

APPENDIX M
Storm Water Quality Management Plan

Permit Application Number: T21-00001

CITY OF OCEANSIDE ENGINEERING DIVISION
PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR Cypress Point Subdivision
ENGINEER OF WORK Patric de Boer RCE 83583 exp:3/31/23 



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How to Use This Template

This template, assembled by GHD Inc. on behalf of the City of Oceanside, is for the development of Storm Water Quality Management Plans (SWQMPs) for Priority Development Projects (PDPs) proposed within Oceanside, CA. It is based on requirements set forth in the Regional Water Quality Control Board's National Pollutant Discharge Elimination System MS4 Permit that covers the San Diego Region (Order No. R9-2013-0001).

All references within the template refer to the City of Oceanside BMP Design Manual dated February 2016 (Manual). Use of this template in conjunction with the Manual is intended to help a project applicant develop a SWQMP compliant with City of Oceanside and MS4 Permit requirements.

Template Date: February 16, 2016

Assembled By:



Quick Reference Guide

Item	Project Information
Project Name	Cypress Point Subdivision
Application Number(s)	T21-00001
Project Address	Vacant Lot, west end of Pala Road
Total Parcel Area	316,904 sq. ft.
Project Description	The site is a vacant lot at the western terminus of Pala Road. It is sparsely covered with scrub and grass. The development proposes 54 single-family homes, private roads, hardscape, landscaping and vegetated biofiltration basins.
Proposed Disturbed Area	326,912 sq. ft.
Created or Replaced Impervious	195,166 sq. ft.
Project Hydrologic Unit Watershed	☐ Santa Maria ☒ San Luis Rey ☐ Carlsbad
Required to implement HMP	☒ Yes ☐ No



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CERTIFICATION PAGE

Project Name: Cypress Point Subdivision

Permit Application Number: T21-00001

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the City of Oceanside BMP Design Manual, which is based on the requirements of San Diego Regional Water Quality Control Board Order No. R9-2013-0001 (MS4 Permit).

I have read and understand that the City has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this SWQMP by City staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

As Engineer of Work, I agree to indemnify, defend, and hold harmless the City of Oceanside, its officers, agents, and employees from any and all liability, claims, damages, or injuries to any person or property which might arise from the negligent acts, errors, or omissions of the Engineer of Work, my employees, agents or consultants.



C83583 exp:3/31/2023

Engineer of Work's Signature, PE Number & Expiration Date

Patric de Boer

Print Name

Omega Engineering Consultants

Company

3/19/2021

Date



Project Name: Cypress Point Subdivision

Priority Development Project - Storm Water Mitigation Plan



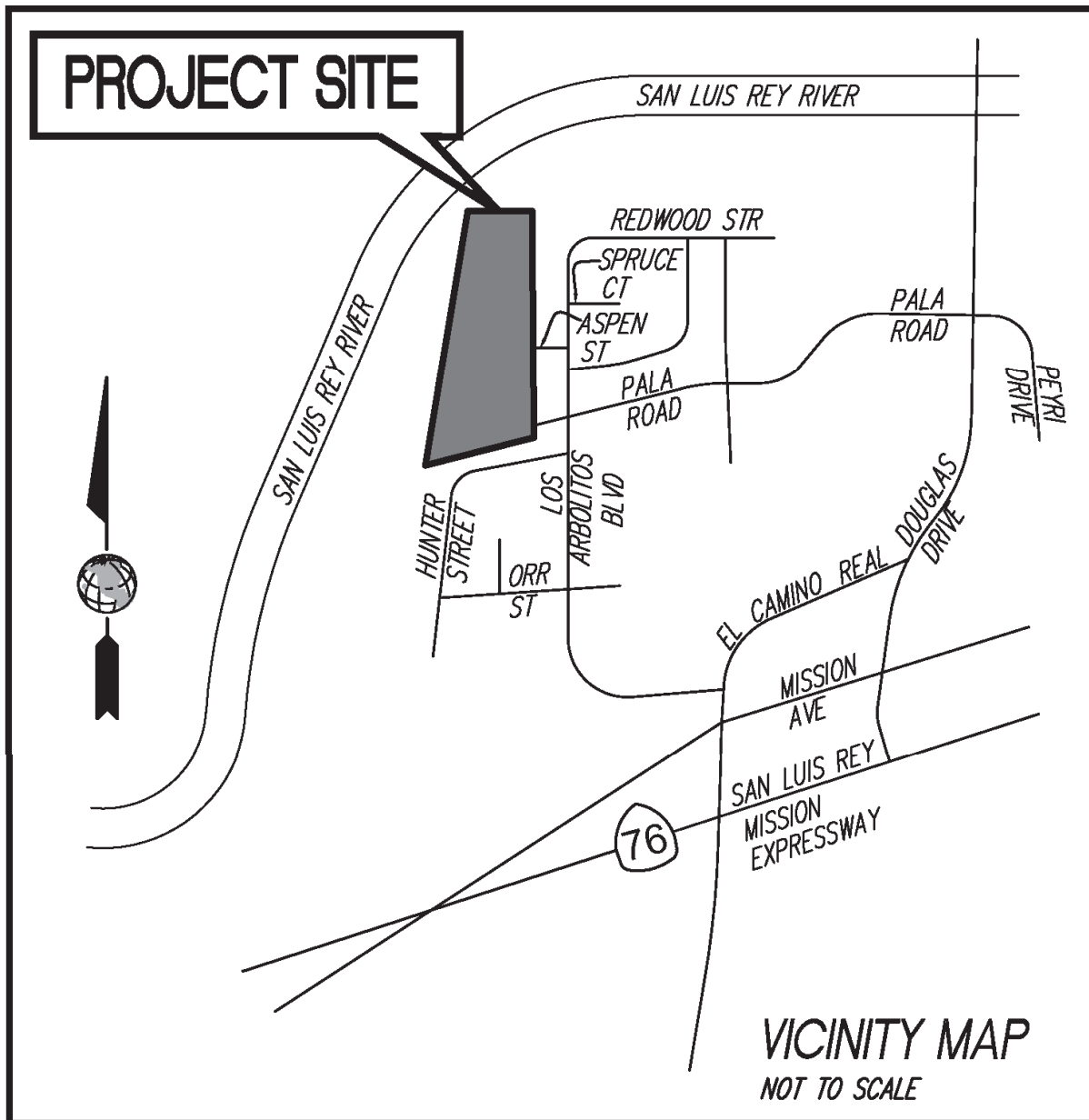
SUBMITTAL RECORD

Use this Table to keep a record of submittals of this SWQMP. Each time the SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Changes
1	12/24/2020	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	1 ST Submittal
2	03/18/2021	☒ Preliminary Design/ Planning/ CEQA ☐ Final Design	Redlines Addressed
3		☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	
4		☐ Preliminary Design/ Planning/ CEQA ☐ Final Design	Click here to enter text.



Project Vicinity Map



Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)		Form I-1
Project Identification		
Project Name: Cypress Point Subdivision		
Permit Application Number: T21-00001		Date: 12/21/2020
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short <u>summary</u> of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual for guidance.	☒ Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is <u>not</u> a "development project" (e.g., the project includes <i>only</i> interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or exception to PDP definitions? To answer this item, see Section 1.4 of the manual <i>in its entirety</i> for guidance, AND complete Form I-2, Project Type Determination.	☐ Standard Project	Stop. Standard Project requirements apply, including Standard Project SWQMP.
	☒ PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	☐ Exception to PDP definitions	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below. Prepare Standard Project SWQMP.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable: N/A		



Step	Answer	Progression
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual for guidance.	☐ Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☒ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (<i>not required if prior lawful approval does not apply</i>): N/A		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual for guidance.	☒ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☐ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply: N/A		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☒ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply: No mapped CCSYA's exist onsite or upstream of the site.		



Project Type Determination Checklist			Form I-2
Project Information			
Project Name: Cypress Point Subdivision			
Permit Application Number: <u>T21-00001</u>			
Project Type Determination: Standard Project or PDP			
The project is (select one): ☒ New Development ☐ Redevelopment			
The total proposed newly created or replaced impervious area is: 195,166 ft² (4.48) acres			
Is the project in any of the following categories, (a) through (f)?			
Yes ☒	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ☒	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ☒	(c)	New and redevelopment projects that create 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption SIC code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.



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Yes ☐	No ☒	(d)	New or redevelopment projects that create or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). <u>Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and SDRWQCB; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and SDRWQCB; and any other equivalent environmentally sensitive areas which have been identified by the Copermitttees. See manual Section 1.4.2 for additional guidance.</u>
Yes ☐	No ☒	(e)	New development projects that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets. This category includes retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.
Yes ☒	No ☐	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. <i>Note: See manual Section 1.4.2 for additional guidance.</i>
Does the project meet the definition of one or more of the PDP categories (a) through (f) listed above? ☐ No – the project is not a PDP (Standard Project). ☒ Yes – the project is a PDP.			
The following is for redevelopment PDPs only: The area of existing (pre-project) impervious area at the project site is: <u> N/A </u> ft² (A) The total proposed newly created or replaced impervious area is: <u> N/A </u> ft² (B) Percent impervious surface created or replaced (A/B)*100: <u> N/A </u> % The percent impervious surface created or replaced is (select one based on the above calculation): ☐ less than or equal to fifty percent (50%) – only new impervious areas are considered PDP OR ☐ greater than fifty percent (50%) – the entire project site is a PDP			



Site Information Checklist For PDPs		Form I-3B (PDPs)
Project Summary Information		
Project Name:	Cypress Point Subdivision	
Project Address:	Terminus of Pala Road, Oceanside, CA 92058	
Assessor's Parcel Number(s)	158-301-46-00	
Permit Application Number	T21-00001	
Project Watershed (Hydrologic Unit)	Select One: ☐ Santa Margarita 902 ☒ San Luis Rey 903 ☐ Carlsbad 904	
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	7.28 Acres (316,904 Square Feet)	
Area to be disturbed by the project (Project Area)	7.50 Acres (326,912 Square Feet)	
Project Proposed Impervious Area (subset of Project Area)	4.48 Acres (195,166 Square Feet)	
Project Proposed Pervious Area (subset of Project Area)	3.02 Acres (131,746 Square Feet)	
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.		

Hydrologic Unit	Hydrologic Area	Hydrologic Sub-Area
Santa Margarita 902.00	☐ Ysidora 902.10	☐ Lower Ysidora 902.11
San Luis Rey 903.00	☒ Lower San Luis 903.10	☒ Mission 903.11
		☐ Bonsall 903.12
Carlsbad 904.00	☐ Loma Alta 904.10	Not Applicable
	☐ Buena Vista Creek 904.20	☐ El Salto 904.21
		☐ Vista 904.22
	☐ Agua Hedionda 4.30	☐ Los Monos 904.31



Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- ☐ Existing development
☐ Previously graded but not built out
☐ Agricultural or other non-impervious use
☒ Vacant, undeveloped/natural

Description / Additional Information:

The existing site is a bare, vacant lot with several feet of artificial fill. No drainage improvements exist on the site. Site receives run-on from areas to the east of the site.

Existing Land Cover Includes (select all that apply):

- ☒ Vegetative Cover
☒ Non-Vegetated Pervious Areas
☐ Impervious Areas

Description / Additional Information:

Site cover consists of bare dirt and seasonal grasses/shrubs. Site is underlain by several feet of artificial fill.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
☐ NRCS Type B
☐ NRCS Type C
☒ NRCS Type D

Approximate Depth to Groundwater:

- ☐ Groundwater Depth < 5 feet
☐ 5 feet < Groundwater Depth < 10 feet
☒ 10 feet < Groundwater Depth < 20 feet
☐ Groundwater Depth > 20 feet



Description of Existing Site Topography and Drainage [How is storm water runoff conveyed from the site? At a minimum, this description should answer (1) whether existing drainage conveyance is natural or urban; (2) describe existing constructed storm water conveyance systems, if applicable; and (3) is runoff from offsite conveyed through the site? If so, describe]:

1) The existing drainage is natural, as it occurs via overland flow and concentrated flow in earthen ditches.

2) No permanent stormwater conveyances exist on site. A graded ditch accepts runoff from the dead end of Aspen Street and conveys it west across the site to a concrete channel that borders the site.

3) Offsite runoff is conveyed through the site at Aspen Street, and at the dead end of Pala Road.

The on-site and offsite runoff discharges to an existing drainage channel that runs adjacent to San Luis River. The runoff then confluences with San Luis River (Lower) approximately 1600 feet south of the site. The distance from this point to the Pacific Ocean is approximately 3.5 miles.



Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes 54 single family, two story homes with attached garages. There will also be a private road constructed to access the residential area. Pala road will be extended to a proposed cul-de-sac. 4 biofiltration basins are proposed for water quality and HMP compliance purposes. Onsite storm drains are proposed to intercept onsite and offsite runoff and convey it to a surface discharge point at the southwest corner of the project site.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

54 single family homes, private road, concrete walkways

List/describe proposed pervious features of the project (e.g., landscape areas):

Landscaping, tree wells, decomposed granite walkways, biofiltration basins

Does the project include grading and changes to site topography?

☒ Yes

☐ No

Description / Additional Information:

Project will import several feet of fill to raise the site above the 100-year flood elevation. The site will be regraded to slope at approximately 0.5% to the south.



Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒ Yes

☐ No

Description / Additional Information:

Project will construct onsite and offsite stormdrains to bypass the run-on from offsite areas. The run-on from Aspen Street will be intercepted by 2 curb inlets near the intersection of Aspen Street and Cypress Point Boulevard. This runoff will be conveyed through the site via a 30" trunk storm drain eventually being discharged to a surface outfall southwest of the site.

Offsite runoff from Pala Road will be intercepted by 2 curb inlets and conveyed west along the proposed street extension in a 24"x72" box culvert, eventually discharging to the same outfall as the previously described runoff from Aspen Street.

Onsite runoff will be conveyed on the surface via gutters to the four biofiltration basins for Water Quality Treatment and HMP detention. These 4 BMPs will drain via the previously described 30" trunk storm drain to the previously described surface outfall.



Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- ☒ Onsite storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☒ Need for future indoor & structural pest control
- ☒ Landscape/outdoor pesticide use
- ☐ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☐ Refuse areas
- ☐ Industrial processes
- ☐ Outdoor storage of equipment or materials
- ☐ Vehicle and equipment cleaning
- ☐ Vehicle/equipment repair and maintenance
- ☐ Fuel dispensing areas
- ☐ Loading docks
- ☒ Fire sprinkler test water
- ☒ Miscellaneous drain or wash water
- ☒ Plazas, sidewalks, and parking lots



Identification of Receiving Water Pollutants of Concern

Describe path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

Project surface drains to the 4 proposed biofiltration basins. These BMPs drain via a 30" stormdrain to a proposed 60" storm drain in Pala Road. The 60" stormdrain outfalls to a vegetated area adjacent to San Luis Rey River. San Luis Rey River then outlets to the Pacific Ocean.

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs
San Luis Rey River, Lower	Chloride Enterococcus Fecal Coliform Phosphorus Total Dissolved Solids Total Nitrogen as N Toxicity	Est 2019 Est 2021 Est 2021 Est 2021 Est 2019 Est 2021 Est 2021
Pacific Ocean Shoreline, San Luis Rey HU, at San Luis Rey River Mouth	Esterococcus	Est 2021



Identification of Project Site Pollutants*

***Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)**

Identify pollutants expected from the project site based on all proposed use(s) of the site (see manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

Note: Indicator Bacteria shall be addressed as a Pollutant of Concern (POC) for projects located in the Lower San Luis Hydrologic Area and for projects that discharge to the Pacific Ocean Shoreline within the boundaries of the City of Oceanside.

