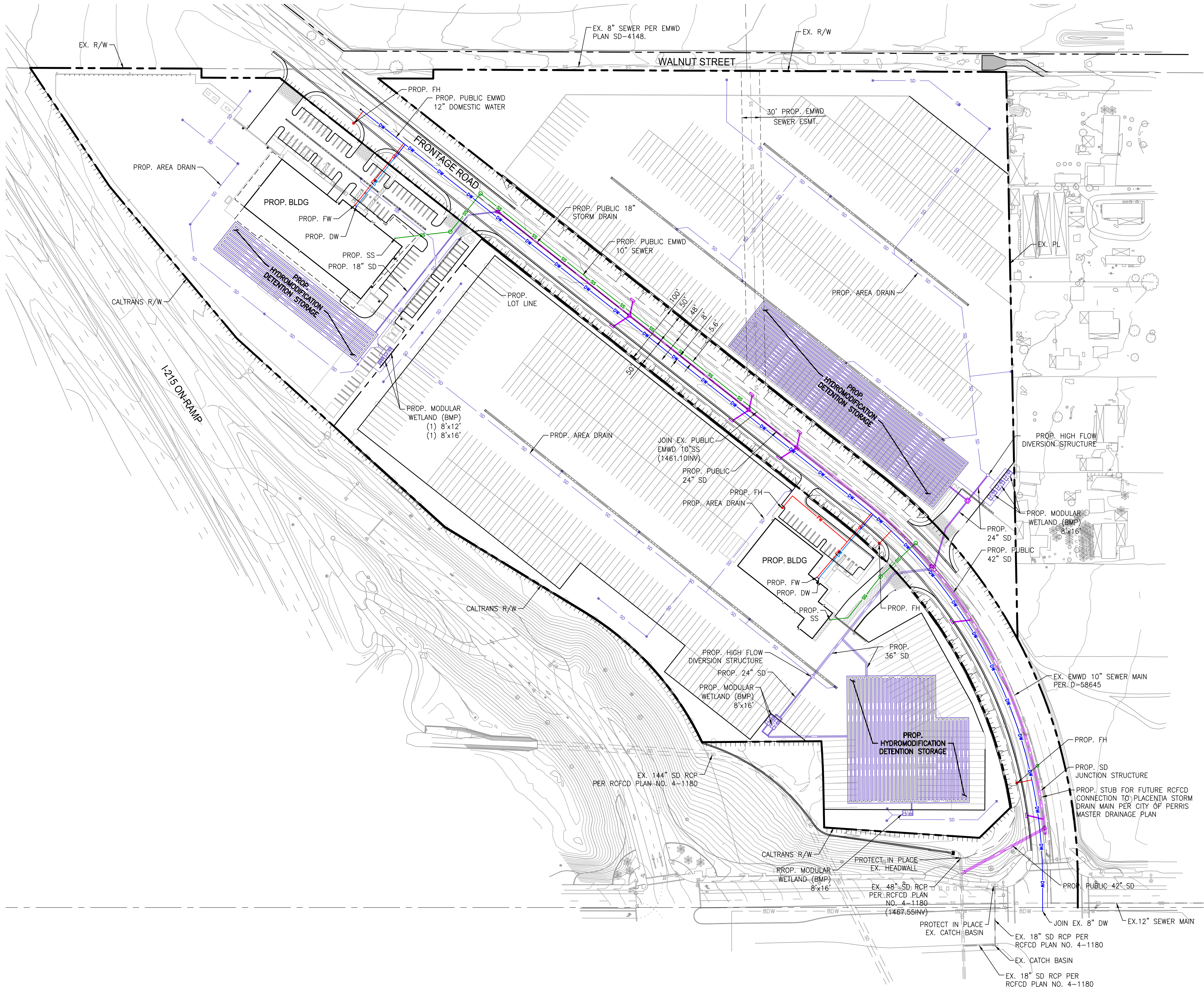
Drawn by: SF, MK, AH

Date: 4/29/2024

Revision:

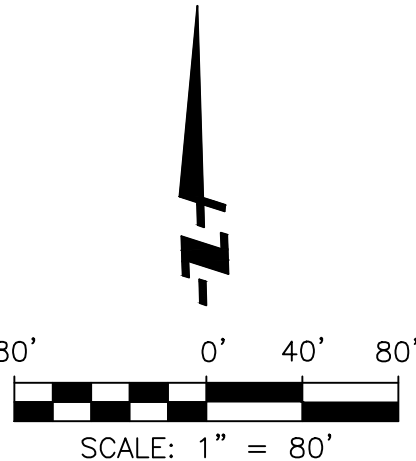
Sheet:

C-04



- ABBREVIATIONS:**
- | | |
|-------|---|
| BLDG | BUILDING |
| BMP | BEST MANAGEMENT PRACTICES |
| DW | DOMESTIC WATER |
| EMWD | EASTERN MUNICIPAL WATER DISTRICT |
| ESMT | EASEMENT |
| EX | EXISTING |
| FH | FIRE HYDRANT |
| FW | FIRE WATER |
| INV | INVERT |
| NO. | NUMBER |
| PL | PROPERTY LINE |
| PROP. | PROPOSED |
| RCFCD | RIVERSIDE COUNTY FLOOD CONTROL DISTRICT |
| R/W | RIGHT-OF-WAY |
| SD | STORM DRAIN |
| SS | SANITARY SEWER |

- LEGEND:**
- | | |
|--|--|
| | PROPOSED PROPERTY LINE |
| | PROPOSED LOT LINE |
| | STREET CENTERLINE |
| | EASEMENT LINE |
| | PROPOSED SANITARY SEWER |
| | PUBLIC STORM DRAIN |
| | PRIVATE STORM DRAIN |
| | PUBLIC DOMESTIC WATER |
| | PRIVATE DOMESTIC WATER |
| | PROPOSED FIRE WATER |
| | EXISTING SANITARY SEWER |
| | FIRE WATER REDUCED-PRESSURE PRINCIPLE DETECTOR ASSEMBLY (RPDA) |
| | FIRE HYDRANT |
| | DOMESTIC WATER BACKFLOW PREVENTION ASSEMBLY |
| | WATER METER |
| | SEWER MANHOLE |
| | STORM DRAIN INLET |
| | CATCH BASIN |
| | JUNCTION STRUCTURE |



hpa, inc.
18831 bardeen avenue - ste.
#100 Irvine, ca
92612
tel: 949-863-1770
email: hpa@hparchs.com



1501 QUAIL STREET, SUITE 250
Newport Beach, CA 92660
tel: 949-330-7564

Project:

BARKER PLACENTIA
Perris, CA

Consultants:

Civil:	-
Structural:	-
Mechanical:	-
Plumbing:	-
Electrical:	-
Landscape:	-
Fire Protection:	-
Soils Engineer:	-

Title: CONCEPTUAL UTILITY PLAN

Project Number: 4149-001

Drawn by: SF, MK, AH

Date: 4/29/2024

Revision:

Sheet: **C-05**

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

June 14, 2023

Orbis Real Estate Partners
280 Newport Center Drive, Suite 240
Newport Beach, California 92660



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Will Johnson
Acquisitions Associate

Project No.: **23G149-2**

Subject: **Preliminary Results of Infiltration Testing**
Proposed Industrial/Retail Development
NWC Placentia Avenue and Frontage Road
Perris, California

Reference: Geotechnical Feasibility Study, Proposed Industrial/Retail Development, NWC Placentia Avenue and Frontage Road, Perris, California, prepared for Orbis Real Estate Partners by Southern California Geotechnical, Inc. (SCG), SCG Project No. 23G149-1, dated June 13, 2023.

Mr. Johnson:

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

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 23P243, dated May 1, 2023. The scope of services included site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the preliminary infiltration rates of the on-site 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 overall site is located on the northeast and southwest sides of the newly re-routed Frontage Road, northwest of Placentia Avenue and Frontage Road in Perris, California. The northeast site is bounded to the north by Walnut Avenue, to the southwest by Frontage Road, and to the east by existing single-family residences. The southwest site is bounded to the north by a vacant lot, to the west by the Escondido Freeway (Interstate 215) north-bound on-ramp, to the south by Placentia Avenue, and to the east by Frontage Road. The general locations of both sites are illustrated on the Site Location Map, included as Plate 1 of this report.

The overall site consists of several parcels which total 25.6± acres in size. Most of the site is generally vacant and undeveloped, with the exception of remnants of the previous Frontage Road.

The ground surface cover consists of exposed soil with moderate to dense native grass and weed growth.

Detailed topographic information for the overall was obtained from an ALTA plan provided by the client. Based on this plan, the overall site topography generally slopes downward to the southeast at a gradient of $1\pm$ percent with an elevation change of 14 to $20\pm$ feet.

Proposed Development

A site plan was unavailable at the time of this feasibility study. However, we understand that the site may be developed with one (1) or more industrial/retail buildings. We expect that the proposed buildings will likely be surrounded by asphaltic concrete (AC) pavements in the parking and drive lane areas, Portland cement concrete (PCC) pavements in the loading dock areas, and concrete flatwork with limited areas of landscaped planters throughout.