Note: Nutrients shall be addressed as a Pollutant of Concern (POC) for projects located in the Loma Alta Hydrologic Area.



Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the manual)?

☒ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

☐ Yes

☒ No, no critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Section 6.2 of the manual been performed?

☐ 6.2.1 Verification of GLUs Onsite

☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment

☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite

☐ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what is the final result?

☐ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite.

☐ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 8 of the SWQMP.

☐ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

N/A



Flow Control for Post-Project Runoff*

***This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

POC 1 is located at the outfall to the vegetated area adjacent to San Luis Rey River. The flow does not immediately drain into the river. It flows west approximately ½ mile before flowing into the river. For this reason the site is not HMP exempt.

Has a geomorphic assessment been performed for the receiving channel(s)?

☒ No, the low flow threshold is 0.1Q2 (default low flow threshold)

☐ Yes, the result is the low flow threshold is 0.1Q2

☐ Yes, the result is the low flow threshold is 0.3Q2

☐ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

N/A

Discussion / Additional Information: (optional)

N/A



Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

Approximately 0.5-acres of the project disturbed area drains to the roadway frontage of Rancho Del Oro Drive. The hydromodification management of this area is accounted for in the calculations for POC 1. The water quality treatment of this 0.5-acres is provided via proposed street trees in the landscaped area along Rancho Del Oro Drive.

Optional Additional Information or Continuation of Previous Sections as Needed

This space provided for additional information or continuation of information from previous sections as needed.

N/A



Source Control BMP Checklist for All Development Projects (Standard Projects and PDPs)		Form I-4	
Project Identification			
Project Name Cypress Point Subdivision			
Permit Application Number: T21-00001			
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement		Implemented?	
SC-1 Prevention of Illicit Discharges into the MS4		☒ Yes	☐ No ☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage		☒ Yes	☐ No ☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal		☐ Yes	☐ No ☒ N/A
Discussion / justification if SC-3 not implemented: No outdoor material storage areas proposed.			



Form I-4 Page 2 of 3

Source Control Requirement	Implemented?		
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-4 not implemented: No outdoor work areas proposed.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			



Form I-4 Page 3 of 3

SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	Implemented?		
Onsite storm drain inlets	☒ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☒ N/A
Interior parking garages	☐ Yes	☐ No	☒ N/A
Need for future indoor & structural pest control	☒ Yes	☐ No	☐ N/A
Landscape/outdoor pesticide use	☒ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☒ N/A
Food service	☐ Yes	☐ No	☒ N/A
Refuse area	☒ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☒ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle and equipment cleaning	☒ Yes	☐ No	☐ N/A
Vehicle/equipment repair and maintenance	☐ Yes	☐ No	☒ N/A
Fuel dispensing areas	☐ Yes	☐ No	☒ N/A
Loading docks	☐ Yes	☐ No	☒ N/A
Fire sprinkler test water	☒ Yes	☐ No	☐ N/A
Miscellaneous drain or wash water	☒ Yes	☐ No	☐ N/A
Plazas, sidewalks, and parking lots	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			



Site Design BMP Checklist for All Development Projects (Standard Projects and PDPs)		Form I-5	
Project Identification			
Project Name: Cypress Point Subdivision			
Permit Application Number: T21-00001			
Site Design BMPs			
All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement site design BMPs shown in this checklist.			
Answer each category below pursuant to the following.			
• "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.			
Site Design Requirement		Applied?	
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features		☐ Yes	☐ No ☒ N/A
Discussion / justification if SD-1 not implemented: No natural drainage pathways or hydrologic features exist on this mass graded site			
SD-2 Conserve Natural Areas, Soils, and Vegetation		☐ Yes	☐ No ☒ N/A
Discussion / justification if SD-2 not implemented: No natural areas exist on this mass graded site.			
SD-3 Minimize Impervious Area		☒ Yes	☐ No ☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction		☒ Yes	☐ No ☐ N/A
Discussion / justification if SD-4 not implemented: SD-4 will be implemented in all landscaped areas. The soil will be amended with organics and mulch to provide a better growing medium than the native soil.			



Site Design Requirement	Applied?		
SD-5 Impervious Area Dispersion	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-5 not implemented: Sufficient Landscaped area is not available to properly implement impervious area dispersion as it is specified in the BMP design manual. The building roofs will however drain to the landscaping adjacent to the proposed houses before flowing to the gutter.			
SD-6 Runoff Collection	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-8 not implemented: Harvest and use will not be used on this site. Please see Form I-7 provided in Attachment 1. The expense of the rain barrels, pumps, and irrigation system interconnection does not justify the benefit of SD-8. Additionally it is not feasible to implement a separate system for each residence.			



Summary of PDP Structural BMPs	Form I-6 (PDPs)
Project Identification	
Project Name: Cypress Point Subdivision	
Permit Application Number: T21-0000	
PDP Structural BMPs	
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative to certify construction of the structural BMPs (see Section 1.12 of the manual). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the manual). Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).	



Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The strategy for BMP selection is as follows:

Harvest and Use was deemed infeasible due to the demand for harvested water being insufficient to justify the cost of the system. Please see Form I-7 provided in Attachment 1. Additionally, it is not feasible to provide 54 separate systems (one for each of the houses).

Full retention via infiltration was investigated next. It was found to be infeasible due to the presence of liquifiable soils. Full and partial retention were ruled out because of this.

Biofiltration was considered next and found to be feasible. Four fully lined biofiltration basins with additional gravel storage were designed. These will be used for Water Quality Treatment as well as Hydromodification storage.

Portions of the proposed site that are within the public right of way could not be feasibly drained to a biofiltration basin. These areas will drain to street trees with amended soils. The DCV tributary to these trees will be less than 25% of the total project DCV.

The street trees are not used for hydromodification compliance and do not use the DCV multipliers. Hydromodification compliance for the whole site is met through detention in the four biofiltration basins.

(Continue on page 2 as necessary.)



Structural BMP Summary Information**(Copy this page as needed to provide information for each individual proposed structural BMP)**Structural BMP ID No. **BMP-1**

Construction Plan Sheet No. C-6

Type of structural BMP:

- ☐ Retention by harvest and use (HU-1)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☒ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

- ☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

Andrew Kann

Omega Engineering Consultants
858-634-8620

Who will be the final owner of this BMP?

An HOA will be formed, BMPs will be owned by the HOA. Details are not yet available

Who will maintain this BMP into perpetuity?

The proposed HOA will maintain the BMP

What is the funding mechanism for maintenance?

Funding will come from HOA fees



Structural BMP Summary Information**(Copy this page as needed to provide information for each individual proposed structural BMP)**Structural BMP ID No. **BMP-2**

Construction Plan Sheet No. C-6

Type of structural BMP:

- ☐ Retention by harvest and use (HU-1)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☒ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

- ☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

Andrew Kann

Omega Engineering Consultants
858-634-8620

Who will be the final owner of this BMP?

An HOA will be formed, BMPs will be owned by the HOA. Details are not yet available

Who will maintain this BMP into perpetuity?

The proposed HOA will maintain the BMP

What is the funding mechanism for maintenance?

Funding will come from HOA fees



Structural BMP Summary Information**(Copy this page as needed to provide information for each individual proposed structural BMP)**Structural BMP ID No. **BMP-3**

Construction Plan Sheet No. C-6

Type of structural BMP:

- ☐ Retention by harvest and use (HU-1)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☒ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

- ☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

Andrew Kann

Omega Engineering Consultants
858-634-8620

Who will be the final owner of this BMP?

An HOA will be formed, BMPs will be owned by the HOA. Details are not yet available

Who will maintain this BMP into perpetuity?

The proposed HOA will maintain the BMP

What is the funding mechanism for maintenance?

Funding will come from HOA fees



Structural BMP Summary Information**(Copy this page as needed to provide information for each individual proposed structural BMP)**Structural BMP ID No. **BMP-4**

Construction Plan Sheet No. C-6

Type of structural BMP:

- ☐ Retention by harvest and use (HU-1)
☐ Retention by infiltration basin (INF-1)
☐ Retention by bioretention (INF-2)
☐ Retention by permeable pavement (INF-3)
☐ Partial retention by biofiltration with partial retention (PR-1)
☒ Biofiltration (BF-1)
☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
☐ Detention pond or vault for hydromodification management
☐ Other (describe in discussion section below)

Purpose:

- ☐ Pollutant control only
☐ Hydromodification control only
☒ Combined pollutant control and hydromodification control
☐ Pre-treatment/forebay for another structural BMP
☐ Other (describe in discussion section below)

Who will certify construction of this BMP?

Provide name and contact information for the party responsible to sign BMP verification forms if required by the [City Engineer] (See Section 1.12 of the manual)

Andrew Kann

Omega Engineering Consultants
858-634-8620

Who will be the final owner of this BMP?

An HOA will be formed, BMPs will be owned by the HOA. Details are not yet available

Who will maintain this BMP into perpetuity?

The proposed HOA will maintain the BMP

What is the funding mechanism for maintenance?

Funding will come from HOA fees





City of Oceanside
300 N Coast Highway
Oceanside, CA 92054

Permanent BMP Construction

Self Certification Form

February
2016

Date Prepared: Click here to enter text.	Project No.: T21-00001
Project Applicant:	Phone:
Project Address:	
Project Engineer: Andrew Kann	Phone: 619-634-8620
The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings. This form must be completed by the engineer and installing contractor and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of Oceanside.	
ENGINEER'S CERTIFICATION: As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 of the San Diego Regional Water Quality Control Board. I understand that this BMP certification statement does not constitute an operation and maintenance verification. Signature: _____ Date of Signature: _____	



Printed Name: _____

Title: _____

Phone No. _____

Engineer's Stamp

CONTRACTOR'S CERTIFICATION:

As the professional in responsible charge for construction of the above project, I certify that all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per the approved SWQMP and Construction Permit No. [Click here to enter text.](#); have been constructed in compliance with the approved plans and all applicable specifications, permits, and ordinances.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____

Date of Signature: _____

Printed Name: _____

Title: _____

Phone No. _____



ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.



Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☒ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Design Capture Volume Worksheet	☒ Included
Attachment 1d	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☒ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1e	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☒ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1f	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☒ Included



Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☒ Underlying hydrologic soil group
- ☒ Approximate depth to groundwater
- ☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☒ Existing topography and impervious areas
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☒ Structural BMPs (identify location, type of BMP, and size/detail)



Placeholder – **DMA Exhibit**

Please provide the Exhibit in 24"x36" format with map pocket, wet stamp, and date.



Placeholder – **Tabular Summary of DMAs (if separate from DMA Exhibit)**

Leave placeholder intact if not applicable.

☒ Not Applicable – Tabular Summary included on DMA Exhibit



Automated Worksheet B.1: Calculation of Design Capture Volume (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA-1	DMA-2	DMA-3	DMA-4	DMA-5	DMA-6	DMA-7	DMA-8	DMA-9		unitless
	2	85th Percentile 24-hr Storm Depth	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63		inches
	3	Impervious Surfaces <u>Not Directed to Dispersion Area</u> (C=0.90)	23,560	23,409	80,054	45,616	20,027	1,250	1,250	0	0		sq-ft
	4	Semi-Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.30)											sq-ft
	5	Engineered Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.10)											sq-ft
	6	Natural Type A Soil <u>Not Serving as Dispersion Area</u> (C=0.10)											sq-ft
	7	Natural Type B Soil <u>Not Serving as Dispersion Area</u> (C=0.14)											sq-ft
	8	Natural Type C Soil <u>Not Serving as Dispersion Area</u> (C=0.23)											sq-ft
	9	Natural Type D Soil <u>Not Serving as Dispersion Area</u> (C=0.30)	16,250	16,866	38,864	30,760	3,065	547	435	9,025	15,934		sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	Yes	Yes	Yes	No	No	No	yes/no
	11	Impervious Surfaces Directed to Dispersion Area per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil Serving as Dispersion Area per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil Serving as Dispersion Area per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil Serving as Dispersion Area per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil Serving as Dispersion Area per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A					5	1	1				#
	19	Average Mature Tree Canopy Diameter					22	15	15				ft
	20	Number of Rain Barrels Proposed per SD-E											#
21	Average Rain Barrel Size											gal	
Initial Runoff Factor Calculation	22	Total Tributary Area	39,810	40,275	118,918	76,376	23,092	1,797	1,685	9,025	15,934	0	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.66	0.65	0.70	0.66	0.82	0.72	0.75	0.30	0.30	0.00	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	25	Initial Weighted Runoff Factor	0.66	0.65	0.70	0.66	0.82	0.72	0.75	0.30	0.30	0.00	unitless
	26	Initial Design Capture Volume	1,379	1,374	4,370	2,646	994	68	66	142	251	0	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	28	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.66	0.65	0.70	0.66	0.82	0.72	0.75	0.30	0.30	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	1,379	1,374	4,370	2,646	994	68	66	142	251	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	1,120	100	100	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.66	0.65	0.70	0.66	0.00	0.00	0.00	0.30	0.30	0.00	unitless
	36	Final Effective Tributary Area	26,275	26,179	83,243	50,408	0	0	0	2,708	4,780	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	1,120	100	100	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	1,379	1,374	4,370	2,646	0	0	0	142	251	0	cubic-feet
No Warning Messages													

Automated Worksheet B.2: Retention Requirements (V2.0)

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
Basic Analysis	1	Drainage Basin ID or Name	DMA-1	DMA-2	DMA-3	DMA-4	DMA-5	DMA-6	DMA-7	DMA-8	DMA-9	-	unitless
	2	85th Percentile Rainfall Depth	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	-	inches
	3	Predominant NRCS Soil Type Within BMP Location	D	D	D	D	D	D	D	D	D		unitless
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted	Restricted		unitless
	5	Nature of Restriction	Other	Other	Other	Other	Other	Other	Other	Other	Other		unitless
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	No	No	No	No	No	No	No	No	No		yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		yes/no
	9	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		in/hr
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	in/hr
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	-	percentage
	12	Fraction of DCV Requiring Retention	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	ratio
	13	Required Retention Volume	14	14	44	26	0	0	0	1	3	-	cubic-feet

No Warning Messages

Category	#	Description	<i>i</i>	<i>ii</i>	<i>iii</i>	<i>iv</i>	<i>v</i>	<i>vi</i>	<i>vii</i>	<i>viii</i>	<i>ix</i>	<i>x</i>	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA-1	DMA-2	DMA-3	DMA-4	DMA-5	DMA-6	DMA-7	DMA-8	DMA-9	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	in/hr
	3	Design Capture Volume Tributary to BMP	1,379	1,374	4,370	2,646	0	0	0	142	251	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	Vegetated	Vegetated	Vegetated							unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined							unitless
	6	Does BMP Have an Underdrain?	Underdrain	Underdrain	Underdrain	Underdrain							unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	Standard	Standard	Standard							unitless
	8	Provided Surface Area	2,126	1,732	2,568	1,650							sq-ft
	9	Provided Surface Ponding Depth	6	6	6	6							inches
	10	Provided Soil Media Thickness	18	18	18	18							inches
	11	Provided Gravel Thickness (Total Thickness)	12	12	12	12							inches
	12	Underdrain Offset	3	3	3	3							inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	1.00	1.00	1.00	1.00							inches
	14	Specialized Soil Media Filtration Rate											in/hr
	15	Specialized Soil Media Pore Space for Retention											unitless
	16	Specialized Soil Media Pore Space for Biofiltration											unitless
	17	Specialized Gravel Media Pore Space											unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	23	Effective Retention Depth	2.10	2.10	2.10	2.10	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.27	0.22	0.10	0.11	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	120	120	120	120	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.28	0.24	0.12	0.13	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	387	327	528	346	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	992	1,047	3,842	2,300	0	0	0	142	251	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.0432	0.0432	0.0432	0.0432	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.88	1.08	0.73	1.13	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	0.88	1.08	0.73	1.13	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	5.27	6.47	4.36	6.79	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	37	Effective Depth of Biofiltration Storage	13.20	13.20	13.20	13.20	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	7	6	8	5	0	0	0	0	0		

Attention!