We understand that the proposed development may include on-site storm water infiltration. Detailed plans for the stormwater infiltration systems are presently unavailable. It is assumed that the proposed stormwater infiltration systems may consist of below-grade chamber systems or detention basins located in the southeast corners of each site, extending to a depth of $10\pm$ feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, referenced above. As part of this investigation, SCG drilled a total of seven (7) borings to depths of 20 to $25\pm$ feet below the existing site grades. Two of the borings encountered artificial fill soils, extending from the ground surface to depths of $2\frac{1}{2}$ to $3\pm$ feet. The fill soils generally consist of medium dense silty sands and clayey sands. Younger alluvium was encountered beneath the artificial fill soils and at the ground surface at the boring locations, extending to depths of $2\frac{1}{2}$ to $8\frac{1}{2}\pm$ feet below existing site grades. The younger alluvium generally consists of medium dense to dense silty sands and clayey sands. Older alluvium was encountered beneath the younger alluvium at all of the boring locations, extending to at least the maximum depth explored of 25 feet below existing site grades. The older alluvium generally consists of dense to very dense silty sands and clayey sands, with occasional medium dense silty sands and clayey sands.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a greater depth than at least $25\pm$ feet below existing site grades.

As a part of our research, we reviewed available groundwater data in order to determine groundwater levels for the site. Water level data was obtained from the California Department of Water Resources website, <https://wdl.water.ca.gov/waterdatalibrary/>. Several monitoring wells are located within 1 mile radius of the site. Water level readings within these monitoring wells indicate a high groundwater level of $42\pm$ feet below the ground surface in October 2022.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe-excavated trenches, extending to a depth of 10± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as Infiltration Test Nos. I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

Artificial fill soils were encountered at the ground surface at all of the infiltration test locations, extending to depths of ½ to 4± feet below the existing site grades. The artificial fill soils generally consist of loose to dense silty sands. Infiltration Trench No. I-1 encountered occasional cobbles extending to a depth of 4± feet from the ground surface. The fill soils possess a disturbed and mottled appearance resulting in their classification as artificial fill. Younger alluvium was encountered beneath the artificial fill soils at Infiltration Trench No. I-2, extending to a depth of 2± feet. The younger alluvium generally consists of loose to medium dense silty sands. Older alluvium was encountered beneath the younger alluvium at Infiltration Trench No. I-2 and the artificial fill soils at the remaining infiltration test locations, extending to at least the maximum depth explored of 10± feet. The older alluvium generally consists of dense to very dense silty sands with varying clay content, and clayey sands with varying silt content. Infiltration Trench No. I-3 encountered an older alluvium stratum consisting of very dense to hard clayey sands to sandy clays at a depth of 1 to 10± feet from the ground surface.

Infiltration Testing

We understand that the results of the infiltration testing will be used to prepare a preliminary design for the storm water infiltration systems that will be used at the subject site. As previously mentioned, 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 the test locations, the outer ring was driven 3± inches into the soil at the base of each 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

Infiltration testing was performed at all of the trench locations. 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 was

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 tests.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 30-minute increments. 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 the tests are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used for design. These rates are summarized below:

<u>Infiltration Test No.</u>	<u>Depth (feet)</u>	<u>Soil Description</u>	<u>Measured Infiltration Rate (inches/hour)</u>
I-1	10	Brown Silty fine to coarse Sand, trace Clay, little fine Gravel	0.43
I-2	10	Dark Brown Clayey fine to medium Sand, little Silt	0.00
I-3	10	Dark Brown Clayey fine to medium Sand to fine to medium Sandy Clay, little Silt	0.00
I-4	10	Brown Clayey fine to medium Sand, little Silt	0.00

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the trenches were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Trench Logs.

Grain Size Analysis

The grain size distribution of selected soils collected 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 on Plates C-1 through C-4 of this report. The percentage passing the No. 200 sieve is also reported on the Trench Logs.

Design Recommendations

Four (4) infiltration tests were performed at the subject site. The soils encountered at the bottom of the test locations consist of dense to very dense older alluvium. As noted above, measured infiltration rates of 0.0 inches per hour were obtained at three of the test locations. A measured infiltration rate of 0.43 inch per hour was obtained at the remaining test location. **Based on the results of infiltration testing and the subsurface profile encountered at the test locations, the site is underlain by soils which are not conducive to infiltration. Therefore, infiltration is not recommended for this project.**

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.



Joseph Lozano Leon
Staff Engineer

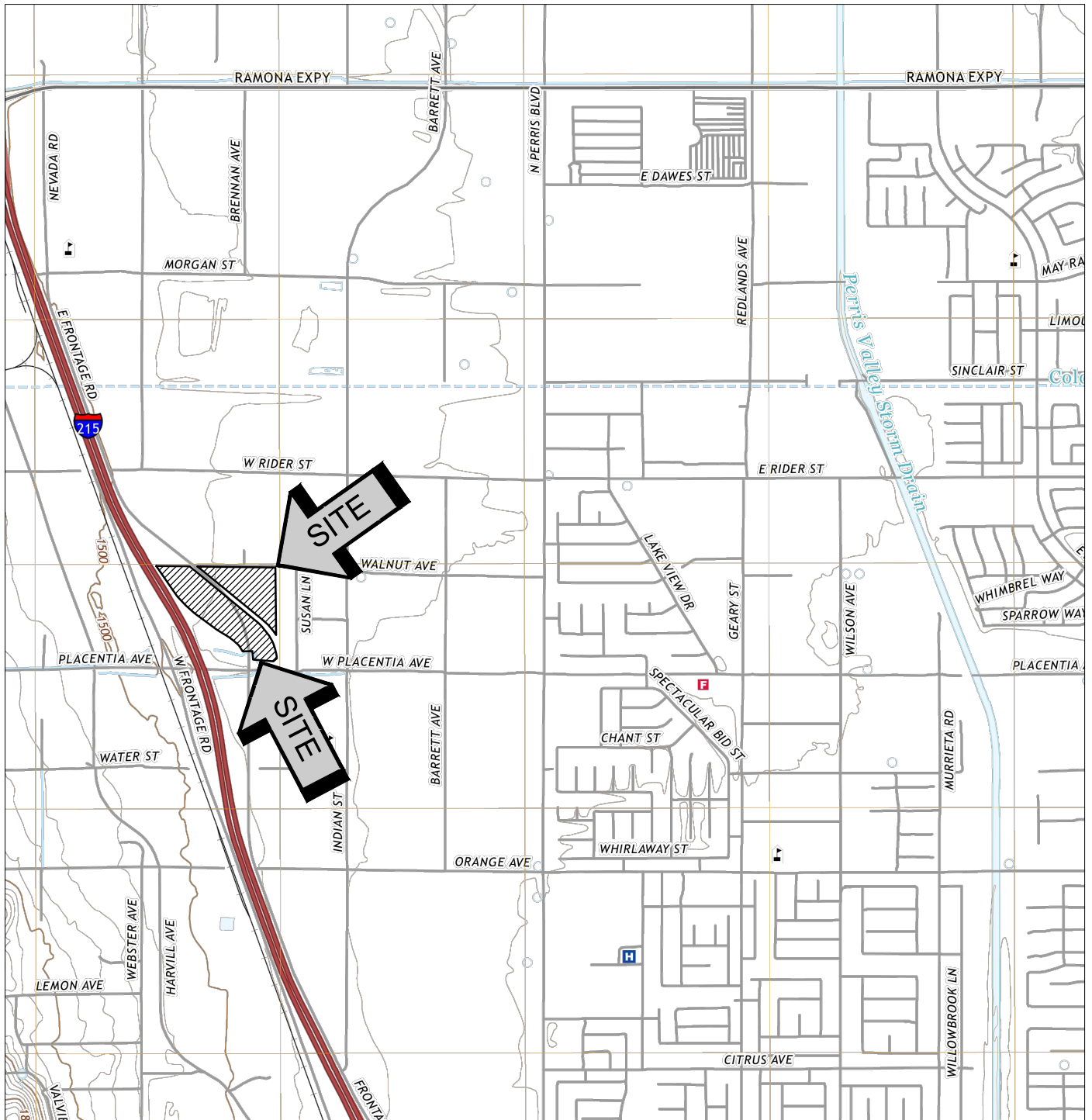


Robert G. Trazo, GE 2655
Principal Engineer



Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Trench Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grainsize Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE
PERRIS QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA,
2021.



SITE LOCATION MAP

PROPOSED INDUSTRIAL/RETAIL DEVELOPMENT

PERRIS, CALIFORNIA

SCALE: 1" = 2000'

DRAWN: JLL

CHKD: RGT

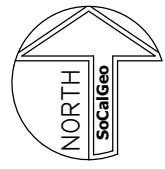
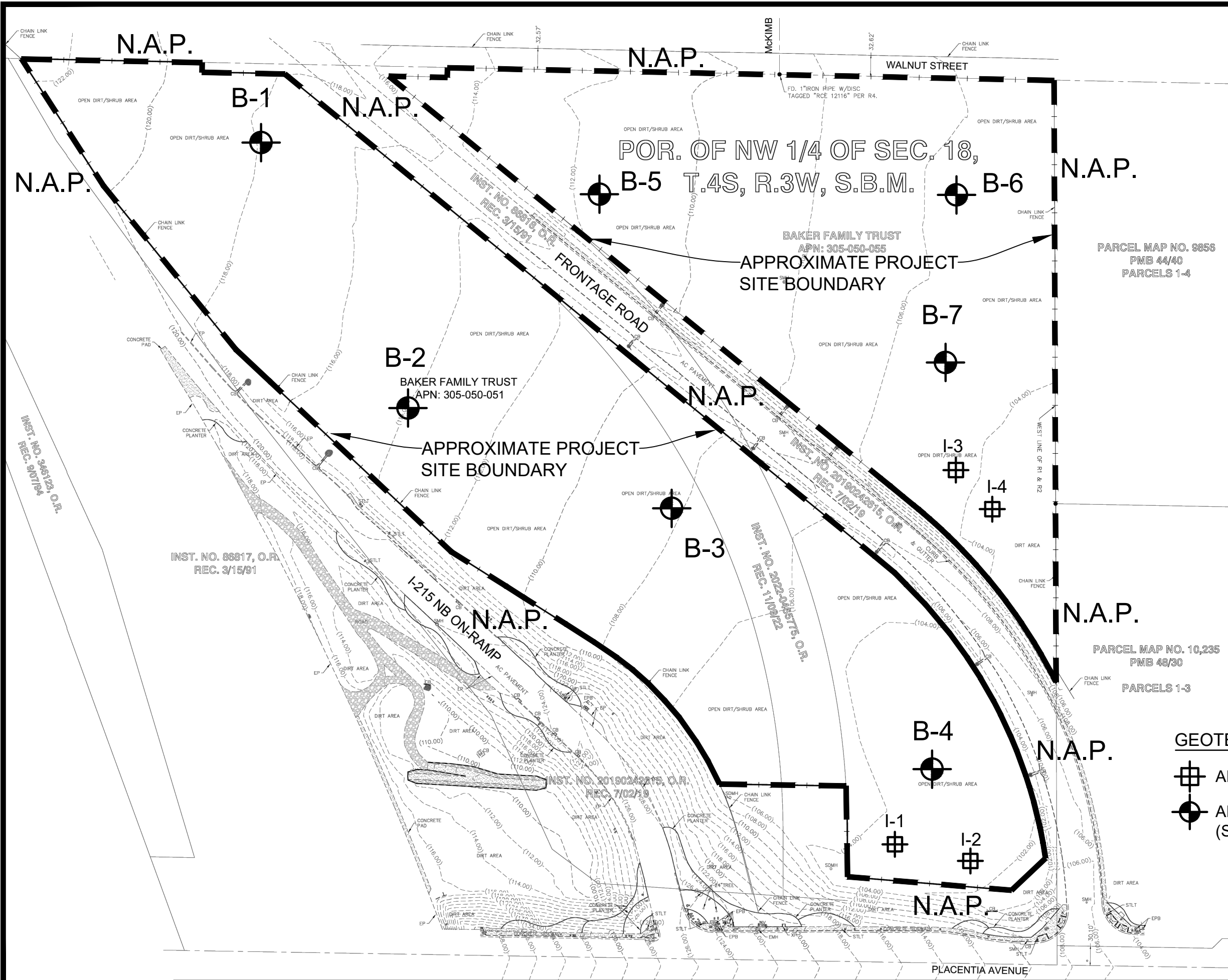
SCG PROJECT

23G149-2

PLATE 1



SOUTHERN
CALIFORNIA
GEOTECHNICAL



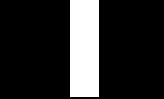
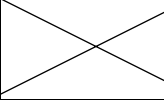
GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION FROM (SCG PROJECT NO. 23G149-1)

NOTE: ALTA PLAN PROVIDED BY THE CLIENT.

INFILTRATION TEST LOCATION PLAN	
PROPOSED INDUSTRIAL/RETAIL DEVELOPMENT	
PERRIS, CALIFORNIA	
SCALE: 1" = 150'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JLL	
CHKD: RGT	
SCG PROJECT 23G149-2	
PLATE 2	

TRENCH LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH:

Distance in feet below the ground surface.

SAMPLE:

Sample Type as depicted above.

BLOW COUNT:

Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.:

Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG:

Graphic Soil Symbol as depicted on the following page.

DRY DENSITY:

Dry density of an undisturbed or relatively undisturbed sample in lbs/ft³.

MOISTURE CONTENT:

Moisture content of a soil sample, expressed as a percentage of the dry weight.

LIQUID LIMIT:

The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT:

The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE:

The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR:

The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



JOB NO.: 23G149-2	EXCAVATION DATE: 6/2/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial/Retail Development	EXCAVATION METHOD: Backhoe	CAVE DEPTH: ---
LOCATION: Perris, California	LOGGED BY: Joseph Hernandez	READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
5					<u>FILL</u> : Brown Silty fine to medium Sand, trace coarse Sand, little fine to coarse Gravel, occasional Cobbles, dense-moist		9					
					<u>OLDER ALLUVIUM</u> : Brown Silty fine to coarse Sand, trace Clay, little fine Gravel, dense to very dense-damp							
10							3			28		
					Trench Terminated at 10'							

TBL 23G149-2 (TRENCHES).GPJ SOCALGEO.GDT 6/14/23



JOB NO.: 23G149-2				EXCAVATION DATE: 6/2/23				WATER DEPTH: Dry				
PROJECT: Proposed Industrial/Retail Development				EXCAVATION METHOD: Backhoe				CAVE DEPTH: ---				
LOCATION: Perris, California				LOGGED BY: Joseph Hernandez				READING TAKEN: At Completion				
FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
					<u>FILL:</u> Light Brown Silty fine Sand, trace medium Sand, trace fine root fibers, medium dense-dry to damp		3					
5					<u>OLDER ALLUVIUM:</u> Dark Brown Clayey fine to medium Sand to fine to medium Sandy Clay, little Silt, very dense to hard-moist							
10			4.5				11			55		
Trench Terminated at 10'												

TBL_23G149-2 (TRENCHES).GPJ SOCALGEO.GDT 6/14/23



JOB NO.: 23G149-2	EXCAVATION DATE: 6/2/23	WATER DEPTH: Dry
PROJECT: Proposed Industrial/Retail Development	EXCAVATION METHOD: Backhoe	CAVE DEPTH: ---
LOCATION: Perris, California	LOGGED BY: Joseph Hernandez	READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG		DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
					SURFACE ELEVATION: --- MSL <u>FILL</u>: Light Brown Silty fine Sand, trace medium Sand, little fine root fibers, dense-dry <u>OLDER ALLUVIUM</u>: Brown Clayey fine to medium Sand, little Silt, very dense-moist		1					
5												
10							11			37		
					Trench Terminated at 10'							

TBL 23G149-2 (TRENCHES).GPJ SOCALGEO.GDT 6/14/23

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial/Retail Development
Project Location	Perris, California
Project Number	23G149-2
Engineer	Joseph Hernandez

Infiltration Test No I-1

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

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

Test Interval		Time (hr)	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	9:30 AM	30	0	700	0	5000	1.92	4.57	0.76	1.80
	Final	10:00 AM	30	700		5000					
2	Initial	10:00 AM	30	0	500	0	1300	1.37	1.19	0.54	0.47
	Final	10:30 AM	60	500		1300					
3	Initial	10:30 AM	30	0	400	0	1000	1.10	0.91	0.43	0.36
	Final	11:00 AM	90	400		1000					
4	Initial	11:00 AM	30	0	400	0	900	1.10	0.82	0.43	0.32
	Final	11:30 AM	120	400		900					
5	Initial	11:30 AM	30	0	400	0	1000	1.10	0.91	0.43	0.36
	Final	12:00 PM	150	400		1000					
6	Initial	12:00 PM	30	0	400	0	1000	1.10	0.91	0.43	0.36
	Final	12:30 PM	180	400		1000					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial/Retail Development
Project Location	Perris, California
Project Number	23G149-2
Engineer	Joseph Hernandez

Infiltration Test No I-2

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

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

Test Interval		Time (hr)	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	11:45 AM	30	0	100	0	800	0.27	0.73	0.11	0.29
	Final	12:15 PM	30	100		800					
2	Initial	12:15 PM	30	0	0	0	600	0.00	0.55	0.00	0.22
	Final	12:45 PM	60	0		600					
3	Initial	12:45 PM	30	0	0	0	600	0.00	0.55	0.00	0.22
	Final	1:15 PM	90	0		600					
4	Initial	1:15 PM	30	0	0	0	400	0.00	0.37	0.00	0.14
	Final	1:45 PM	120	0		400					
5	Initial	1:45 PM	30	0	0	0	200	0.00	0.18	0.00	0.07
	Final	2:15 PM	150	0		200					
6	Initial	2:15 PM	30	0	0	0	200	0.00	0.18	0.00	0.07
	Final	2:45 PM	180	0		200					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial/Retail Development
Project Location	Perris, California
Project Number	23G149-2
Engineer	Joseph Hernandez

Infiltration Test No I-3

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

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

Test Interval		Time (hr)	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	10:00 AM	30	0	100	0	1500	0.27	1.37	0.11	0.54
	Final	10:30 AM	30	100		1500					
2	Initial	10:30 AM	30	0	50	0	300	0.14	0.27	0.05	0.11
	Final	11:00 AM	60	50		300					
3	Initial	11:00 AM	30	0	0	0	150	0.00	0.14	0.00	0.05
	Final	11:30 AM	90	0		150					
4	Initial	11:30 AM	30	0	0	0	100	0.00	0.09	0.00	0.04
	Final	12:00 PM	120	0		100					
5	Initial	12:00 PM	30	0	0	0	100	0.00	0.09	0.00	0.04
	Final	12:30 PM	150	0		100					
6	Initial	12:30 PM	30	0	0	0	100	0.00	0.09	0.00	0.04
	Final	1:00 PM	180	0		100					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial/Retail Development
Project Location	Perris, California
Project Number	23G149-2
Engineer	Joseph Hernandez