-Minimum annual retention criteria are not satisfied for each individual drainage area. Implement additional site design elements, increase structural BMP retention capacity, or demonstrate that such requirements are satisfied at the project-level.

-This BMP does not fully satisfy the performance standards for pollutant control for the drainage area.

Harvest and Use Feasibility Checklist		Form I-7
1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season? ☒ Toilet and urinal flushing ☒ Landscape irrigation ☐ Other: _____		
2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2. Irrigation Demand = (1,470 gallons/acre) x (3.02 acres) = 4,439 gallons = 594 cf Toilet Demand = (216 residents) x (9.3 gallons per resident) x (1.5 days) = 3,013 gallons = 403 cf *Note: 3-4 residents per unit, 54 units total = 4 residents * 54 units = 216 residents Total = Irrigation Demand + Toilet Demand = 997 cf		
3. Calculate the DCV using worksheet B-2.1. DCV = <u>11,290</u> (cubic feet)		
3a. Is the 36 hour demand greater than or equal to the DCV? ☐ Yes / ☒ No ➡ ↓	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV? ☐ Yes / ☒ No ➡ ↓	3c. Is the 36 hour demand less than 0.25DCV? ☒ Yes ↓
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.
Is harvest and use feasible based on further evaluation? ☐ Yes, refer to Appendix E to select and size harvest and use BMPs. ☒ No, select alternate BMPs.		



Categorization of Infiltration Feasibility Condition		Form I-8	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	☐	☒
Provide basis: Infiltration has not been measured onsite. Infiltration is precluded by the presence of liquefiable soils below the site Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	☐	☒
Provide basis: No, underlying soils are sandy, liquefiable soil. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			



Form I-8 Page 2 of 4

Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: No. Per Geotechnical Report, "Infiltration could create groundwater mounding due to geologic variability of the alluvial material." Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☒	☐
Provide basis: Infiltration would not be anticipated to cause water balance issues or increase discharge of contaminated groundwater. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result *	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	☐ Full Infiltration ☒ No	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings



Form I-8 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	☐	☒

Provide basis:

Infiltration has not been measured onsite. Infiltration is precluded by the presence of liquefiable soils below the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	☐	☒
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Provide basis:

No, underlying soils are sandy, liquefiable soil and are not suitable for infiltration at any rate.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.



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Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☐	☒
Provide basis: No. Per Geotechnical Report, "Infiltration could create groundwater mounding due to geologic variability of the alluvial material." Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	☒	☐
Provide basis: No downstream water rights are known to exist. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	☐ Partial Infiltration ☒ No Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings



ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.



Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	1. Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☒ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☒ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours



Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☒ Underlying hydrologic soil group
- ☒ Approximate depth to groundwater
- ☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☒ Critical coarse sediment yield areas to be protected
- ☒ Existing topography
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Point(s) of Compliance (POC) for Hydromodification Management
- ☒ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☒ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

Please provide the Exhibit in 24"x36" format with map pocket, wet date, and stamp.

SEE DMA MAP FOR HMP INFO



Placeholder – **Hydromodification Management Exhibit**

Replace placeholder with required exhibit.



Placeholder – **6.2.1 Verification of GLUs Onsite** (if applicable)

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

☒ Not Applicable



No mapped CCSYA's exist on or upstream of the site

 Yes

© 2020 Google

3000 ft

Placeholder – **6.2.3 Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite** (Optional)

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

Not Applicable



Placeholder – **6.3.4 Geomorphic Assessment of Receiving Channels** (Optional)

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

Not Applicable



Placeholder - **Flow Control Facility Design and Structural BMP Drawdown Calculations**

Replace placeholder with required calculations/documentation.

See Chapter 6 and Appendix G of the BMP Design Manual



EVENT THRESHOLD CALCULATION

Pre-project Flow Frequency - Long-term Simulation

Statistics - Node e-poc Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	1/4/1978	4	7.076	0.22	58
2	4/14/2003	8	6.463	0.44	29
3	10/1/1983	3	5.648	0.66	19.33
4	1/4/1995	7	5.459	0.88	14.5
5	1/15/1979	5	5.349	1.11	11.6
6	9/23/1986	1	4.8	1.33	9.67
7	2/25/1969	19	4.423	1.55	8.29
8	2/25/2003	5	4.395	1.77	7.25
9	2/3/1958	16	4.349	1.99	6.44
10	10/27/2004	7	4.063	2.21	5.8
11	10/29/2000	3	4.02	2.43	5.27
12	3/17/1982	18	3.99	2.65	4.83
13	2/18/2005	3	3.977	2.88	4.46
14	1/16/1952	9	3.952	3.1	4.14
15	1/13/1993	10	3.903	3.32	3.87
16	2/28/1978	14	3.893	3.54	3.63
17	2/20/1980	13	3.713	3.76	3.41
18	4/1/1958	9	3.656	3.98	3.22
19	1/28/1983	5	3.494	4.2	3.05
20	2/10/1978	4	3.48	4.42	2.9
21	11/22/1965	25	3.411	4.65	2.76
22	2/14/1986	7	3.375	4.87	2.64
23	2/16/1980	4	3.334	5.09	2.52
24	10/20/2004	7	3.316	5.31	2.42
25	3/2/1980	4	3.298	5.53	2.32
26	2/3/1998	6	3.287	5.75	2.23
27	2/27/1983	5	3.189	5.97	2.15
28	1/27/2008	6	3.181	6.19	2.07
29	12/29/1991	13	3.169	6.42	2
30	3/16/1963	4	3.16	6.64	1.93
31	2/23/1998	12	3.154	6.86	1.87
32	4/28/2005	3	3.114	7.08	1.81
33	12/19/1970	2	3.112	7.3	1.76
34	2/22/2008	7	3.104	7.52	1.71
35	2/17/1998	10	2.969	7.74	1.66
36	12/1/1961	20	2.93	7.96	1.61
37	2/4/1994	3	2.925	8.19	1.57
38	11/15/1952	2	2.92	8.41	1.53
39	2/18/1993	1	2.906	8.63	1.49
40	1/6/2008	3	2.897	8.85	1.45
41	1/18/1993	8	2.897	9.07	1.41
42	11/11/1985	4	2.892	9.29	1.38
43	1/28/1980	11	2.765	9.51	1.35
44	3/1/1983	4	2.757	9.73	1.32
45	3/11/1995	3	2.756	9.96	1.29
46	1/16/1978	6	2.731	10.18	1.26
47	1/10/1980	13	2.711	10.4	1.23
48	2/17/1980	11	2.645	10.62	1.21
49	2/14/1998	8	2.631	10.84	1.18
50	2/27/1991	6	2.627	11.06	1.16
51	12/18/1967	11	2.604	11.28	1.14
52	2/12/1992	6	2.581	11.5	1.12
53	3/15/1986	3	2.575	11.73	1.09
54	1/12/1960	6	2.561	11.95	1.07
55	8/17/1977	3	2.506	12.17	1.05
56	1/15/1993	35	2.479	12.39	1.04
57	3/19/1981	3	2.44	12.61	1.02
58	4/27/1960	3	2.42	12.83	1
59	12/24/1983	2	2.41	13.05	0.98
60	3/1/1991	11	2.401	13.27	0.97
61	2/22/2005	11	2.401	13.5	0.95
62	2/8/1993	3	2.395	13.72	0.94
63	2/22/1998	6	2.389	13.94	0.92
64	1/20/1962	7	2.388	14.16	0.91
65	12/22/1982	1	2.378	14.38	0.89
66	1/16/1972	3	2.371	14.6	0.88
67	3/8/1968	6	2.32	14.82	0.87
68	2/6/1969	7	2.308	15.04	0.85
69	2/12/2003	3	2.278	15.27	0.84
70	12/25/1983	7	2.265	15.49	0.83
71	12/24/1971	3	2.256	15.71	0.82
72	12/31/2004	3	2.252	15.93	0.81
73	1/11/2005	9	2.216	16.15	0.79
74	3/20/1973	5	2.206	16.37	0.78
75	1/27/1983	7	2.197	16.59	0.77
76	3/27/1991	5	2.178	16.81	0.76
77	9/18/1963	4	2.177	17.04	0.75
78	11/22/1973	2	2.161	17.26	0.74
79	1/14/1978	14	2.149	17.48	0.73
80	1/30/2007	1	2.143	17.7	0.73
81	2/19/1980	2	2.13	17.92	0.72
82	1/9/2005	18	2.113	18.14	0.71
83	12/29/1977	1	2.084	18.36	0.7
84	2/21/2005	6	2.073	18.58	0.69
85	3/15/2003	4	2.067	18.81	0.68

10-year Q: 4.894 cfs
2-year Q: 3.169 cfs

(Adjust Column "I" to interpolate from Table)

Lower Flow Threshold: 10%

0.1xQ2 (Pre): 0.317 cfs

EVENT THRESHOLD CALCULATION

86	3/15/1952	9	2.056	19.03	0.67
87	2/19/1958	3	2.048	19.25	0.67
88	2/13/1992	2	2.042	19.47	0.66
89	1/12/1995	6	2.04	19.69	0.65
90	1/3/2005	3	2.021	19.91	0.64
91	2/26/2004	5	2.019	20.13	0.64
92	1/26/2001	1	2.018	20.35	0.63
93	9/5/1978	2	2	20.58	0.62
94	2/11/1959	3	2	20.8	0.62
95	3/24/1994	4	1.991	21.02	0.61
96	12/24/1988	3	1.986	21.24	0.6
97	1/13/1957	5	1.982	21.46	0.6
98	1/19/1954	6	1.98	21.68	0.59
99	2/15/1992	5	1.98	21.9	0.59
100	11/8/2002	1	1.976	22.12	0.58
101	11/14/1972	2	1.947	22.35	0.57
102	1/9/1980	14	1.939	22.57	0.57
103	1/13/1997	4	1.937	22.79	0.56
104	2/19/1993	2	1.926	23.01	0.56
105	2/14/2001	3	1.923	23.23	0.55
106	1/12/1997	3	1.922	23.45	0.55
107	12/5/1966	9	1.91	23.67	0.54
108	2/12/1978	6	1.904	23.89	0.54
109	3/25/1991	3	1.896	24.12	0.53
110	12/10/1965	4	1.87	24.34	0.53
111	1/5/1979	7	1.87	24.56	0.52
112	11/7/1979	1	1.862	24.78	0.52
113	3/13/1967	2	1.861	25	0.51
114	1/26/1999	2	1.855	25.22	0.51
115	11/25/1988	3	1.855	25.44	0.5
116	2/13/1954	3	1.851	25.66	0.5
117	11/24/1983	2	1.838	25.88	0.5
118	1/15/1997	3	1.818	26.11	0.49
119	3/19/1991	3	1.815	26.33	0.49
120	11/30/1952	4	1.784	26.55	0.48
121	11/21/1996	12	1.782	26.77	0.48
122	5/11/1957	2	1.77	26.99	0.48
123	11/18/1986	2	1.769	27.21	0.47
124	4/8/1975	9	1.758	27.43	0.47
125	11/17/1964	3	1.748	27.65	0.46
126	2/21/2005	10	1.74	27.88	0.46
127	1/11/2001	3	1.734	28.1	0.46
128	12/24/1959	2	1.725	28.32	0.45
129	2/1/1960	4	1.713	28.54	0.45
130	2/17/1990	4	1.704	28.76	0.45
131	1/24/1969	36	1.682	28.98	0.44
132	2/28/1991	2	1.682	29.2	0.44
133	10/14/2006	1	1.674	29.42	0.44
134	3/16/1958	6	1.669	29.65	0.43
135	3/11/1995	7	1.669	29.87	0.43
136	11/30/1967	1	1.668	30.09	0.43
137	3/2/1983	10	1.659	30.31	0.42
138	11/28/1981	6	1.652	30.53	0.42
139	4/13/1956	7	1.646	30.75	0.42
140	12/25/1968	1	1.644	30.97	0.41
141	2/13/1978	3	1.64	31.19	0.41
142	1/26/1995	1	1.618	31.42	0.41
143	2/22/2004	1	1.614	31.64	0.41
144	11/20/1963	9	1.607	31.86	0.4
145	2/14/1980	4	1.599	32.08	0.4
146	12/2/1952	1	1.598	32.3	0.4
147	4/3/1958	3	1.595	32.52	0.39
148	1/10/1978	2	1.584	32.74	0.39
149	1/17/1988	2	1.579	32.96	0.39
150	4/20/1988	4	1.577	33.19	0.39
151	12/20/2002	4	1.57	33.41	0.38
152	2/25/2001	4	1.564	33.63	0.38
153	3/3/1983	2	1.526	33.85	0.38
154	11/17/1972	1	1.525	34.07	0.38
155	3/21/1958	13	1.519	34.29	0.37
156	3/20/1991	4	1.513	34.51	0.37
157	9/10/1976	7	1.509	34.73	0.37
158	11/30/2007	13	1.505	34.96	0.37
159	1/29/1998	4	1.499	35.18	0.36
160	12/16/1987	4	1.492	35.4	0.36
161	4/3/1965	2	1.489	35.62	0.36
162	3/20/1992	2	1.482	35.84	0.36
163	3/24/1983	4	1.479	36.06	0.36
164	12/7/1982	3	1.479	36.28	0.35
165	4/20/1983	3	1.469	36.5	0.35
166	1/17/1990	3	1.467	36.73	0.35
167	3/5/1995	15	1.461	36.95	0.35
168	11/29/1985	8	1.46	37.17	0.35
169	3/30/1978	1	1.454	37.39	0.34
170	4/7/1958	12	1.449	37.61	0.34
171	1/22/1967	7	1.446	37.83	0.34
172	3/11/2006	1	1.436	38.05	0.34
173	3/6/1980	3	1.427	38.27	0.34
174	12/28/2004	2	1.426	38.5	0.33
175	1/26/1956	14	1.424	38.72	0.33
176	2/7/1966	2	1.421	38.94	0.33
177	12/17/1987	7	1.42	39.16	0.33
178	3/19/1979	3	1.419	39.38	0.33
179	1/6/1993	14	1.418	39.6	0.32

EVENT THRESHOLD CALCULATION

180	1/3/1977	2	1.416	39.82	0.32
181	1/29/1957	10	1.414	40.04	0.32
182	11/16/1965	7	1.411	40.27	0.32
183	1/7/2005	7	1.411	40.49	0.32
184	12/21/1988	4	1.404	40.71	0.32
185	12/29/2004	7	1.402	40.93	0.31
186	1/17/1952	11	1.402	41.15	0.31
187	12/11/1985	3	1.4	41.37	0.31
188	12/29/1965	2	1.4	41.59	0.31
189	2/11/2003	1	1.385	41.81	0.31
190	11/19/1967	2	1.381	42.04	0.31
191	2/8/1998	4	1.379	42.26	0.3
192	10/12/1987	6	1.372	42.48	0.3
193	1/14/1960	4	1.36	42.7	0.3
194	2/28/1970	2	1.357	42.92	0.3
195	11/30/1993	1	1.341	43.14	0.3
196	4/8/1965	11	1.339	43.36	0.3
197	3/1/1960	1	1.336	43.58	0.29
198	2/16/1959	7	1.333	43.81	0.29
199	1/18/1955	5	1.319	44.03	0.29
200	3/7/1952	5	1.318	44.25	0.29
201	1/25/1958	1	1.316	44.47	0.29
202	11/25/1985	2	1.295	44.69	0.29
203	11/28/1981	2	1.294	44.91	0.29
204	10/18/2004	1	1.285	45.13	0.28
205	11/16/1972	6	1.283	45.35	0.28
206	7/22/1976	3	1.276	45.58	0.28
207	12/9/2001	3	1.27	45.8	0.28
208	2/7/1998	3	1.264	46.02	0.28
209	1/1/1982	2	1.264	46.24	0.28
210	3/5/2000	3	1.254	46.46	0.28
211	2/28/1957	1	1.249	46.68	0.27
212	2/15/1980	1	1.243	46.9	0.27
213	1/7/1992	4	1.226	47.12	0.27
214	3/5/1980	4	1.22	47.35	0.27
215	2/8/1993	1	1.214	47.57	0.27
216	3/30/1954	1	1.214	47.79	0.27
217	1/12/1980	7	1.212	48.01	0.27
218	9/25/1986	4	1.208	48.23	0.27
219	2/26/2001	3	1.206	48.45	0.26
220	1/10/1955	1	1.206	48.67	0.26
221	11/21/1963	7	1.198	48.89	0.26
222	2/22/2004	2	1.19	49.12	0.26
223	12/7/1992	2	1.184	49.34	0.26
224	1/29/1981	2	1.183	49.56	0.26
225	11/5/1960	2	1.163	49.78	0.26
226	1/26/1969	3	1.161	50	0.26
227	3/17/1979	1	1.157	50.22	0.26
228	1/25/1997	8	1.151	50.44	0.25
229	11/24/2001	2	1.147	50.66	0.25
230	11/21/1967	2	1.145	50.88	0.25
231	11/11/1954	9	1.145	51.11	0.25
232	4/11/1967	3	1.143	51.33	0.25
233	10/14/1957	2	1.14	51.55	0.25
234	1/26/1958	1	1.137	51.77	0.25
235	1/7/1995	13	1.114	51.99	0.25
236	2/13/1973	3	1.099	52.21	0.25
237	2/7/1978	4	1.092	52.43	0.24
238	4/7/2001	1	1.092	52.65	0.24
239	12/21/1970	1	1.085	52.88	0.24
240	1/6/1977	20	1.072	53.1	0.24
241	1/5/1992	14	1.071	53.32	0.24
242	12/29/1951	13	1.07	53.54	0.24
243	3/10/1986	2	1.056	53.76	0.24
244	11/23/1951	1	1.049	53.98	0.24
245	5/12/1998	1	1.047	54.2	0.24
246	1/30/1966	1	1.033	54.42	0.24
247	3/25/1977	3	1.032	54.65	0.23
248	4/18/1995	2	1.021	54.87	0.23
249	12/6/1966	3	1.02	55.09	0.23
250	1/10/1995	7	1.02	55.31	0.23
251	2/6/1976	3	1.016	55.53	0.23
252	3/1/1970	2	1.012	55.75	0.23
253	12/19/1967	2	1.004	55.97	0.23
254	1/21/1964	2	1.004	56.19	0.23
255	1/7/1957	6	0.998	56.42	0.23
256	2/20/1969	1	0.994	56.64	0.23
257	3/2/1970	1	0.994	56.86	0.23
258	12/19/1984	2	0.97	57.08	0.22
259	3/28/1993	2	0.964	57.3	0.22
260	2/3/1958	7	0.962	57.52	0.22
262	2/21/2000	2	0.954	57.96	0.22
262	2/20/2000	2	0.954	57.96	0.22
263	3/11/1973	2	0.949	58.19	0.22
264	3/2/1981	3	0.946	58.41	0.22
265	12/27/1984	5	0.943	58.63	0.22
266	2/25/1987	1	0.94	58.85	0.22
267	3/19/1962	3	0.927	59.07	0.22
268	12/18/1984	7	0.926	59.29	0.22
269	1/5/1982	3	0.924	59.51	0.22
270	3/6/1983	1	0.906	59.73	0.21
271	3/4/1978	2	0.904	59.96	0.21
272	12/25/2003	1	0.904	60.18	0.21
273	3/4/1983	3	0.902	60.4	0.21

EVENT THRESHOLD CALCULATION

274	1/9/1998	2	0.898	60.62	0.21
275	3/12/1978	2	0.892	60.84	0.21
276	1/22/1964	1	0.89	61.06	0.21
277	2/23/1969	12	0.89	61.28	0.21
278	3/23/1954	3	0.889	61.5	0.21
279	2/10/1963	1	0.886	61.73	0.21
280	2/8/1978	6	0.88	61.95	0.21
281	3/20/1979	1	0.88	62.17	0.21
282	3/11/1973	1	0.878	62.39	0.21
283	2/7/1994	2	0.877	62.61	0.2
284	12/4/1974	1	0.871	62.83	0.2
285	12/16/2002	1	0.86	63.05	0.2
286	2/10/1982	7	0.855	63.27	0.2
287	3/10/1986	5	0.852	63.5	0.2
288	11/24/1984	4	0.848	63.72	0.2
289	3/1/1981	3	0.836	63.94	0.2
290	11/30/1970	10	0.836	64.16	0.2
291	4/21/1988	1	0.836	64.38	0.2
292	3/8/1973	1	0.831	64.6	0.2
293	3/28/1979	1	0.831	64.82	0.2
294	3/8/1975	1	0.829	65.04	0.2
295	3/5/1981	7	0.828	65.27	0.2
296	1/9/1978	5	0.825	65.49	0.2
297	3/8/1974	9	0.819	65.71	0.2
298	2/9/1985	2	0.816	65.93	0.19
299	3/8/1952	1	0.814	66.15	0.19
300	2/18/1969	7	0.809	66.37	0.19
301	2/26/1983	1	0.808	66.59	0.19
302	2/8/1962	8	0.805	66.81	0.19
304	3/25/1998	2	0.793	67.26	0.19
304	3/31/1998	2	0.793	67.26	0.19
305	1/20/1982	1	0.791	67.48	0.19
306	2/17/1994	2	0.782	67.7	0.19
307	12/3/1966	2	0.777	67.92	0.19
308	1/30/1966	2	0.775	68.14	0.19
309	1/13/1952	5	0.774	68.36	0.19
310	2/16/1959	1	0.769	68.58	0.19
311	1/5/1977	10	0.767	68.81	0.19
312	1/27/2008	3	0.766	69.03	0.19
313	11/19/1967	2	0.763	69.25	0.19
314	2/13/2001	1	0.763	69.47	0.18
315	2/6/1978	1	0.76	69.69	0.18
316	4/20/2007	1	0.758	69.91	0.18
317	7/8/1976	2	0.758	70.13	0.18
318	12/11/1996	9	0.758	70.35	0.18
319	4/12/1956	3	0.753	70.58	0.18
320	4/20/1957	3	0.753	70.8	0.18
321	3/25/1954	3	0.752	71.02	0.18
322	2/9/1981	2	0.749	71.24	0.18
323	1/5/2008	2	0.744	71.46	0.18
324	1/31/1993	1	0.743	71.68	0.18
325	1/25/1995	5	0.735	71.9	0.18
326	12/6/1997	1	0.735	72.12	0.18
327	3/1/1957	2	0.735	72.35	0.18
328	2/22/1969	6	0.734	72.57	0.18
329	1/29/1980	8	0.733	72.79	0.18
330	3/4/1970	2	0.733	73.01	0.18
331	7/15/1976	3	0.731	73.23	0.18
332	3/31/1978	3	0.724	73.45	0.17
333	4/1/1982	2	0.72	73.67	0.17
334	3/3/1980	1	0.72	73.89	0.17
335	2/5/1978	3	0.717	74.12	0.17
336	2/6/1965	1	0.716	74.34	0.17
337	12/24/1971	2	0.711	74.56	0.17
338	2/21/1959	3	0.708	74.78	0.17
339	3/11/1978	1	0.706	75	0.17
340	12/16/1965	6	0.691	75.22	0.17
341	2/25/1958	1	0.69	75.44	0.17
342	1/18/1972	6	0.689	75.66	0.17
343	2/8/1983	1	0.689	75.88	0.17
344	2/15/1973	1	0.687	76.11	0.17
345	11/14/1988	3	0.671	76.33	0.17
346	1/24/1967	5	0.647	76.55	0.17
347	2/27/1996	1	0.626	76.77	0.17
348	1/24/1954	4	0.62	76.99	0.17
349	3/20/1994	2	0.614	77.21	0.17
350	2/3/1994	1	0.608	77.43	0.17
351	2/27/1955	1	0.602	77.65	0.17
352	1/31/1979	2	0.601	77.88	0.16
353	1/8/1974	3	0.588	78.1	0.16
354	4/4/2006	3	0.582	78.32	0.16
355	3/16/2003	1	0.565	78.54	0.16
356	2/26/1996	1	0.564	78.76	0.16
357	11/12/1983	1	0.564	78.98	0.16
358	2/10/1976	1	0.553	79.2	0.16
359	2/6/1966	2	0.55	79.42	0.16
360	2/11/2005	5	0.539	79.65	0.16
361	1/11/1995	6	0.536	79.87	0.16
362	1/7/1993	5	0.521	80.09	0.16
363	3/22/1954	3	0.496	80.31	0.16
364	1/7/1993	3	0.495	80.53	0.16
365	5/9/1977	1	0.492	80.75	0.16
366	3/10/1975	3	0.491	80.97	0.16
367	2/28/2006	1	0.483	81.19	0.16

EVENT THRESHOLD CALCULATION

368	3/14/1982	1	0.475	81.42	0.16
369	1/9/1991	1	0.468	81.64	0.16
370	3/1/1953	1	0.466	81.86	0.16
371	3/15/1958	1	0.453	82.08	0.16
372	1/27/2001	1	0.441	82.3	0.16
373	3/16/1954	1	0.428	82.52	0.16
376	2/16/1998	1	0.423	83.19	0.15
376	2/19/1998	1	0.423	83.19	0.15
376	2/27/2001	1	0.423	83.19	0.15
377	3/7/1994	2	0.421	83.41	0.15
378	1/20/1982	1	0.407	83.63	0.15
379	11/8/1998	1	0.407	83.85	0.15
380	1/28/1957	2	0.402	84.07	0.15
381	3/18/1983	1	0.396	84.29	0.15
382	3/23/1992	1	0.393	84.51	0.15
383	12/7/1980	2	0.371	84.73	0.15
384	12/30/1977	3	0.365	84.96	0.15
385	12/27/1971	2	0.363	85.18	0.15
386	11/14/1965	4	0.362	85.4	0.15
387	12/8/1984	2	0.361	85.62	0.15
388	3/10/1975	3	0.359	85.84	0.15
389	11/6/1960	1	0.359	86.06	0.15
390	1/10/1978	4	0.348	86.28	0.15
391	9/17/1963	1	0.345	86.5	0.15
392	2/11/1973	1	0.335	86.73	0.15
393	3/21/1991	4	0.326	86.95	0.15
394	3/13/1986	1	0.319	87.17	0.15
395	1/4/2005	3	0.317	87.39	0.15
396	1/16/1970	2	0.313	87.61	0.15
397	12/28/1971	3	0.31	87.83	0.15
398	4/11/1998	1	0.309	88.05	0.15
399	1/19/1978	1	0.309	88.27	0.15
400	1/8/1985	2	0.307	88.5	0.14
401	1/6/2008	1	0.305	88.72	0.14
402	3/16/1957	1	0.302	88.94	0.14
403	2/21/1962	2	0.3	89.16	0.14
404	3/26/1991	4	0.297	89.38	0.14
405	12/20/1984	1	0.296	89.6	0.14
406	2/1/1996	1	0.295	89.82	0.14
407	4/14/1971	1	0.293	90.04	0.14
408	3/6/1958	1	0.29	90.27	0.14
409	1/18/1980	2	0.283	90.49	0.14
410	4/5/1969	1	0.278	90.71	0.14
411	4/18/1983	1	0.272	90.93	0.14
412	12/26/1977	1	0.271	91.15	0.14
413	12/4/1987	1	0.265	91.37	0.14
414	12/27/1984	6	0.256	91.59	0.14
415	3/16/1986	1	0.246	91.81	0.14
416	3/21/1983	1	0.246	92.04	0.14
417	1/7/1993	2	0.245	92.26	0.14
418	4/12/1999	2	0.22	92.48	0.14
419	4/10/1952	3	0.219	92.7	0.14
420	3/21/1969	1	0.219	92.92	0.14
421	11/7/1969	1	0.218	93.14	0.14
422	2/18/2005	1	0.214	93.36	0.14
423	3/22/1992	1	0.214	93.58	0.14
424	4/15/1976	1	0.212	93.81	0.14
425	12/20/1952	3	0.212	94.03	0.14
426	11/7/1966	2	0.207	94.25	0.14
427	1/31/1996	1	0.204	94.47	0.14
428	12/14/1965	1	0.204	94.69	0.14
429	2/9/1963	2	0.204	94.91	0.14
430	1/12/2001	6	0.202	95.13	0.13
431	3/25/1980	2	0.192	95.35	0.13
432	1/24/1995	1	0.183	95.58	0.13
434	3/6/2001	1	0.181	96.02	0.13
434	3/26/1998	1	0.181	96.02	0.13
435	12/30/1952	1	0.175	96.24	0.13
436	1/31/1956	1	0.163	96.46	0.13
437	1/28/1969	3	0.15	96.68	0.13
438	3/20/1958	2	0.143	96.9	0.13
439	3/10/1980	1	0.134	97.12	0.13
440	2/29/1960	1	0.116	97.35	0.13
441	6/10/1957	2	0.113	97.57	0.13
442	12/16/1988	1	0.106	97.79	0.13
443	2/19/1980	1	0.103	98.01	0.13
444	1/17/1993	1	0.095	98.23	0.13
445	3/9/1978	2	0.072	98.45	0.13
446	2/11/2005	1	0.071	98.67	0.13
447	2/8/1976	1	0.049	98.89	0.13
448	3/12/1973	1	0.03	99.12	0.13
449	4/17/1963	1	0.029	99.34	0.13
450	12/19/1970	1	0.028	99.56	0.13
451	12/6/1998	1	0.02	99.78	0.13

FLOW DURATION CURVE CALCULATION

Low-flow Threshold: 10%
 0.1xQ2 (Pre): 0.317 cfs
 Q10 (Pre): 4.894 cfs
 Ordinate #: 100
 Incremental Q (Pre): 0.04577 cfs
 Total Hourly Data: 497374 hours