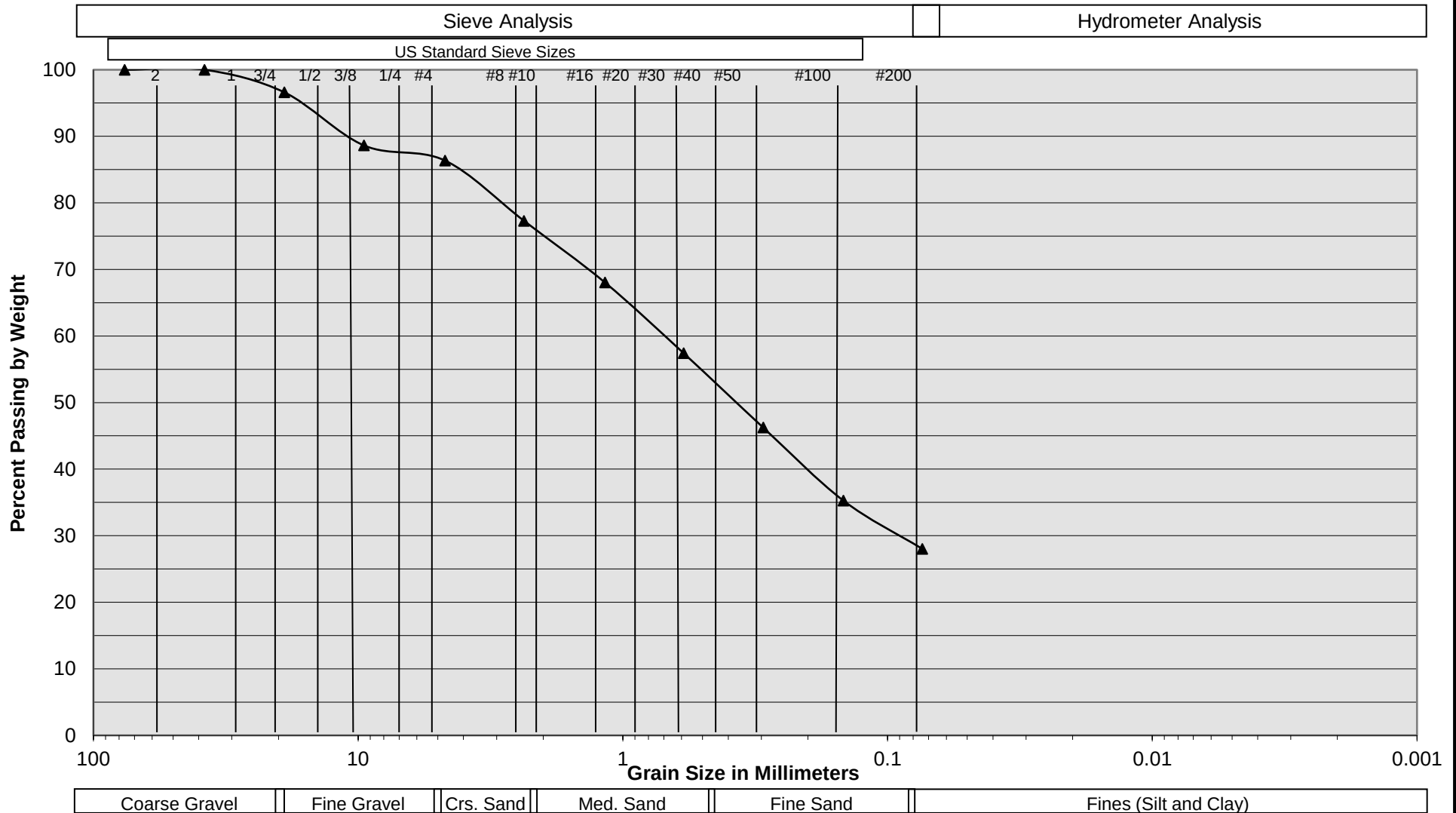
Infiltration Test No I-4

Constants			
	Diameter (ft)	Area (ft ²)	Area (cm ²)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

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

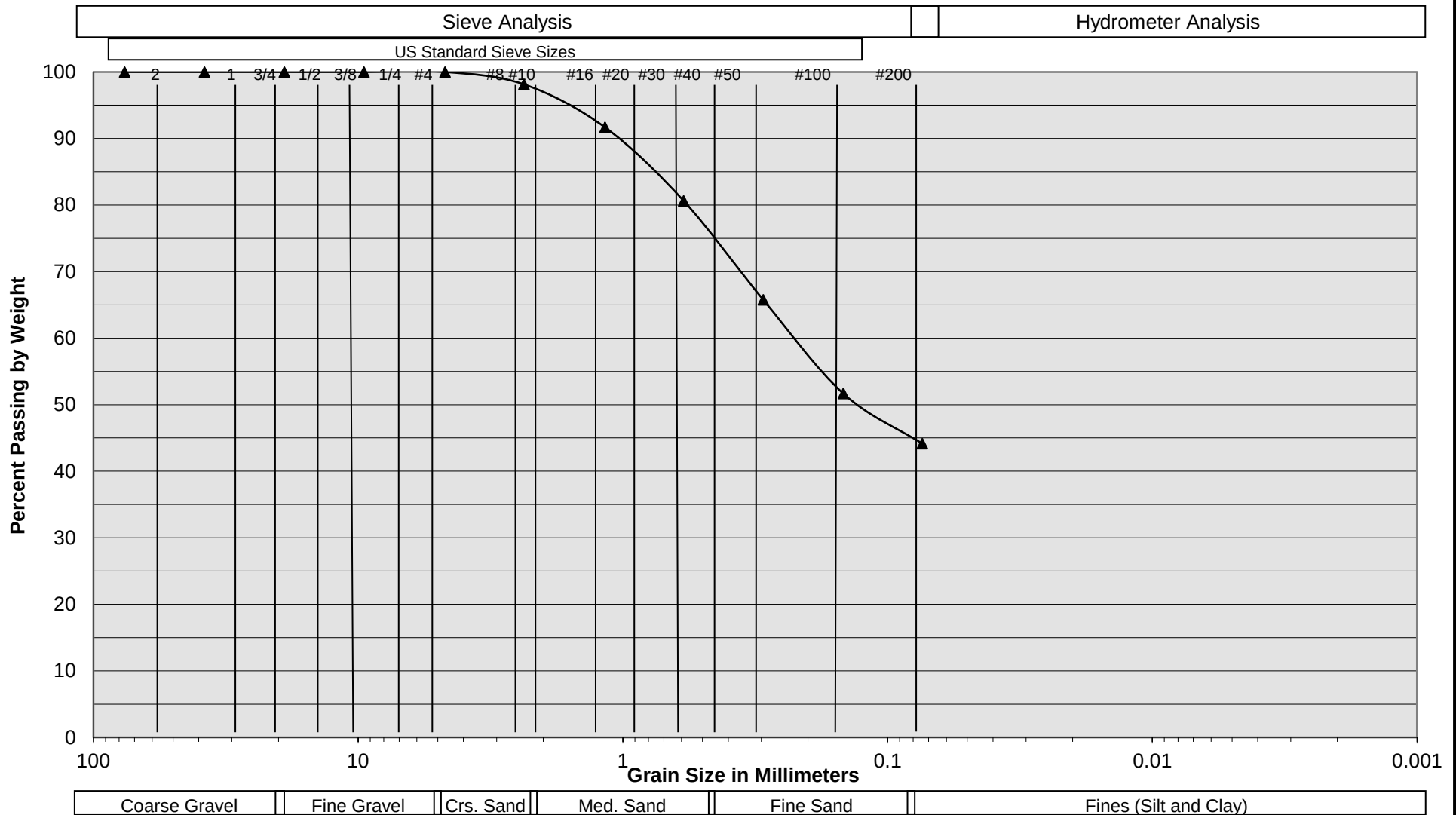
Test Interval		Time (hr)	Interval Elapsed (min)	Flow Readings				Infiltration Rates			
				Inner Ring (ml)	Ring Flow (cm ³)	Annular Ring (ml)	Space Flow (cm ³)	Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	12:00 PM	30	0	50	0	3000	0.14	2.74	0.05	1.08
	Final	12:30 PM	30	50		3000					
2	Initial	12:30 PM	30	0	50	0	2000	0.14	1.83	0.05	0.72
	Final	1:00 PM	60	50		2000					
3	Initial	1:00 PM	30	0	0	0	1800	0.00	1.64	0.00	0.65
	Final	1:30 PM	90	0		1800					
4	Initial	1:30 PM	30	0	0	0	1400	0.00	1.28	0.00	0.50
	Final	2:00 PM	120	0		1400					
5	Initial	2:00 PM	30	0	0	0	1000	0.00	0.91	0.00	0.36
	Final	2:30 PM	150	0		1000					
6	Initial	2:30 PM	30	0	0	0	1000	0.00	0.91	0.00	0.36
	Final	3:00 PM	180	0		1000					