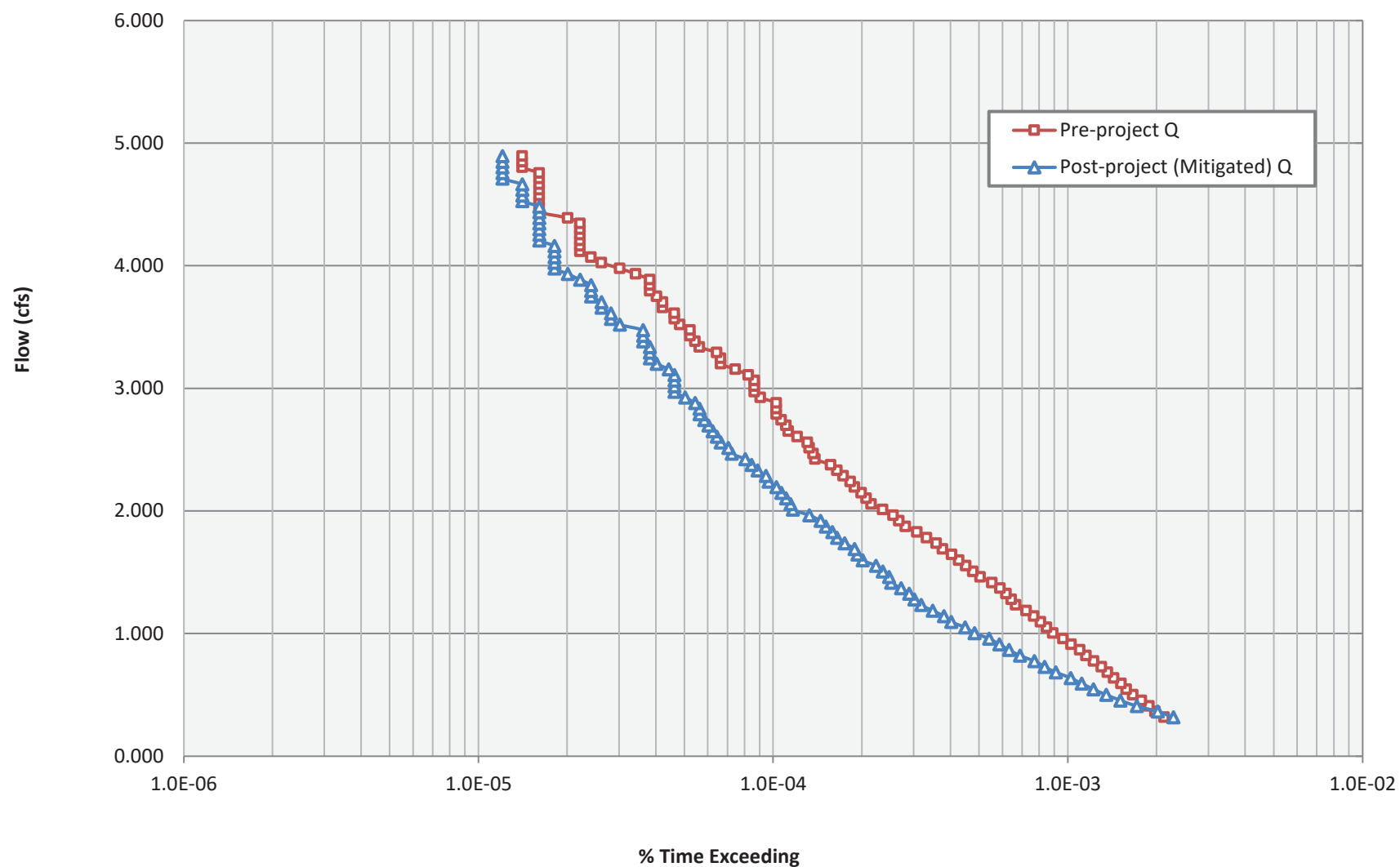
The proposed BMP: **PASSED**

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.317	1057	2.13E-03	1134	2.28E-03	107%	Pass
1	0.363	984	1.98E-03	1004	2.02E-03	102%	Pass
2	0.408	939	1.89E-03	852	1.71E-03	91%	Pass
3	0.454	884	1.78E-03	749	1.51E-03	85%	Pass
4	0.500	826	1.66E-03	672	1.35E-03	81%	Pass
5	0.546	786	1.58E-03	608	1.22E-03	77%	Pass
6	0.592	755	1.52E-03	554	1.11E-03	73%	Pass
7	0.637	713	1.43E-03	509	1.02E-03	71%	Pass
8	0.683	678	1.36E-03	453	9.11E-04	67%	Pass
9	0.729	647	1.30E-03	415	8.34E-04	64%	Pass
10	0.775	609	1.22E-03	383	7.70E-04	63%	Pass
11	0.820	574	1.15E-03	342	6.88E-04	60%	Pass
12	0.866	546	1.10E-03	314	6.31E-04	58%	Pass
13	0.912	511	1.03E-03	291	5.85E-04	57%	Pass
14	0.958	479	9.63E-04	269	5.41E-04	56%	Pass
15	1.003	443	8.91E-04	240	4.83E-04	54%	Pass
16	1.049	421	8.46E-04	223	4.48E-04	53%	Pass
17	1.095	402	8.08E-04	200	4.02E-04	50%	Pass
18	1.141	381	7.66E-04	189	3.80E-04	50%	Pass
19	1.187	359	7.22E-04	173	3.48E-04	48%	Pass
20	1.232	331	6.65E-04	158	3.18E-04	48%	Pass
21	1.278	320	6.43E-04	150	3.02E-04	47%	Pass
22	1.324	307	6.17E-04	144	2.90E-04	47%	Pass
23	1.370	293	5.89E-04	135	2.71E-04	46%	Pass
24	1.415	275	5.53E-04	125	2.51E-04	45%	Pass
25	1.461	251	5.05E-04	123	2.47E-04	49%	Pass
26	1.507	237	4.77E-04	117	2.35E-04	49%	Pass
27	1.553	224	4.50E-04	111	2.23E-04	50%	Pass
28	1.598	212	4.26E-04	100	2.01E-04	47%	Pass
29	1.644	201	4.04E-04	96	1.93E-04	48%	Pass
30	1.690	187	3.76E-04	94	1.89E-04	50%	Pass
31	1.736	178	3.58E-04	87	1.75E-04	49%	Pass
32	1.782	165	3.32E-04	82	1.65E-04	50%	Pass
33	1.827	153	3.08E-04	79	1.59E-04	52%	Pass
34	1.873	140	2.81E-04	75	1.51E-04	54%	Pass
35	1.919	133	2.67E-04	72	1.45E-04	54%	Pass
36	1.965	127	2.55E-04	66	1.33E-04	52%	Pass
37	2.010	117	2.35E-04	58	1.17E-04	50%	Pass
38	2.056	107	2.15E-04	57	1.15E-04	53%	Pass
39	2.102	103	2.07E-04	55	1.11E-04	53%	Pass
40	2.148	99	1.99E-04	53	1.07E-04	54%	Pass
41	2.193	94	1.89E-04	51	1.03E-04	54%	Pass
42	2.239	91	1.83E-04	48	9.65E-05	53%	Pass
43	2.285	86	1.73E-04	47	9.45E-05	55%	Pass
44	2.331	82	1.65E-04	44	8.85E-05	54%	Pass
45	2.377	78	1.57E-04	42	8.44E-05	54%	Pass
46	2.422	69	1.39E-04	40	8.04E-05	58%	Pass
47	2.468	68	1.37E-04	36	7.24E-05	53%	Pass
48	2.514	66	1.33E-04	35	7.04E-05	53%	Pass
49	2.560	65	1.31E-04	33	6.63E-05	51%	Pass
50	2.605	60	1.21E-04	32	6.43E-05	53%	Pass
51	2.651	56	1.13E-04	31	6.23E-05	55%	Pass
52	2.697	55	1.11E-04	30	6.03E-05	55%	Pass
53	2.743	53	1.07E-04	29	5.83E-05	55%	Pass
54	2.788	51	1.03E-04	28	5.63E-05	55%	Pass
55	2.834	51	1.03E-04	28	5.63E-05	55%	Pass
56	2.880	51	1.03E-04	27	5.43E-05	53%	Pass
57	2.926	45	9.05E-05	25	5.03E-05	56%	Pass

FLOW DURATION CURVE CALCULATION

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
58	2.972	43	8.65E-05	23	4.62E-05	53%	Pass
59	3.017	43	8.65E-05	23	4.62E-05	53%	Pass
60	3.063	43	8.65E-05	23	4.62E-05	53%	Pass
61	3.109	41	8.24E-05	23	4.62E-05	56%	Pass
62	3.155	37	7.44E-05	22	4.42E-05	59%	Pass
63	3.200	33	6.63E-05	20	4.02E-05	61%	Pass
64	3.246	33	6.63E-05	19	3.82E-05	58%	Pass
65	3.292	32	6.43E-05	19	3.82E-05	59%	Pass
66	3.338	28	5.63E-05	19	3.82E-05	68%	Pass
67	3.383	27	5.43E-05	18	3.62E-05	67%	Pass
68	3.429	26	5.23E-05	18	3.62E-05	69%	Pass
69	3.475	26	5.23E-05	18	3.62E-05	69%	Pass
70	3.521	24	4.83E-05	15	3.02E-05	63%	Pass
71	3.567	23	4.62E-05	14	2.81E-05	61%	Pass
72	3.612	23	4.62E-05	14	2.81E-05	61%	Pass
73	3.658	21	4.22E-05	13	2.61E-05	62%	Pass
74	3.704	21	4.22E-05	13	2.61E-05	62%	Pass
75	3.750	20	4.02E-05	12	2.41E-05	60%	Pass
76	3.795	19	3.82E-05	12	2.41E-05	63%	Pass
77	3.841	19	3.82E-05	12	2.41E-05	63%	Pass
78	3.887	19	3.82E-05	11	2.21E-05	58%	Pass
79	3.933	17	3.42E-05	10	2.01E-05	59%	Pass
80	3.978	15	3.02E-05	9	1.81E-05	60%	Pass
81	4.024	13	2.61E-05	9	1.81E-05	69%	Pass
82	4.070	12	2.41E-05	9	1.81E-05	75%	Pass
83	4.116	11	2.21E-05	9	1.81E-05	82%	Pass
84	4.162	11	2.21E-05	9	1.81E-05	82%	Pass
85	4.207	11	2.21E-05	8	1.61E-05	73%	Pass
86	4.253	11	2.21E-05	8	1.61E-05	73%	Pass
87	4.299	11	2.21E-05	8	1.61E-05	73%	Pass
88	4.345	11	2.21E-05	8	1.61E-05	73%	Pass
89	4.390	10	2.01E-05	8	1.61E-05	80%	Pass
90	4.436	8	1.61E-05	8	1.61E-05	100%	Pass
91	4.482	8	1.61E-05	8	1.61E-05	100%	Pass
92	4.528	8	1.61E-05	7	1.41E-05	88%	Pass
93	4.573	8	1.61E-05	7	1.41E-05	88%	Pass
94	4.619	8	1.61E-05	7	1.41E-05	88%	Pass
95	4.665	8	1.61E-05	7	1.41E-05	88%	Pass
96	4.711	8	1.61E-05	6	1.21E-05	75%	Pass
97	4.757	8	1.61E-05	6	1.21E-05	75%	Pass
98	4.802	7	1.41E-05	6	1.21E-05	86%	Pass
99	4.848	7	1.41E-05	6	1.21E-05	86%	Pass
100	4.894	7	1.41E-05	6	1.21E-05	86%	Pass

Flow Duration Curve [Pre vs. Post (Mitigated)]



[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option Value
FLOW_UNITS CFS
INFILTRATION GREEN_AMPT
FLOW_ROUTING KINWAVE
LINK_OFFSETS DEPTH
MIN_SLOPE 0
ALLOW_PONDING NO
SKIP_STEADY_STATE YES

START_DATE 08/28/1951
START_TIME 00:05:00
REPORT_START_DATE 08/28/1951
REPORT_START_TIME 00:05:00
END_DATE 05/23/2008
END_TIME 23:00:00
SWEEP_START 01/01
SWEEP_END 12/31
DRY_DAYS 0
REPORT_STEP 01:00:00
WET_STEP 00:15:00
DRY_STEP 04:00:00
ROUTING_STEP 0:01:00
RULE_STEP 00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP 0.75
LENGTHENING_STEP 0
MIN_SURFAREA 12.557
MAX_TRIALS 8
HEAD_TOLERANCE 0.005
SYS_FLOW_TOL 5
LAT_FLOW_TOL 5
MINIMUM_STEP 0.5
THREADS 4

[EVAPORATION]
;;Data Source Parameters
;;-----
MONTHLY 0.06 0.08 0.11 0.15 0.17 0.79 0.19 0.18 0.15 0.11 0.08 0.06
DRY_ONLY NO

[RAINGAGES]
;;Name Format Interval SCF Source
;;-----

OCEANSIDE_GAUGE INTENSITY 1:00 1.0 TIMESERIES OCEANSIDE_SERIES

[SUBCATCHMENTS]

::Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack

EX-SITE	OCEANSIDE_GAUGE	E-POC		7.50	0.0	3800	2.0	0
DMA-1	OCEANSIDE_GAUGE	P-POC		0.91	59	796	0.4	0
DMA-2	OCEANSIDE_GAUGE	P-POC		0.92	58	806	0.5	0
DMA-3	OCEANSIDE_GAUGE	P-POC		2.73	678	2378	0.5	0
DMA-4	OCEANSIDE_GAUGE	P-POC		1.75	60	1528	0.5	0
DMA-5	OCEANSIDE_GAUGE	P-POC		0.53	87	462	0.5	0
DMA-6	OCEANSIDE_GAUGE	P-POC		0.04	70	36	2.0	0
DMA-7	OCEANSIDE_GAUGE	P-POC		0.04	74	34	2	0
DMA-8	OCEANSIDE_GAUGE	P-POC		0.21	0.0	181	0.5	0
DMA-9	OCEANSIDE_GAUGE	P-POC		0.37	0.0	319	0.7	0

[SUBAREAS]

::Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted

EX-SITE	0.01	0.03	0.05	0.10	25	OUTLET	
DMA-1	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-2	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-3	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-4	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-5	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-6	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-7	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-8	0.01	0.08	0.05	0.10	25	PERVIOUS	100
DMA-9	0.01	0.10	0.05	0.05	25	PERVIOUS	100

[INFILTRATION]

::Subcatchment	Param1	Param2	Param3	Param4	Param5

EX-SITE	9.0	0.025	0.33	7	0
DMA-1	6.0	0.1	0.32	7	0
DMA-2	6.0	0.1	0.32	7	0
DMA-3	6.0	0.1	0.32	7	0
DMA-4	6.0	0.1	0.32	7	0
DMA-5	6.0	0.1	0.32	7	0
DMA-6	6.0	0.1	0.32	7	0
DMA-7	6.0	0.1	0.32	7	0
DMA-8	6.0	0.1	0.32	7	0
DMA-9	6.0	0.10	0.32	7	0

[LID_CONTROLS]

::Name	Type/Layer Parameters							
::-----	-----							
BMP	BC							
BMP	SURFACE	6	0.0	0	0	5		
BMP	SOIL	18	0.4	0.2	0.1	5	5	1.5

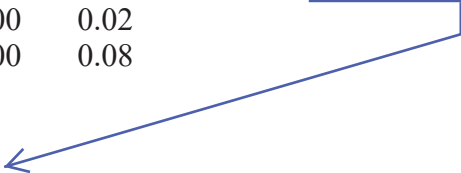
BMP	STORAGE	24	0.67	0.0	0		
BMP	DRAIN	0.2217	0.5	0	6	0	0

[LID_USAGE]											
Subcatchment	LID Process	Number	Area	Width	InitSat	FromImp	ToPerv	RptFile	DrainTo	FromPerv	
DMA-1	BMP	1	2126	0	0	100	0	*	*	100	
DMA-2	BMP	1	1732	0	0	100	0	*	*	100	
DMA-3	BMP	1	2568	0	0	100	0	*	*	100	
DMA-4	BMP	1	1650	0	0	100	0	*	*	100	

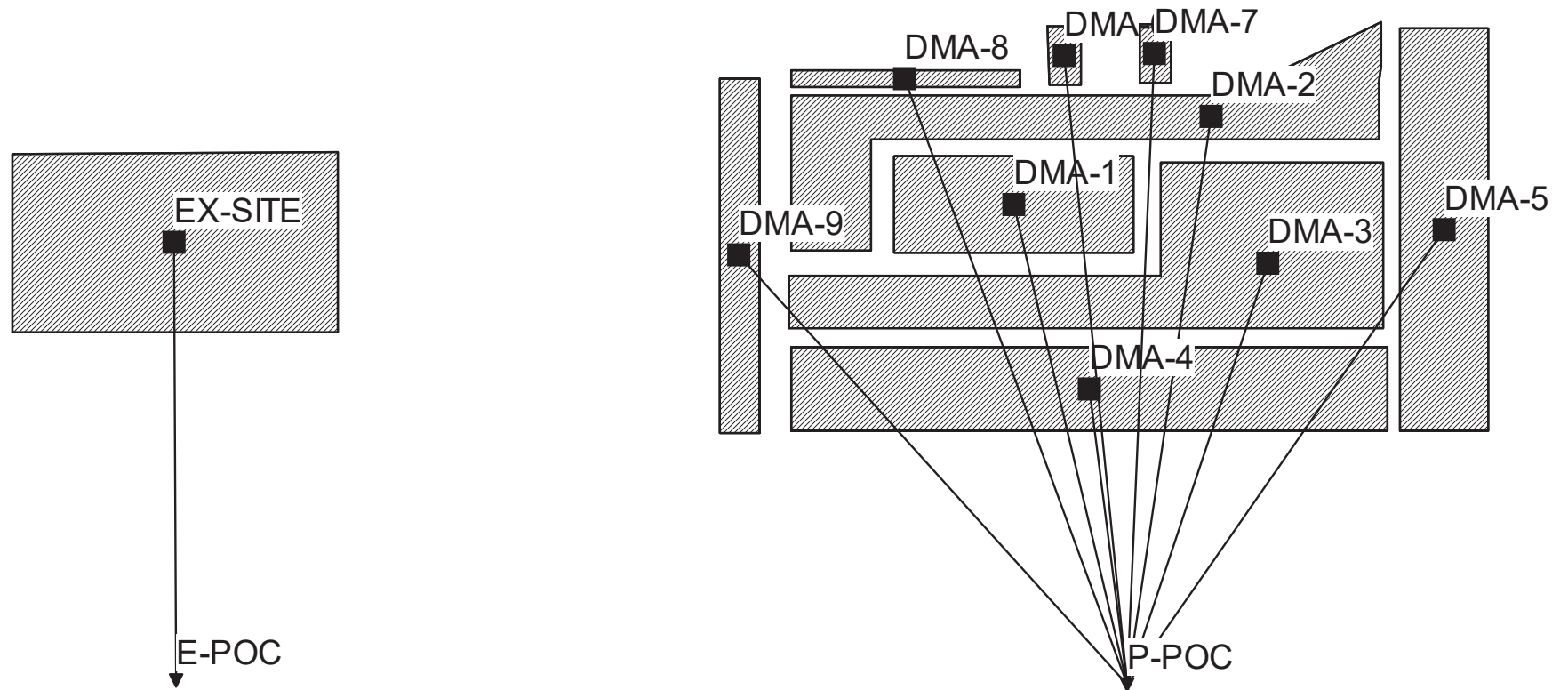
[OUTFALLS]					
Name	Elevation	Type	Stage Data	Gated	Route To
E-POC	0	FREE	NO		
P-POC	0	FREE	NO		

[TIMESERIES]			
Name	Date	Time	Value
OCEANSIDE_SERIES	8/28/1951	5:00	0.06
OCEANSIDE_SERIES	8/28/1951	6:00	0.11
OCEANSIDE_SERIES	8/28/1951	7:00	0.12
OCEANSIDE_SERIES	8/28/1951	8:00	0.15
OCEANSIDE_SERIES	8/28/1951	9:00	0.21
OCEANSIDE_SERIES	8/28/1951	10:00	0.04
OCEANSIDE_SERIES	8/28/1951	11:00	0.01
OCEANSIDE_SERIES	8/28/1951	12:00	0.02
OCEANSIDE_SERIES	8/28/1951	20:00	0.01
OCEANSIDE_SERIES	8/28/1951	22:00	0.01
OCEANSIDE_SERIES	8/28/1951	23:00	0.01
OCEANSIDE_SERIES	8/28/1951	24:00	0.01
OCEANSIDE_SERIES	8/29/1951	1:00	0.03
OCEANSIDE_SERIES	8/29/1951	2:00	0.01
OCEANSIDE_SERIES	8/29/1951	3:00	0.02
OCEANSIDE_SERIES	8/29/1951	4:00	0.01
OCEANSIDE_SERIES	8/30/1951	4:00	0.01
OCEANSIDE_SERIES	8/30/1951	5:00	0.01
OCEANSIDE_SERIES	9/28/1951	2:00	0.02
OCEANSIDE_SERIES	9/28/1951	4:00	0.01
OCEANSIDE_SERIES	9/28/1951	5:00	0.03
OCEANSIDE_SERIES	9/29/1951	3:00	0.01
OCEANSIDE_SERIES	9/30/1951	4:00	0.01
OCEANSIDE_SERIES	10/1/1951	5:00	0.01
OCEANSIDE_SERIES	10/2/1951	24:00	0.01
OCEANSIDE_SERIES	10/3/1951	1:00	0.02
OCEANSIDE_SERIES	10/4/1951	2:00	0.02
OCEANSIDE_SERIES	10/5/1951	3:00	0.03
OCEANSIDE_SERIES	10/6/1951	4:00	0.02
OCEANSIDE_SERIES	10/7/1951	5:00	0.08

Rain Gauge time series is appended here as the full set is several hundred pages long. The full time series was used in the analysis.



OCEANSIDE_GAUGE



Placeholder – **Vector Control Plan** (required when structural BMPs will drain in 96 hours)

Replace placeholder with required documentation.

Leave placeholder intact if not applicable.

Not Applicable



ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.



Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☒ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Draft Maintenance Agreement (when applicable)	☒ Included ☐ Not Applicable



CITY OF OCEANSIDE



BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE PLAN FOR PRIORITY PROJECTS

PROJECT NAME: _____ CYPRESS POINT SUBDIVISION _____

PARCEL NUMBER: _____

PROJECT NUMBER: _____ T21-00001 _____

APPLICANT NAME: _____ CONCORDIA COMMUNITIES, LLC _____

DATE: _____ 03/18/2021 _____

Prepared for:

City of Oceanside
Engineering Division
300 North Coast Hwy
Oceanside, CA 92054

Deemed Complete by the City of Oceanside
Engineering Division

Name: _____ Date: _____

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TABLES

TABLE 1 Ownership and Maintenance
TABLE 2 BMP Operation and Maintenance Funding
TABLE 3 Source Control BMPs
TABLE 4 Drainage Management Areas
TABLE 5 Stormwater Treatment Control BMPs

ATTACHMENTS

1. Organizational Chart
2. Training Program
3. BMP Operation and Maintenance Funding Supplemental Information
4. LID BMPs Inspection Form
5. Source Control BMP Inspection Form
6. Site Map
7. Plans and Other Operation and Maintenance Requirements
8. Treatment Control BMP Inspection and Maintenance Checklist(s)
9. Maintenance Schedule
10. Service Agreement
11. Annual Inspection and Maintenance Reporting Form
12. Copy of Storm water facility maintenance Agreement (SWFMA)
13. Annual Maintenance Cost Estimate

I. COMPLIANCE WITH STORMWATER BEST MANAGEMENT PRACTICES MAINTENANCE REQUIREMENTS

All applicants are responsible for ensuring that stormwater best management practices (BMPs) or facilities installed on their property are properly maintained and that they function as designed. Tenants shall be aware of their responsibilities regarding stormwater facility maintenance and need to be familiar with the contents of this Operations and Maintenance Plan (O&M Plan). Applicants have signed and agreed to a Standard Storm Water Facilities Maintenance Agreement with Access Rights and Covenants (SWFMA). All other maintenance agreements between the applicant and their maintenance employees associated with this property shall be included in Attachment 10.

II. DESIGNATION RESPONSIBLE PARTIES

Responsible parties shall be designated and identified in Table 1.

- The Responsible BMP Party is individual, party, or parties that shall have direct responsibility for the maintenance of stormwater controls. This individual shall be the designated contact with City of Oceanside inspectors and should sign self-inspection reports and any correspondence regarding verification of inspections and required maintenance.
- The Duly Authorized Representative is the corporate officer authorized to negotiate and execute any contracts that might be necessary for future changes to operation and maintenance or to implement remedial measures if problems occur.
- The Designated Emergency Respondent is the party responsible for emergencies such as clogged drains, broken irrigation pipes, etc., that would require immediate response should they occur during off-hours.

TABLE 1 OWNERSHIP AND MAINTENANCE			
	Name	Address	Phone / Email
Responsible BMP Party (if different than above)	HOA to be determined	TBD	TBD
Employees reporting to Responsible BMP Party			
Duly Authorized			

Representative			
Designated Emergency Respondent ¹			

¹ The Designated Emergency Respondent's phone number must be a cellular phone that is reachable 24 hours a day.

Updated contact information must be provided to City of Oceanside immediately whenever a property is sold and whenever designated individuals or contractors change.

A. Maintenance Personnel

Maintenance personnel including Responsible BMP Party, Employees Reporting to Responsible BMP Party, and the Designated Emergency Respondent, must be qualified to properly maintain stormwater BMPs (including treatment and flow-control facilities), especially for restoration or rehabilitation work. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

B. Organizational Chart

An organization chart showing the relationships of authority and responsibility between the individuals responsible for maintenance is provided in Attachment 1.

C. Training

Periodic training is conducted by the responsible BMP party for all personnel affiliated with the maintenance of stormwater BMPs. New staff and/or contractors training regarding the purpose, mode of operation, and maintenance requirements for the site's storm water facilities will be provided by the site. Necessary ongoing training for staff and/or contractors will also be provided. The site's Staff Training Program is described in Attachment 2.

TABLE 2 BMP OPERATION AND MAINTENANCE FUNDING	
Sources of Funding	The proposed HOA will maintain the BMP's.
Budget Category for Expenditures	

Process for establishing Annual O&M Budget	
Process for obtaining unexpected expenditures for major corrective activities	

D. BMP Maintenance Funding

The funding for BMP operation and maintenance shall be described in Table 2; including sources of funds, budget category for expenditures, process for establishing the annual operations and maintenance budget, and process for obtaining authority should unexpected expenditures for major corrective maintenance be required. Any supplemental information, including calculations and documentation shall be included in Attachment 3.

III. LOW IMPACT DEVELOPMENT AND SITE DESIGN BMPS

Low Impact Development (LID) and Site Design BMPs have been incorporated into the project to minimize stormwater impacts. LID BMPs collectively minimize directly connected impervious area and promote infiltration on the project site. Site design BMPs are permanent measures and are similar to LID BMPs.

The LID and Site Design BMPs for the project which require maintenance are identified along with their locations, including Drainage Management Areas (DMAs), in the project SWQMP. A LID Inspection form for the site is provided in Attachment 4. In the event that a project use should change or maintenance considerations may require the site to become amended, Table 22 should be referenced for original site constraints and design guidelines.

IV. SOURCE CONTROL BMPS

Source control BMPs have been selected for the project in order to minimize or prevent pollutant generation. The SWQMP and Table 4 of this O&M identifies the potential pollutant sources and corresponding permanent and operational source controls as well as their locations.

Source control BMPs should be inspected routinely in order to reduce or prevent pollution from accumulating in these areas. Routine inspections of the site's source controls are discussed in the site's maintenance schedule. Source control inspection forms are in Attachment 5.

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ On-site storm drain inlets	All inlets shall be marked with City of Oceanside storm drain markers	- Maintain and periodically replace inlet markers, as necessary. - Review stormwater pollution prevention information applicable to the site. - Adhere to applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com - Do 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.	As needed
☐ Interior floor drains and elevator shaft sump pumps	Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	- Inspect and maintain drains to prevent blockages and overflow. - Regularly clear all associated cleanouts and hand holes.	
☐ Interior parking garages	Parking garage floor drains will be plumbed to the sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.	

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ Landscape/ Outdoor Pesticide Use	- Final site landscape plans shall be placed in Attachment 7 and shall be used to maintain the following: - Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. - 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, maintain and replace, as necessary, 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 a minimum amount of or no pesticides (consider the use of organic techniques). - Review and adhere to applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com - Review IMP information and provide to landscape and maintenance personnel.	
☒ Use efficient irrigation systems	- Employ rain shutoff devices to prevent irrigation after precipitation. - Design irrigation systems to each landscape area's specific water requirements. - Use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines. - Employ other comparable, equally effective, methods to reduce irrigation water runoff.	- Inspect irrigation system for leaks and/or malfunctions. - Inspect that water usage is consistent with vegetation requirements. - Inspect that irrigation shut-off controls operate correctly.	Landscape areas

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Review Integrated Pest Management information and provide to other maintenance personnel.	Proposed houses along the development
☐ Pools, spas, ponds, decorative fountains, and other water features.	Plumb pools to the sanitary sewer in accordance with local requirements.	Review and adhere to applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	
☐ Food service	- 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.		

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ Refuse areas	• State how site refuse will be handled and provide supporting detail to what is shown on plans. • Prohibitive signs shall be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar. • Any drains from dumpsters, compactors, and bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	• Provide adequate number of receptacles. • Inspect receptacles regularly; repair or replace leaky receptacles. • Keep receptacles covered at all times. • Prohibit/prevent dumping of liquid or hazardous wastes. • Post and replace, as necessary, “no hazardous materials” signs. • Inspect and pick up litter daily and clean up spills immediately. • Keep spill control materials available on-site. Review Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	
☐ Industrial processes.	• Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system in compliance with the applicable municipal waste water district's requirements (include a copy of the waste acceptance letter from the agency accepting the waste in Attachment 10). • Grade or berm area to prevent run-on from surrounding areas. • Installation of storm drains in areas of equipment repair is prohibited. • Implement other features which are comparable or equally effective.	• Review and adhere to Fact Sheet SC-10, “Non- Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☐ Outdoor storage of equipment or materials	• Comply with all requirements of local 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 • 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.	• Review and adhere to 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	
	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.		

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ Vehicle and Equipment Cleaning	• If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced. • Equip wash area with a clarifier, grease trap or other pretreatment facility, as appropriate and properly connect to the sanitary sewer. • Implement other features which are comparable or equally effective • 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. • 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. • 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 and permitted by proper regulatory authorities (attach permits in Attachment 10, as necessary).	• Follow operational measures to implement the following (if applicable): ○ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ○ Car dealerships and similar may rinse cars with water only. ○ Review and adhere to Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	Future residents may wash their vehicles on the lot's driveway. Commercial car wash facilities not proposed.