Grain Size Distribution



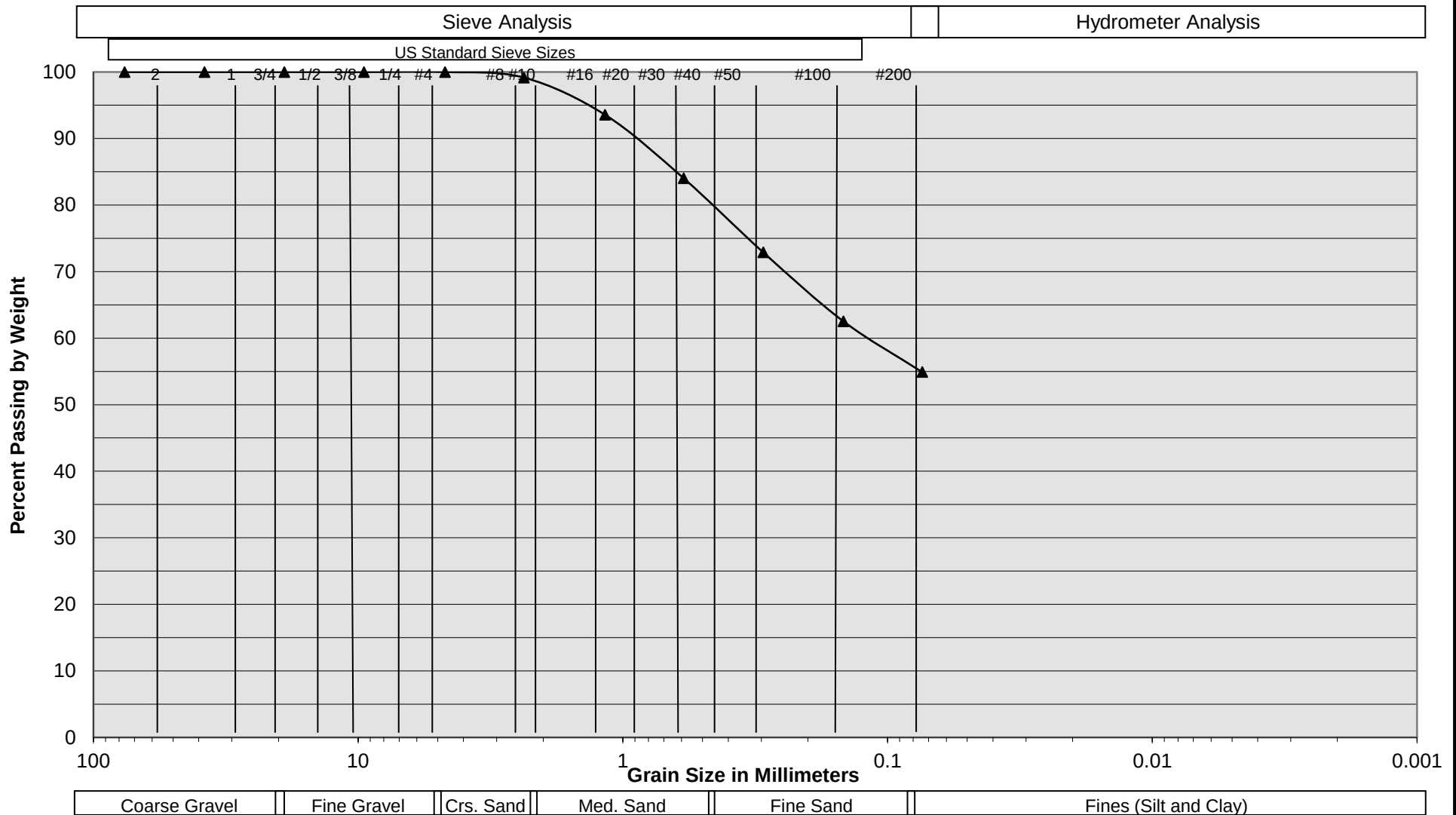
Sample Description	I-1 @ 9'
Soil Classification	Brown Silty fine to coarse Sand, little fine Gravel, trace Clay
Proposed Industrial/Retail Development Perris, California Project No. 23G149-2 PLATE C- 1	
	 SOUTHERN CALIFORNIA GEOTECHNICAL A California Corporation

Grain Size Distribution



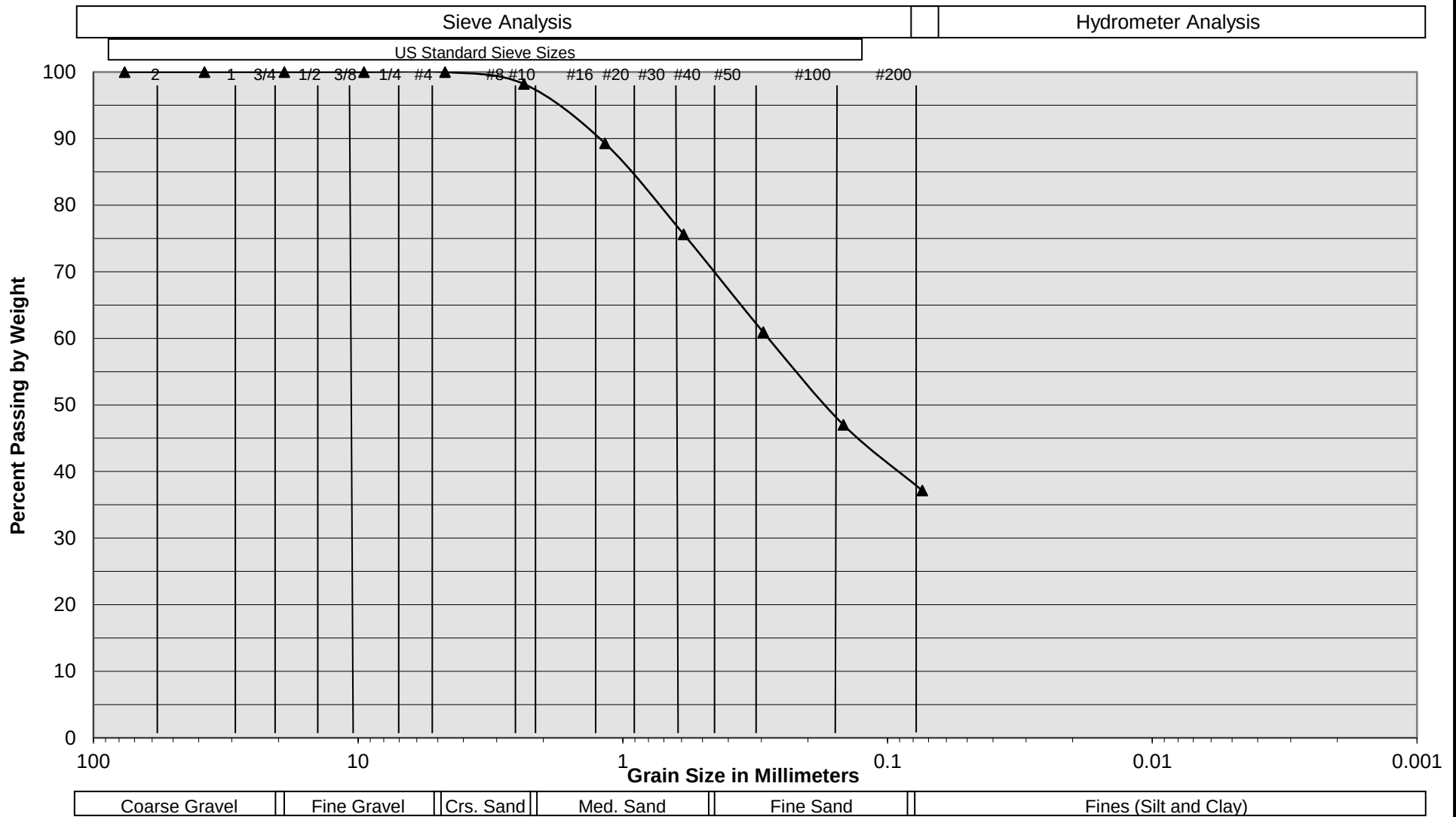
Sample Description	I-2 @ 9'
Soil Classification	Dark Brown Clayey fine to medium Sand, little Silt
Proposed Industrial/Retail Development Perris, California Project No. 23G149-2 PLATE C- 2	
	 SOUTHERN CALIFORNIA GEOTECHNICAL <i>A California Corporation</i>

Grain Size Distribution



Sample Description	I-3 @ 9'		
Soil Classification	Dark Brown Clayey fine to medium Sand to fine to medium Sandy Clay, little Silt		
Proposed Industrial/Retail Development Perris, California Project No. 23G149-2 PLATE C- 3			SOUTHERN CALIFORNIA GEOTECHNICAL <i>A California Corporation</i>

Grain Size Distribution



Sample Description	I-4 @ 9'	
Soil Classification	Brown Clayey fine to medium Sand, little Silt	
Proposed Industrial/Retail Development Perris, California Project No. 23G149-2 PLATE C- 4		 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

Not Applicable.

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

<u>Santa Ana Watershed</u> - BMP Design Flow Rate, Q_{BMP} (Rev. 10-2011)						Legend: Required Entries Calculated Cells			
<i>(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)</i>									
Company Name Fusco Engineering				Date 4/25/2024					
Designed by Serena Ausili				Case No 					
Company Project Number/Name 4149-001 Barker Placentia									
BMP Identification									
BMP NAME / ID DMA A <i>Must match Name/ID used on BMP Design Calculation Sheet</i>									
Design Rainfall Depth									
Design Rainfall Intensity						I = 0.20 in/hr			
Drainage Management Area Tabulation									
<i>Insert additional rows if needed to accommodate all DMAs draining to the BMI</i>									
DMAs	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type <i>(use pull-down menu)</i>	Effective Imperivous Fraction, I_r	DMA Runoff Factor	DMA Areas x Runoff Factor	<i>Design Rainfall Intensity (in/hr)</i>	<i>Design Flow Rate (cfs)</i>	<i>Proposed Flow Rate (cfs)</i>
	DMA A	448561	Mixed Surface Types	0.8	0.60	268820.8			
		448561	Total			268820.8	0.20	1.23	1.386
Notes:									
Three (3) MWS-L-8-16 $Q = 0.462 \times 3 = 1.386$									

(Rev. 10-2011)

Required Entries

Calculated Cells

Company Project Number/Name	4149-001 Barker Placentia
-----------------------------	---------------------------

$$\text{MWS-L-8-12 \& MWS-L-8-16} = (0.346 \text{ cfs} + 0.462 \text{ cfs}) = 0.808 \text{ cfs}$$

Santa Ana Watershed - BMP Design Flow Rate, Q_{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 **Fuscoe Engineering**Date **4/25/2024**Designed by **Serena Ausili**

Case No

Company Project Number/Name

4149-001 Barker Placentia**BMP Identification**BMP NAME / ID **DMA C***Must match Name/ID used on BMP Design Calculation Sheet***Design Rainfall Depth**

Design Rainfall Intensity

I = **0.20** in/hr**Drainage Management Area Tabulation***Insert additional rows if needed to accommodate all DMAs draining to the BMf*

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective ImperVIOUS Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
DMA C	448712	Mixed Surface Types	0.84	0.65	290914.4			
	448712				290914.4	0.20	1.34	1.386

Notes:

Three (3) MWS-L-8-16 $Q = 0.462 \times 3 = 1.386$

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.346			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

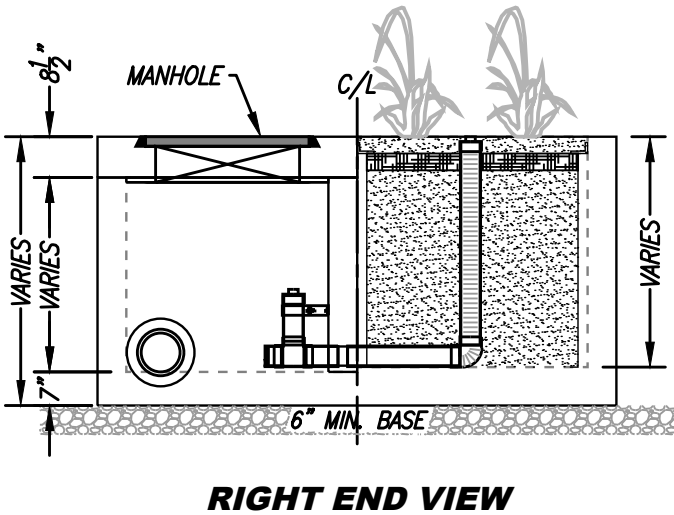
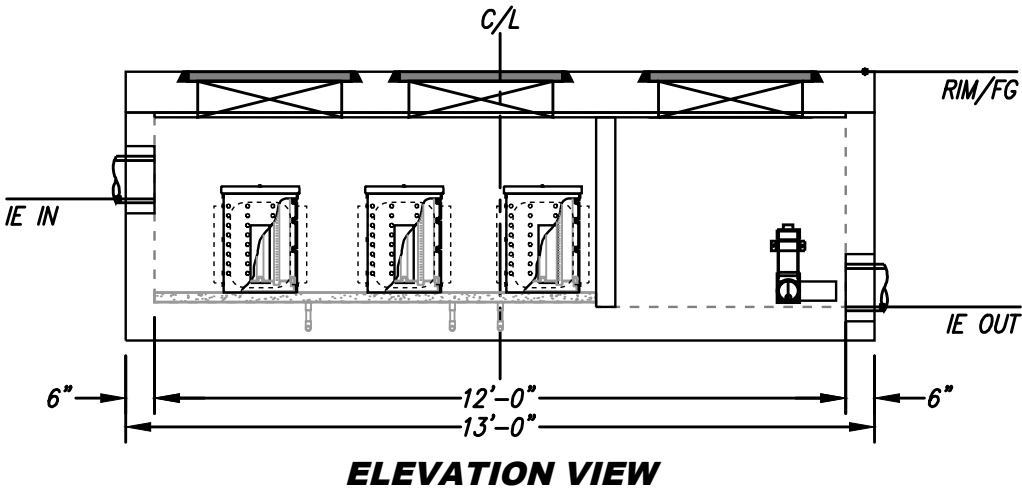
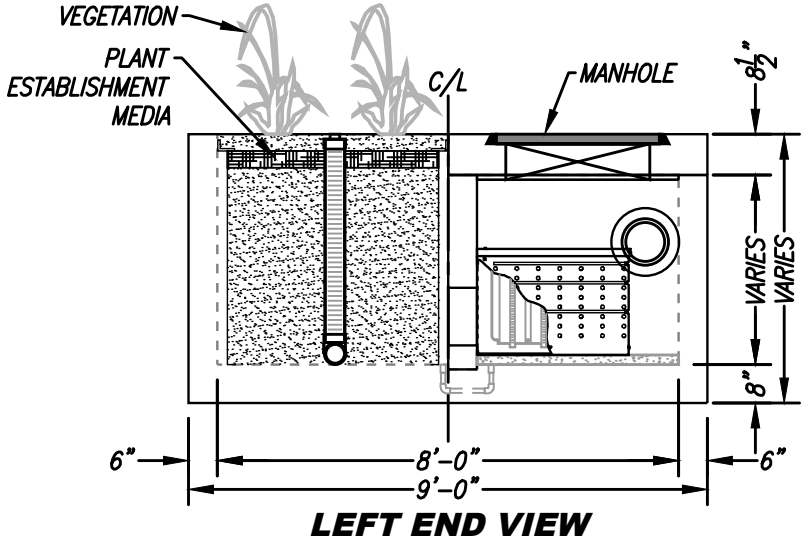
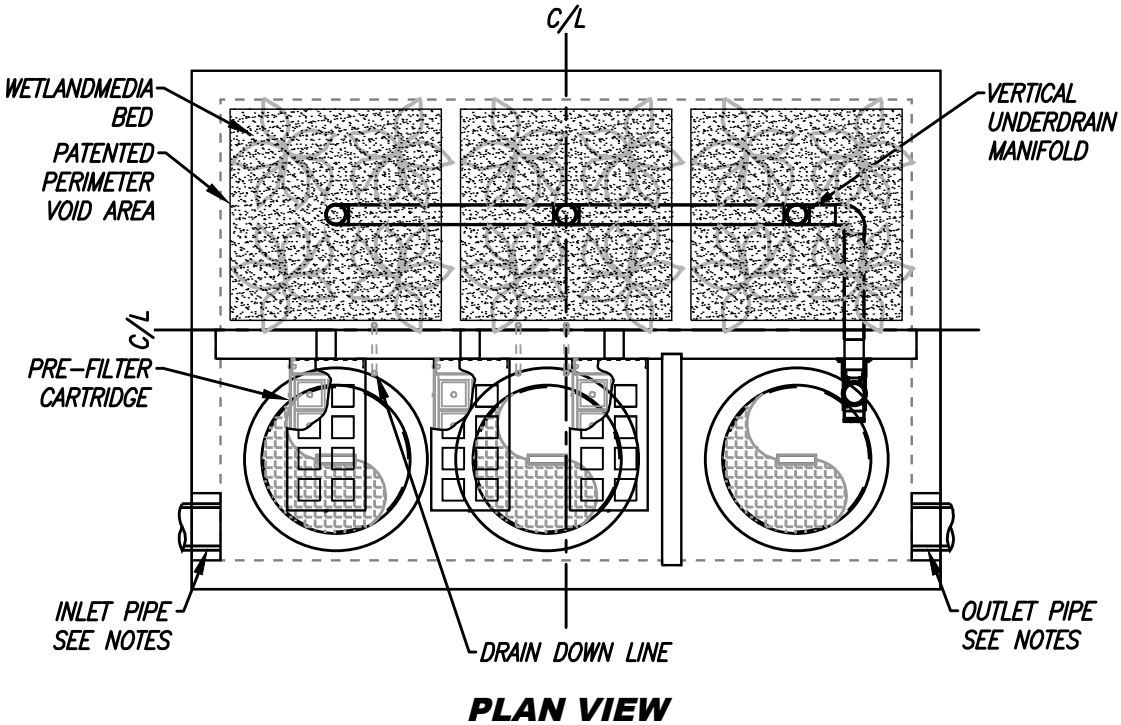
* PRELIMINARY NOT FOR CONSTRUCTION

INSTALLATION NOTES

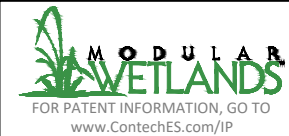
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
FLOW BASED (CFS)			
0.462			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
NOTES:			