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☐ Vehicle/Equipment Repair and Maintenance	• No vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. • An industrial waste discharge permit will be obtained. For floor drains connected to the sanitary sewer; design will meet the permitting agency's requirements. • An industrial waste discharge permit will be obtained for tanks, containers or sinks to be used for parts cleaning or rinsing; design will meet the permitting agency's requirements. • 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.	• 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 rinse water 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.	

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☐ Fuel Dispensing Areas	- Fueling areas¹ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: - Graded at the minimum slope necessary to prevent ponding - 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 area¹. The canopy [or cover] shall not drain onto the fueling area.	- The fueling area is to be dry swept routinely. - Review and adhere to the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	

¹ 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.

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☐ Loading Docks	• 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. • Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible.	• Move loaded and unloaded items indoors as soon as possible. • Review and adhere to Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	
☒ Fire Sprinkler Test Water	• Provide a means to drain fire sprinkler test water to the sanitary sewer.	• Review the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	Each house will have it's own fire sprinkler test system.

**TABLE 3
SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
☒ Miscellaneous Drain or Wash Water - Boiler drain lines - Condensate drain lines - Rooftop equipment - Drainage sumps - Roofing, gutters, and trim	- 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 mounted 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.		
☒ Plazas, sidewalks, and parking lots		Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.	

V. DRAINAGE AREAS

Table 5 summarizes the drainage management areas (DMAs) on site.

TABLE 4 DRAINAGE MANAGEMENT AREAS		
DMA No.	Designation	Description
DMA-1	BMP-1	Portion of paved private rd. & multiple houses
DMA-2	BMP-2	Portion of paved private rd. & sidewalk
DMA-3	BMP-3	Portion of paved private rd. & multiple houses
DMA-4	BMP-4	Portion of paved private rd. & multiple houses
DMA-5	Street Tree	Portion of paved private rd
DMA-6	Street Tree	Portion of paved private rd. & sidewalk
DMA-7	Street Tree	Portion of paved private rd. & sidewalk
DMA-8	-	Portion of landscape area
DMA-9	-	Portion of landscape area

The site map in Attachment 6 shows the DMAs and their flow patterns. The map indicates, using flow patterns, how the flow from each DMA is routed to the corresponding storm water facility. Impervious and pervious areas are shown on the map.

VI. STORMWATER TREATMENT CONTROL BMPS

Treatment control BMPs treating runoff from DMAs are summarized in Table 5.

TABLE 5 STORMWATER TREATMENT CONTROL BMPS			
Treatment Control BMP Type	Description	Size or Treatment Control BMP Capacity	Area Drained or Water Quality Flow
BMP-1	Fully Lined Biofiltration	1,379 CF	39,810 SF
BMP-2	Fully Lined Biofiltration	1,374 CF	40,275 SF
BMP-3	Fully Lined Biofiltration	4,370 CF	118,918 SF
BMP-4	Fully Lined Biofiltration	2,646 CF	76,376 SF

The location and type of each of the project's stormwater facilities on site are shown on the site map in Attachment 6.

The as-built drawings², manufacturer's data, cut-sheets, manuals, and specific operation and maintenance requirements for each treatment control BMP shall be provided in Attachment 7.

² As-built drawings must be included after construction is complete.

VII. INSPECTING STORMWATER BMPS

The quality of stormwater entering the waters of the U.S. or waters of the state relies heavily on the proper operation and maintenance of permanent BMPs. LID, source control, and treatment control stormwater BMPs must be periodically inspected to ensure that they are functioning as designed. Inspections will determine the appropriate maintenance that is required for the facility.

A. Inspection Procedures

All stormwater treatment BMPs are required to be inspected a minimum of once per year. The Inspection and Maintenance Checklist(s) that is applicable to the site is provided in Attachment 8.

B. Inspection Report

The person(s) conducting the inspection activities (Responsible BMP Party. Employees reporting to Responsible BMP Party, or the Designated Emergency Respondent) shall complete the appropriate inspection checklist for the specific facility. All completed checklists are located in Attachment 8. All facilities are to be inspected on an annual basis at a minimum. A copy of each inspection form shall be kept by the applicant a minimum of 5 years.

Inspection Scoring

For each inspection item, a score is given to identify the urgency for any required maintenance. The scoring is as follows:

- 0 = No deficiencies identified.
- 1 = Monitor – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.
- 2 = Routine Maintenance Required – Some inspection items can be addressed through the routine maintenance program. This can include items like vegetation management or debris/trash removal.
- 3 = Immediate Repair Necessary – This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature (outlet, weir, manhole, etc.), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.

N/A = This is checked by an item that may not exist in a facility. Not all facilities have all of the features identified on the form (outlet, weir, manhole, etc.).

Overall Facility Rating

An overall rating is given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any feature on the inspection form.

C. Verification of Inspection and Checklist Submittal

The Stormwater BMP Inspection and Maintenance Checklist (in Attachment 8) provides a record of inspections and the need for maintenance activities at the facility. Verification of the inspection of the stormwater facilities and the facility inspection checklist(s) shall be available to the City of Oceanside if requested.

VIII. MAINTENANCE SCHEDULE FOR STORMWATER BMPS

A maintenance schedule for the stormwater source control and treatment control BMPs on site is provided in Attachment 9. Attachment 9 includes schedules for routine inspection and maintenance, annual inspection and maintenance, and inspection and maintenance after major storm events.

A service agreement with any contractors hired to perform stormwater treatment control BMP maintenance is also provided in Attachment 10.

I . MAINTAINING STORMWATER BMPS

Stormwater BMPs must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

A. Maintenance Categories

Stormwater BMP maintenance programs are separated into three broad categories of work: routine, restoration, and rehabilitation. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

Routine Work

This work includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as road and parking lot sweeping, weed control, mosquito treatment, and algae treatment. These activities normally will be performed

numerous times during the year. These items can be completed without any prior correspondence; however, inspection and maintenance forms shall be completed.

Restoration Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. These items do not require prior correspondence. However, completed maintenance forms are required.

Rehabilitation Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater BMP. This work requires consultation with the City of Oceanside and may require an engineering design with construction plans to be prepared for review and approval.

B. Maintenance Forms

The Stormwater BMP Inspection and Maintenance Form provides a record of maintenance activities and includes general cost information to assist in budgeting for future maintenance. Maintenance Forms for each facility type are provided in Appendix 3. Maintenance Forms shall be completed by the responsible BMP party. The form shall then be reviewed by the applicant or an authorized agent of the applicant and made available for review upon inspection by the City of Oceanside.

PREVENTATIVE MEASURES TO REDUCE MAINTENANCE COSTS

The most effective way to maintain a stormwater quality facility is to prevent pollutants from entering the facility. Common pollutants include sediment, trash & debris, chemicals, pet wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. This maintenance program includes measures to address these potential contaminants at the source and save time and money in the long run. The maintenance program will consider the following:

- Educate employees and patrons to be aware of how their actions affect water quality and how they can help reduce maintenance costs.
- Keep properties, streets, gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper use, storage, and disposal of hazardous wastes and chemicals. Promptly clean up spilled materials and dispose of properly.

- Plan landscape care to minimize and properly use chemicals and pesticides.
- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Encourage pet owners to clean up pet wastes.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean any private storm drainage system components, including inlets, storm drains, and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

I. INSPECTION MAINTENANCE ANNUAL REPORTING

The tenant is responsible for providing verification that the stormwater treatment control BMPs have been properly inspected and maintained unless otherwise noted. Verification includes records of inspections and maintenance performed on site. Any maintenance required will be identified and described. Records should be available at the City of Oceanside's request.

ATTACHMENT 1

ORGANIZATIONAL CHART

ATTACHMENT 2

TRAINING PROGRAM

ATTACHMENT 3

BMP OPERATION AND MAINTENANCE FUNDING SUPPLEMENTAL INFORMATION

ATTACHMENT 4

LID BMPS INSPECTION FORM

LID BMP INSPECTION FORM

Date:	Inspector:		Weather:		
Reason for Inspection:			Comments:		
LID BMP Type	Description	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
☐ Bioretention			☐ Regularly weed and water during plant establishment phase	☐ No ☐ Yes	
			☐ Area is free of litter and excess sediment	☐ No ☐ Yes	
			☐ Area free of erosion and stabilized	☐ No ☐ Yes	
			☐ Plants are healthy and thriving	☐ No ☐ Yes	
			☐ Plant types are those from original design	☐ No ☐ Yes	
☐ Filter Strips			☐ Regularly weed and water during plant establishment phase	☐ No ☐ Yes	
			☐ Plants are healthy and thriving	☐ No ☐ Yes	
			☐ Area free of erosion and stabilized	☐ No ☐ Yes	
			☐ Area is free of litter and excess sediment	☐ No ☐ Yes	
			☐ Plant types are those from original design	☐ No ☐ Yes	
			☐ Flow spreader is free of debris and is not clogged	☐ No ☐ Yes	

LID BMP INSPECTION FORM

Date:	Inspector:		Weather:		
Reason for Inspection:			Comments:		
LID BMP Type	Description	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
☐ Vegetated Buffers			☐ Regularly weed and water during plant establishment phase	☐ No ☐ Yes	
			☐ Plants are healthy and thriving	☐ No ☐ Yes	
			☐ Area free of erosion and stabilized	☐ No ☐ Yes	
			☐ Area is free of litter and excess sediment	☐ No ☐ Yes	
			☐ Plant types are those from original design	☐ No ☐ Yes	
			☐ Flow spreader is free of debris and is not clogged	☐ No ☐ Yes	
☐ Bioswale/Grassed Swale			☐ Regularly weed and water during plant establishment phase	☐ No ☐ Yes	
			☐ Plants are healthy and thriving	☐ No ☐ Yes	
			☐ Area free of erosion and stabilized	☐ No ☐ Yes	
			☐ Area is free of litter and excess sediment	☐ No ☐ Yes	
			☐ Plant types are those from original design	☐ No ☐ Yes	
☐ Green Roofs			☐ Regularly weed and water during plant establishment phase	☐ No ☐ Yes	

LID BMP INSPECTION FORM

Date:	Inspector:		Weather:		
Reason for Inspection:			Comments:		
LID BMP Type	Description	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
☐ <i>Green Roofs Cont'd</i>			☐ Plants are healthy and thriving	☐ No ☐ Yes	
☐ Rain Barrels / Cisterns			☐ Roof catchment and gutters are free of debris and sediment	☐ No ☐ Yes	
			☐ Downspouts are free of leaks and obstructions	☐ No ☐ Yes	
			☐ Rain barrel, top, and seal are free of leaks	☐ No ☐ Yes	
			☐ Overflow pipe is not causing erosion	☐ No ☐ Yes	
☐ Porous Pavement			☐ Pavement is free of debris and sediment	☐ No ☐ Yes	
			☐ Pavement is swept monthly	☐ No ☐ Yes	
			☐ Pavement is in good condition and stabilized	☐ No ☐ Yes	
			☐ Area is dry swept regularly	☐ No ☐ Yes	
☐ Soil Structure Enhancement (use of compost)			☐ Area is protected from compaction	☐ No ☐ Yes	
			☐ Limited foot traffic	☐ No ☐ Yes	
			☐ 2 to 1 ratio of compost soil and existing soil is present	☐ No ☐ Yes	

ATTACHMENT 5

SOURCE CONTROL BMP INSPECTION FORM

SOURCE CONTROL BMP INSPECTION FORM

Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
☐ On-site storm drain inlets		☐ Maintain and periodically replace inlet markers, if necessary.	☐ No ☐ Yes	
		☐ Review stormwater pollution prevention information applicable to the site.	☐ No ☐ Yes	
		☐ Adhere to applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
		☐ Do 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.	☐ No ☐ Yes	
☐ Interior floor drains and elevator shaft sump pumps		☐ Inspect and maintain drains to prevent blockages and overflow.	☐ No ☐ Yes	
☐ Interior parking garages		☐ Inspect and maintain drains to prevent blockages and overflow.	☐ No ☐ Yes	
☐ Landscape/ Outdoor Pesticide Use		☐ Maintain landscaping using minimum or no pesticides.	☐ No ☐ Yes	
		☐ Review and adhere to applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	

SOURCE CONTROL BMP INSPECTION FORM

Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<i>Landscape/Outdoor pesticide Use Continued</i>		☐ Review IMP information and provide to landscape and maintenance personnel.	☐ No ☐ Yes	
☐ Use efficient irrigation systems		☐ Inspect irrigation system for leaks and/or malfunctions.	☐ No ☐ Yes	
☐ Need for future indoor & structural pest control		☐ Review Integrated Pest Management information and provide to other maintenance personnel.	☐ No ☐ Yes	
☐ Pools, spas, ponds, decorative fountains, and other water features.		☐ Review and adhere to applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
☐ Food service		☐ Grease traps cleaned, as necessary. ☐ See Refuse Areas.	☐ No ☐ Yes	
☐ Refuse areas		☐ Provide adequate number of receptacles.	☐ No ☐ Yes	
		☐ Inspect receptacles regularly; repair or replace leaky receptacles.	☐ No ☐ Yes	
		☐ Keep receptacles covered at all times.	☐ No ☐ Yes	
		☐ Prohibit/prevent dumping of liquid or hazardous wastes.	☐ No ☐ Yes	
		☐ Post "no hazardous materials" signs.	☐ No ☐ Yes	

SOURCE CONTROL BMP INSPECTION FORM				
Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<i>Refuse areas- Continued</i>		☐ Inspect and pick up litter daily and clean up spills immediately.	☐ No ☐ Yes	
		☐ Keep spill control materials available on- site. Review Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
☐ Industrial processes.		☐ Review and adhere to Fact Sheet SC-10, "Non- Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
☐ Outdoor storage of equipment or materials		☐ Review and adhere to 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	☐ No ☐ Yes	
☐ Vehicle and Equipment Cleaning		Follow operational measures to implement the following (if applicable):		
		☐ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.	☐ No ☐ Yes	

SOURCE CONTROL BMP INSPECTION FORM				
Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<i>Vehicle and Equipment Cleaning Continued</i>		☐ Car dealerships and similar may rinse cars with potable water only. Any excess water shall be drained through landscaping and dechlorinated prior to discharge to the storm drain system.	☐ No ☐ Yes	
		☐ Review and adhere to Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
☐ Vehicle/Equipment Repair and Maintenance		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 rinse water from parts cleaning into storm drains.	☐ No ☐ Yes	
		☐ 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 ☐ Yes	

SOURCE CONTROL BMP INSPECTION FORM				
Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
Vehicle/Equipment Repair and Maintenance <i>Continued</i>		☐ No person shall leave unattended drip parts or other open containers of chemicals such as vehicle fluid, unless such containers are in use or in an area of secondary containment.	☐ No ☐ Yes	
☐ Fuel Dispensing Areas		☐ The fueling area is to be dry swept routinely.	☐ No ☐ Yes	
		☐ Review and adhere to the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
		☐ Fueling areas are covered by a canopy.	☐ No ☐ Yes	
		☐ The canopy does not drain onto the fueling area.	☐ No ☐ Yes	
		☐ Grading of the area prevents run-on of stormwater to the maximum extent practicable.	☐ No ☐ Yes	
☐ Loading Docks		☐ Move loaded and unloaded items indoors as soon as possible.	☐ No ☐ Yes	
		☐ Review and adhere to Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	

SOURCE CONTROL BMP INSPECTION FORM				
Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
☐ Fire Sprinkler Test Water		☐ Review the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	☐ No ☐ Yes	
☐ Miscellaneous Drain or Wash Water - Boiler drain lines - Condensate drain lines - Rooftop equipment - Drainage sumps - Roofing, gutters, and trim			☐ No ☐ Yes	
☐ Plazas, sidewalks, and parking lots		☐ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.	☐ No ☐ Yes	

ATTACHMENT 6

SITE MAP

ATTACHMENT 7

AS-BUILT DRAWINGS

ATTACHMENT 8

TREATMENT CONTROL BMP INSPECTION AND MAINTENANCE CHECKLIST(S)

Tree Well Filter INSPECTION AND MAINTENANCE CHECKLIST

Property Address: _____

Property Applicant: _____

Treatment Measure No.: _____

Date of Inspection: _____

Type of Inspection: _____

~ Monthly

~ Pre-Wet Season

~ After heavy runoff

~ End of Wet Season

Inspector(s): _____ Overall Facility Score*: _____

~ Other: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed	Date Complete / Initial
1. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.	
2. Planting Mix	Planting mix too deep or too shallow.			Planting mix is at proper depth for optimum filtration and flow.	
3. Mulch	Mulch is missing or patchy in appearance. Areas of bare earth are exposed, or mulch layer is less than 3 inches in depth.			All bare earth is covered, except mulch is kept 6 inches away from trunks of trees and shrubs. Mulch is even in appearance, at a depth of 3 inches.	
4. Trash and Debris Accumulation	Trash and debris accumulated in the tree well filter. Filter does not drain as specified.			Trash and debris removed from tree well filter and disposed of properly. Filter drains per design specifications.	
5. Sediment	Evidence of sedimentation in tree well filter.			Material removed so that there is no clogging or blockage. Sediment is disposed of properly.	