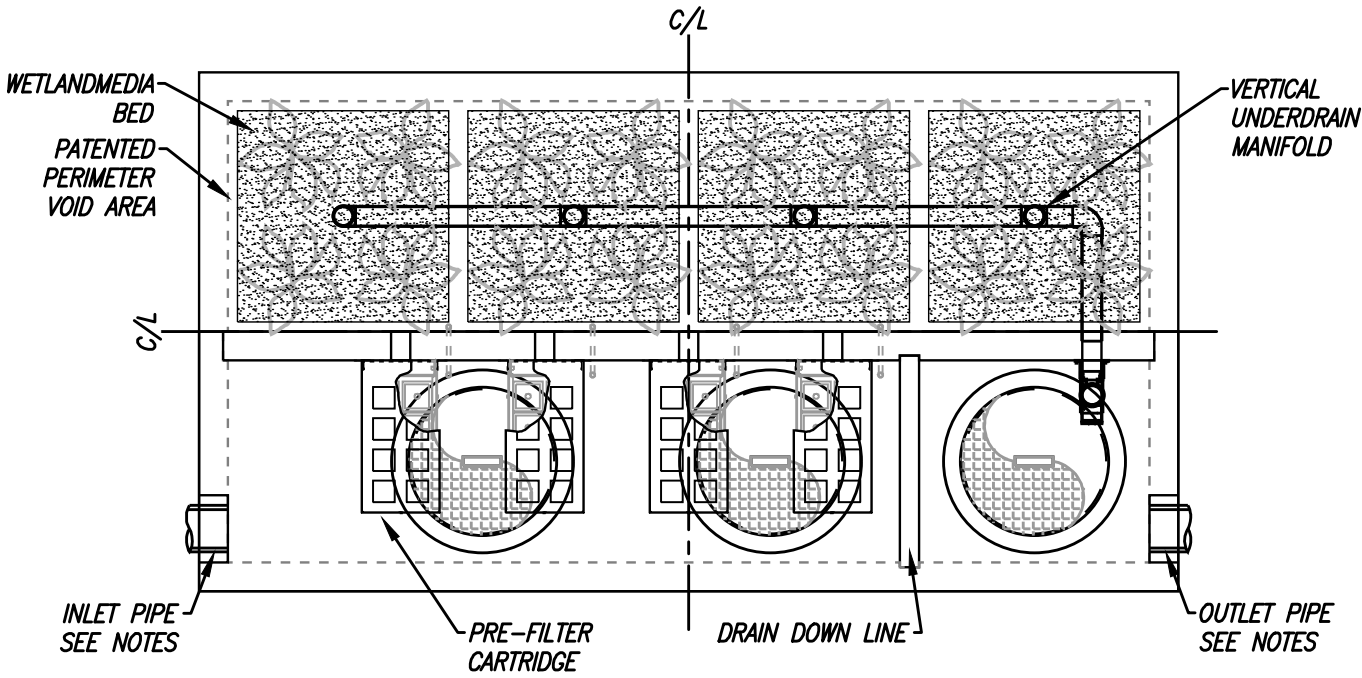
* PRELIMINARY NOT FOR CONSTRUCTION

INSTALLATION NOTES

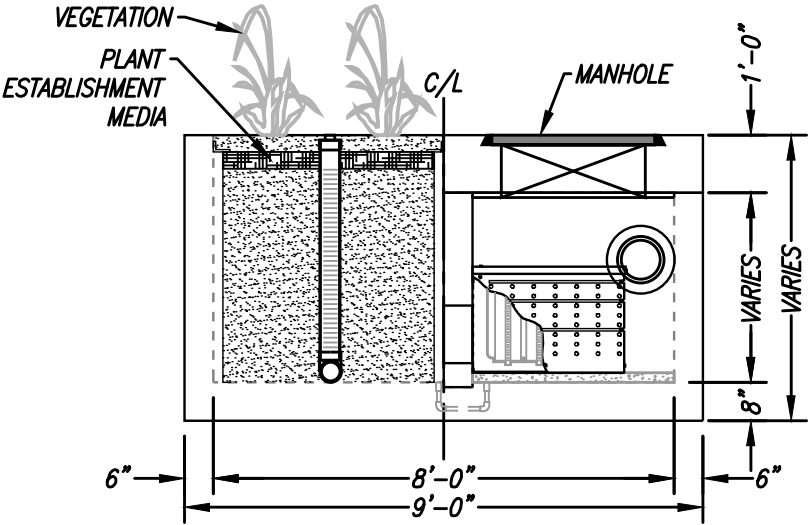
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING CONTECH FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A CONTECH REPRESENTATIVE.

GENERAL NOTES

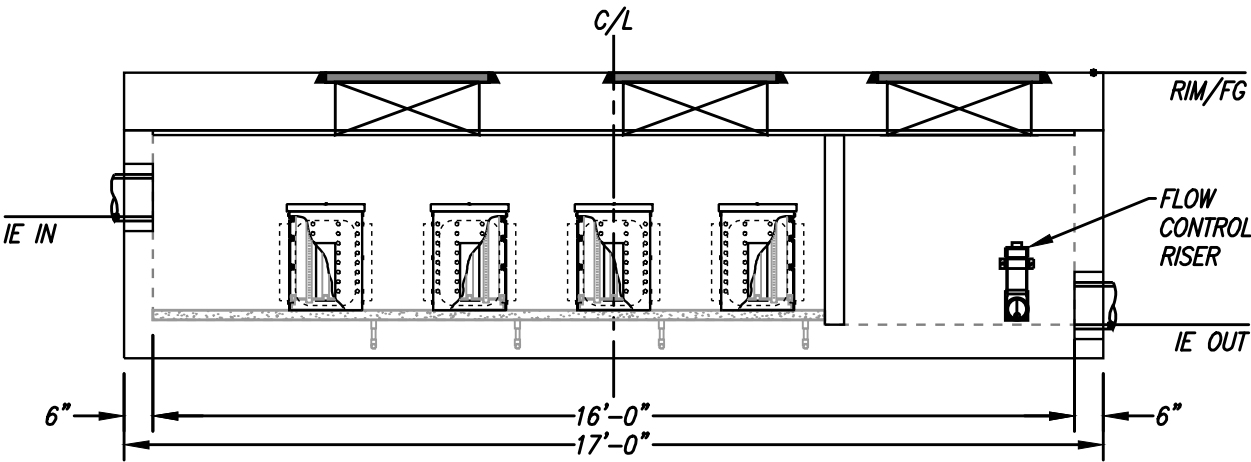
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT CONTECH.



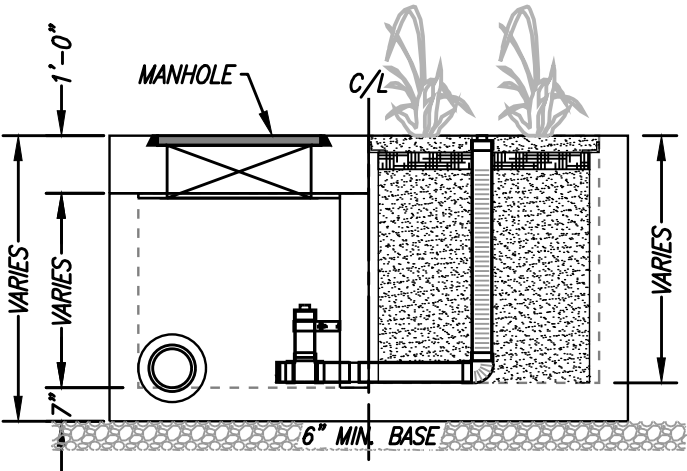
PLAN VIEW



LEFT END VIEW

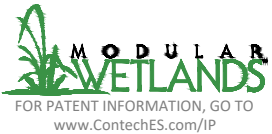


ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.462
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



MWS-L-8-16-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Not Applicable.

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
☒ A. On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”
☐ B. Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ C. Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☐ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	☐ See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials ” in the CASQA Stormwater Quality Handbooks at www.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
☐ J. Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	☐ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☐ Wastewater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to “Outdoor Cleaning Activities and Professional Mobile Service Providers” for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ☐ Car dealerships and similar may rinse cars with water only.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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. Plazas, sidewalks, and parking lots.			☒ 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

Maintenance Requirements

All BMP included as part of the project WQMP are required to be maintained through the regular scheduled inspection and maintenance. The Table below summarizes inspection and maintenance schedule for all BMP included in the WQMP.

BMP Inspection and Maintenance			
BMP	Responsible Party(s)	Inspection/Maintenance Activities Required	Minimum Frequency of Activities
Biotreatment: Modular Wetland Systems	Owner	Inspect system at a minimum of once every six months, prior to the start of the rainy season (October 1), and after major storm events. Typical maintenance includes removing trash & debris from the catch basin screening filter (by hand), removal of sediment and solids in the settlement chamber (vacuum truck), replacement of the BioMediaGREENTM filter cartridge, and replacement of the BioMediaGREENTM drain down filter (if equipped). In addition, plants within the wetland chamber will require trimming in conjunction with landscape maintenance activities. See attached manufacturer's specifications for additional requirements.	2x per year
Underground Detention	Owner	Inspect access entry covers, check for leaks, minor sediment in cistern bottom, vector control issues. Clean out screenings and inspect from clean out port and remove sediment, trash, debris, and oil. Identify any needed corrective maintenance that will require site specific design.	2x per year

Example Covenant and Agreement

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement (adapted from documents from the Ventura County Stormwater Management Program)

Recorded at the request of:

City of _____

After recording, return to:

City of _____

City Clerk _____

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement

OWNER: _____

PROPERTY ADDRESS: _____

APN: _____

THIS AGREEMENT is made and entered into in

_____, California, this _____ day of

_____, by and between

_____, herein after

referred to as "Owner" and the CITY OF _____, a municipal corporation, located in the County of Riverside, State of California hereinafter referred to as "CITY";

WHEREAS, the Owner owns real property ("Property") in the City of

_____, County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of development project known as

_____ within the Property described herein, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff;

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the City;

WHEREAS, said BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

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 peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner hereby provides the City of City's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.
2. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full.
4. The City may require the owner to post security in form and for a time period satisfactory to the city to guarantee the performance of the obligations state herein. Should the Owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the Director may withdraw any previous Urban Runoff-related approval with respect to the property on which BMPs have been installed and/or implemented until such time as Owner repays to City its reasonable costs incurred in accordance with paragraph 3 above.
5. This agreement shall be recorded in the Office of the Recorder of Riverside County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien 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.
6. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.
7. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.
8. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.
9. Time is of the essence in the performance of this Agreement.
10. Any notice to a party required or called for in this Agreement 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 a notice address only by providing written notice thereof to the other party.

IF TO CITY:

IF TO OWNER:

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

OWNER:

City Attorney

Name

CITY OF

Title

Name

OWNER:

Title

Name

ATTEST:

Title

City Clerk

Date

NOTARIES ON FOLLOWING PAGE

EXHIBIT A
(Legal Description)

EXHIBIT B
(Map/Illustration)

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

[illegible]

APPENDIX L

LID/Treatment Control BMP Inspection Form

SANTA ANA REGION
LID/TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE INSPECTION FORM

This inspection and reporting form is used to document findings of inspections of LID/Treatment Control BMPs and maintenance activities for **Insert Permittee Name** owned facilities and developments under the jurisdiction of the **Insert Permittee Name** subject to maintenance and annual reporting requirements. A list of types of LID/Treatment Control BMPs is provided on the next page.

Annual Reporting Period: _____
Project Site Name: _____
Project Site Location / Address: _____
Sub Watershed ☐ MSAR ☐ San Jacinto/Lake Elsinore
Owner / Operator: _____
Contact Name: _____
Contact Address: _____
Contact Phone Number: _____
Contact Email: _____
Inspector Name / Title: _____
Inspector Phone Number: _____
Inspector Signature: _____
Inspection Date / Time: _____

LID/Treatment Control BMP Information:

Identifying Number of BMP	Type of Structural Post-Construction BMP	Date of Construction	Date of Certification to Approved Plans	Location of Structural Post-Construction BMP on the Site

Summary of LID/Treatment Control BMP Inspections and Maintenance:

Identifying Number of BMP	Self or 3 rd Party Certification	Operation and Maintenance Activities Performed and Date(s) Conducted	Inspection Results (including vector or nuisance problems) and Corrective Actions

SANTA ANA REGION
LID/TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE INSPECTION FORM

Types of LID/Treatment Control BMPs

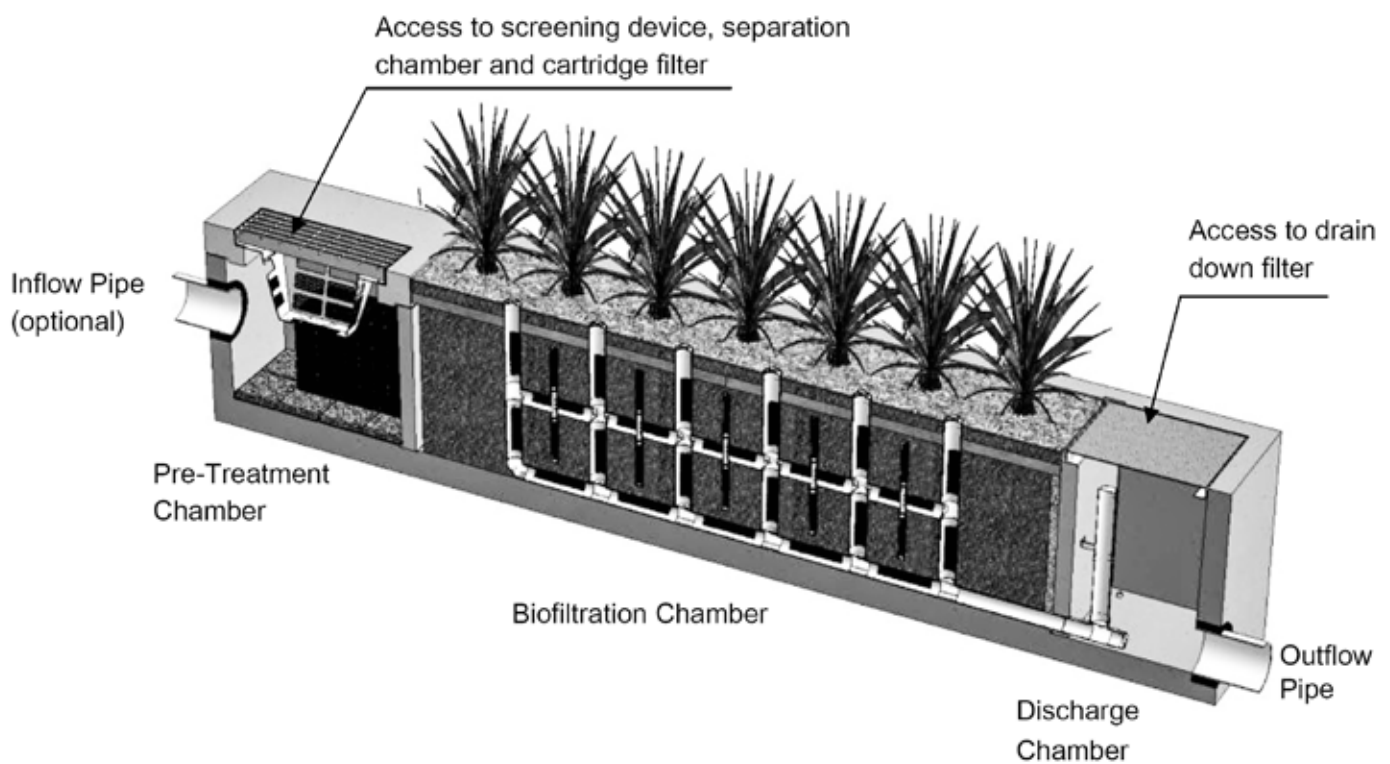
- ☐ Bioretention
- ☐ Dry Well
- ☐ Extended detention basin
- ☐ Grass Filter Strip
- ☐ Grass Swale
- ☐ Green Roof
- ☐ Infiltration Basin
- ☐ Infiltration Trench
- ☐ Landscaped Filter Basin
- ☐ Porous Pavement
- ☐ Rain Barrel/Aboveground Cistern
- ☐ Sand Filter (Austin)
- ☐ Sand Filter (Delaware)
- ☐ Sand Filter Basin
- ☐ Underground Detention/Cistern
- ☐ Water Quality Inlet
- ☐ Wet Pond or Constructed Wetland
- ☐ Other BMPs
- ☐ Proprietary BMPs
 - ☐ Biotreatment
 - ☐ Catch Basin Insert
 - ☐ Hydrodynamic Separation
 - ☐ Media Filtration
 - ☐ Underground Infiltration
 - ☐ Wetland
 - ☐ Wet Vault
 - ☐ Other

Modular Wetlands[®] Linear Operation & Maintenance Manual



Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
 - (5 minute average service time).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
 - (10 minute average service time).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
 - (10-15 minute per cartridge average service time).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
 - (5 minute average service time).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
 - (Service time varies).



System Diagram

Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre- Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer, spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber. Entry into chambers may require confined space training based on state and local regulations.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.



Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.



Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.



Inspection Report Modular Wetlands Linear

Project Name _____		For Office Use Only (Reviewed By) _____ (Date) _____ Office personnel to complete section to the left.
Project Address _____ (city) (Zip Code)		
Owner / Management Company _____		
Contact _____	Phone () - _____	
Inspector Name _____	Date ____ / ____ / ____	Time _____ AM / PM
Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes		
Weather Condition _____		Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	Yes	No	Comments
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth: _____
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber: _____
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____



Cleaning and Maintenance Report Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____

Phone () -

Inspector Name _____

Date ____ / ____ / ____ Time ____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint

☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____

Additional Notes _____

For Office Use Only
(Reviewed By)
(Date) Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat:	MWS Catch Basins						
	Long:							
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:



CONTECH[®] ENGINEERED SOLUTIONS

© 2022 CONTECH ENGINEERED SOLUTIONS LLC, A QUIKRETE COMPANY

800-338-1122

WWW.CONTECHES.COM

ALL RIGHTS RESERVED. PRINTED IN THE USA.

CONTECH ENGINEERED SOLUTIONS LLC PROVIDES SITE SOLUTIONS FOR THE CIVIL ENGINEERING INDUSTRY. CONTECH'S PORTFOLIO INCLUDES BRIDGES, DRAINAGE, SANITARY SEWER, STORMWATER AND EARTH STABILIZATION PRODUCTS. FOR INFORMATION ON OTHER CONTECH DIVISION OFFERINGS, VISIT CONTECHES.COM OR CALL 800-338-1122.

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS A WARRANTY. APPLICATIONS SUGGESTED HEREIN ARE DESCRIBED ONLY TO HELP READERS MAKE THEIR OWN EVALUATIONS AND DECISIONS, AND ARE NEITHER GUARANTEES NOR WARRANTIES OF SUITABILITY FOR ANY APPLICATION. CONTECH MAKES NO WARRANTY WHATSOEVER, EXPRESS OR IMPLIED, RELATED TO THE APPLICATIONS, MATERIALS, COATINGS, OR PRODUCTS DISCUSSED HEREIN. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR ANY PARTICULAR PURPOSE ARE DISCLAIMED BY CONTECH. SEE CONTECH'S CONDITIONS OF SALE (AVAILABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

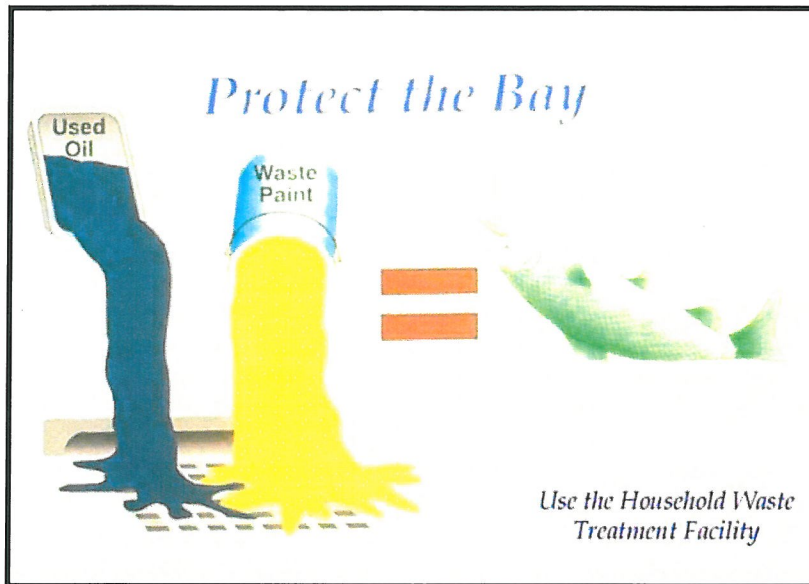
SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Modular Wetlands Maintenance Guide 08/22

Appendix 10: Educational Materials

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



Objectives

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

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.

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/>



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

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).

Targeted Constituents

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



- 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 vacuum 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.

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



Rain Garden

Design Objectives

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

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

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

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain



barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say $\frac{1}{4}$ to $\frac{1}{2}$ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylight some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

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.

Supplemental Information

Examples

- City of Ottawa’s Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, “Low-Impact Development”, January/February 2003.
www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD.
www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

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.

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.