Tree Well Filter - Inspection and Maintenance Checklist

Property Address: _____

Date of Inspection: _____

Treatment Measure No.: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed	Date Complete / Initial
6. Standing Water	When water stands in the tree well filter between storms and does not drain within five days after rainfall.			There should be no areas of standing water once inflow has ceased. Any of the following may apply: sediment or trash blockages removed, overflow pipe repaired.	
7. Overflow Pipe	Does not safely convey excess flows to storm drain. Piping damaged or disconnected.			Overflow pipe conveys excess flow to storm drain efficiently.	
8. Miscellaneous	Any condition not covered above that needs attention in order for the tree well filter to function as designed.			Meet the design specifications.	

*Overall Facility Score = Worst Score from all Defect Items Noted.

**Scores: 0 = OK, 1 = Monitor, 2 = Routine Maintenance, 3 = Immediate Repair Necessary.

Bioretention Area INSPECTION AND MAINTENANCE CHECKLIST

Property Address: _____

Property Applicant: _____

Treatment Measure No.: _____

Date of Inspection: _____

Type of Inspection: _____

~ Monthly

~ Pre-Wet Season

~ After heavy runoff

~ End of Wet Season

Inspector(s): _____ Overall Facility Score*: _____

~ Other: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed
1. Standing Water	When water stands in the bioretention area between storms and does not drain within five days after rainfall.			There should be no areas of standing water once inflow has ceased. Any of the following may apply: sediment or trash blockages removed, improved grade from head to foot of bioretention area, or added underdrains.
2. Trash and Debris Accumulation	Trash and debris accumulated in the bioretention area.			Trash and debris removed from bioretention area and disposed of properly.
3. Sediment	Evidence of sedimentation in bioretention area.			Material removed so that there is no clogging or blockage. Material is disposed of properly.
4. Erosion	Channels have formed around inlets, there are areas of bare soil, and/or other evidence of erosion.			Obstructions and sediment removed so that water flows freely and disperses over a wide area. Obstructions and sediment are disposed of properly.
5. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.

Bioretention Area - Inspection and Maintenance Checklist

Property Address: _____

Date of Inspection: _____

Treatment Measure No.: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed
6. Mulch	Mulch is missing or patchy in appearance. Areas of bare earth are exposed, or mulch layer is less than 3 inches in depth.			All bare earth is covered, except mulch is kept 6 inches away from trunks of trees and shrubs. Mulch is even in appearance, at a depth of 3 inches.
7. Miscellaneous	Any condition not covered above that needs attention in order for the bioretention area to function as designed.			Meet the design specifications.

*Overall Facility Score = Worst Score from all Defect Items Noted.

**Scores: 0 = OK, 1 = Monitor, 2 = Routine Maintenance, 3 = Immediate Repair Necessary

ATTACHMENT 9

MAINTENANCE SCHEDULE

ATTACHMENT 10

STORMWATER FACILITIES MAINTENANCE AGREEMENT WITH ACCESS RIGHTS AND COVENANTS (SWFMA)

CO
CO O
C O OC
O C O C C
O CO
OC C
above space for recorder's use
O M C M C M
CC CO

Cypress Point subdivision

his M for the maintenance and repair of certain storm water
Management facilities is entered into between _____ Concordia Co _____
hereinafter referred to as O and the City of Oceanside hereinafter referred to as
C for the benefit of the C the O the successors in interest to the C or
the O and the public generally.

C

. O is the owner of certain real property located in the City of
Oceanside California more particularly described in exhibit attached hereto and made
a part of hereinafter referred to as the P OP and has proposed that the
P OP be developed as _____ a unit residential subdivision _____ in
accordance with applications for tentative Map no. _____ 1 1 develop ment Plan
no. _____ Conditional use Permit no. _____ radin
Plan Permit no. _____ which are on file with the C . his
requirement is required as a condition of approval for such development as set forth in
resolution no. _____.

. In accordance with the City of Oceanside's urban runoff regulations
Oceanside City Code Chapter the storm water Ordinance the City of Oceanside
subdivision Ordinance the City of Oceanside zoning Ordinance the City of Oceanside
ordinance and or other ordinances or regulations of C which regulate land
development and urban runoff O has prepared and submitted to C a
storm water quality Mitigation Plan hereinafter referred to as MP which is on file at
the C . the MP proposes that storm water runoff from the P OP be
managed by the use of storm water Management facilities which are identified in the
MP as best Management Practices or BMPs .

he precise location s and e tent of the post construction MPs are indicated in the approved MP dated _____. he MP specifies the manner and standards by which the MP's must be repaired and maintained in order to retain their effectiveness as set forth in the Operation Maintenance Plan hereinafter referred to as O M P . he approved MP and O M P containin any revisions thereto are on file with the C .

C. he infor ation contained in the MP and O 's representations that the MPs will be maintained pursuant to the MP have been relied upon by C in approv O 's develop ent applications. t is the purpose of this ree ent to assure that the MPs are maintained by creatin obli ations which are enforceable a ainst the O and the O 's successors in interest in the P OP . t is intended that these obli ations be enforceable notwithstandin other provisions related to MP aintenance which are provided by law.

M

O O for consideration of a C 's approval of the above develop ent applications and b the utual covenants set forth herein
O O

1. **Maintenance of Stormwater Management Facilities.** O agrees for itself and its successors in interest to all or any portion of the P OP to co ply in all respects with the re uire ents of the tor water Ordinance and the MP with re ards to the aintenance of MPs desi nated in the MP and in particular agrees to perfor at its sole cost e pense and liability the followin M C C all inspections cleanin repairs servicin aintenance and other actions specified in the O M P with respect to all of the MPs listed at ecital above at the ti es and in the manner specified in the O M P . O shall initiate perfor and co plete all M C C at the re uired ti e without re uest or de and fro C or any other a ency. O further agrees that M C C shall include replace ent or odification of the MPs in the event that said MPs do not function as intended. eplace ent shall be with an identical type si e and odel of MP e cept that

a he C n ineer ay authori e substitution of an alternative MP if he or she deter ines that it will function as well or better than the ori inal MP and

b Pursuant to ection . . c of the tor water Ordinance if the failure of the MP in the ud ent of the C n ineer indicates that the MP in use is inappropriate or inad e uate to the circu stances the MP ust be odified or replaced with an up rated MP to prevent future failure.

. **Notices.** O further agrees that it shall prior to transferring ownership of any land on which any of the above MPs are located and also prior to transferring ownership of any such MP provide clear written notice of the above maintenance obligations associated with that MP to the transferee. O further agrees to provide evidence to C that O has requested the California Department of Real Estate to include in the public report issued for the development of the P OP a notification regarding the MP maintenance requirements described herein.

. **CITY'S Right to Perform Maintenance.** It is agreed that C shall have the right but not the obligation to elect to perform any or all of the M C C if in the C's sole judgment O has failed to perform the same. It is recognized and understood that the C makes no representation that it intends to or will perform any of the M C C and any election by C to perform any of the M C C shall in no way relieve O of its continuing maintenance obligations under this agreement. If C elects to perform any of the M C C it is understood that C shall be deemed to be acting as the agent of the O and said work shall be without warranty or representation by C as to safety or effectiveness shall be deemed to be accepted by O as is and shall be covered by O's indemnity provisions below.

If C performs any of the M C C after C has demanded that O perform the same and O has failed to do so within a reasonable time stated in the C's demand then O shall pay all of C's costs incurred in performing the M C C. O's obligation to pay C's costs of performing M C C is a continuing obligation and shall apply whether or not C has utilized all or any portion of the security provided pursuant to Paragraph .

. **CITY'S Access Rights.** O hereby authorizes the C to access perpetually over under and across insert either all of the P OP or that portion of the P OP described in Exhibit hereto for purposes of accessing the MPs and performing any of the M C C specified in Paragraph 1 above. C shall have the right at any time and without prior notice to O to enter upon any part of said area as may be necessary or convenient for such purposes. O shall at all times maintain the P OP so as to assure C's access clear and unobstructed.

. **Security.** O has provided C with non refundable security to assure the faithful performance of the obligations of this agreement. The security is in the form of a Cash deposit in the amount of _____. C may utilize the security to provide funding for the cost of C performing any of the M C C under Paragraph above. C may utilize all or any part of the security at any time pursuant to this agreement. Should any portion of the security be used by C

O or a subsequent Owner as applicable shall deposit additional funds in the amount utilized by C thereby restoring the security to the amount initially deposited by O .

. **Administration of Agreement for CITY.** C hereby designates its engineer as the officer charged with responsibility and authority to administer this agreement on behalf of C. Any notice or communication related to the implementation of this agreement desired or required to be delivered to C shall be addressed to

City Engineer
City of Oceanside
North Coast Highway
Oceanside CA

The City Engineer is also granted authority to enter into appropriate agreements to this agreement on behalf of C provided that the agreement is consistent with the purposes of this agreement as set forth above.

. **Defense and Indemnity.** C shall not be liable for and O and its successors in interest shall defend and indemnify C and the employees and agents of C collectively C P against any and all claims demands liability judgments awards fines mechanic's liens or other liens labor disputes losses damages expenses charges or costs of any kind or character including attorneys' fees and court costs hereinafter collectively referred to as C M related to this agreement and arising either directly or indirectly from any act error omission or negligence of O O's successors or their contractors licensees agents servants or employees including without limitation claims caused by the concurrent negligent act error or omission whether active or passive of C P. O shall have no obligation however to defend or indemnify C P from a claim if it is determined by a court of competent jurisdiction that such claim was caused by the sole negligence or willful misconduct of C P. Nothing in this agreement C's approval of the subdivision or other applications or plans and specifications or inspection of the work is intended to acknowledge responsibility for any such matter and C P shall have absolutely no responsibility or liability therefor unless otherwise provided by applicable law.

. **Common Interest Developments.** If the P OP is developed as a Common Interest Development as defined in Civil Code section 111(c) which will include membership in or ownership of an OC O as defined in Civil Code section 111(a) then the following provisions of this Paragraph shall apply during such time as the P OP is encumbered by a C O as defined in Civil Code section 111(h) and the Common Area as Common Area is defined in Civil Code section 111(b) of the P OP is analyzed and controlled by the OC O

a. The OC O through its board of directors shall assume full responsibility to perform the M C C pursuant to this agreement and shall undertake all actions and efforts necessary to accomplish the M C C including but not limited to levying regular or special assessments against each member of the OC O sufficient to provide funding for the M C C conducting a vote of the membership related to such assessments if required by law. In the event insufficient votes have been obtained to authorize an assessment the OC O shall seek authority from a court of competent jurisdiction for a reduced percentage of affirmative votes necessary to authorize the assessment re-conducting the vote of the membership in order to obtain the votes necessary to authorize an assessment and the OC O shall take all action authorized by the C O or California law to collect delinquent assessments including but not limited to the recording and foreclosure of assessment liens.

b. No provision of the C O nor any other governing document of the OC O or grant of authority to its members shall grant or recognize a right of any member or other person to alter improve maintain or repair any of the P OP in any manner which would impair the functioning of the MPs to analyze drainage or storm water runoff as described in the MP. In the event of any conflict between the terms of this agreement and the C O or other OC O governing documents the provisions of this agreement shall prevail.

. **Agreement Binds Successors and Runs with the PROPERTY.** It is understood and agreed that the terms covenants and conditions herein contained shall constitute covenants running with the land and shall be binding upon the heirs executors administrators successors and assigns of O and C shall be deemed to be for the benefit of all persons owning any interest in the P OP including the interest of C or its successors in the access rights authorized herein. It is the intent of the parties hereto that this agreement may be recorded and shall be binding upon all persons purchasing or otherwise acquiring all or any lot unit or other portion of the P OP who shall be deemed to have consented to and become bound by all the provisions hereof.

1. **OWNER's Continuing Responsibilities Where Work Commenced or Permit Obtained.** Notwithstanding any other provision of this agreement no transfer or conveyance of the P OP or any portion thereof shall in any way relieve O of

or otherwise affect O's responsibilities for installation or maintenance of MPs which may have arisen under the ordinances or regulations of C referred to in recital above or other federal state or C laws on account of O having obtained a permit which creates such obligations or having commenced grading construction or other land disturbance work.

11. **Amendment and Release.** The terms of this agreement may be modified only by a written amendment approved and signed by the City Council or the City Engineer acting on behalf of C and by O or O's successors in interest. This agreement may be terminated and O and the PRO released from the covenants set forth herein by a release which C may execute if it determines that another mechanism will assure the ongoing maintenance of the MPs or that it is no longer necessary to assure such maintenance.

12. **Governing Law and Severability.** This agreement shall be governed by the laws of the State of California. Venue in any action related to this agreement shall be in the Superior Court of the State of California County of San Diego North County Division. In the event that any of the provisions of this agreement are held to be unenforceable or invalid by any court of competent jurisdiction the validity and enforceability of the remaining provisions shall not be affected thereby.

IN WITNESS WHEREOF, the parties hereto for themselves their heirs executors administrators successors and assigns do hereby agree to the full performance of the covenants herein contained and have caused this agreement to be executed by setting hereunto their signatures on the dates indicated below

O	s	C	O	OC
y	_____	y	_____	
	as agent		City Engineer	
ate	_____	ate	_____	
y	_____			
	as agent			
ate	_____	PP	O	O O M

				City Attorney

NOTARY ACKNOWLEDGEMENT MUST BE ATTACHED

City Attorney Mayor Water Facilities Maintenance Recreation OM September 1

ATTACHMENT 11

ANNUAL INSPECTION AND MAINTENANCE REPORTING FORM

**URBAN STORMWATER MITIGATION PLAN REPORTING FORM
ANNUAL INSPECTION AND MAINTENANCE OF TREATMENT CONTROL BMPS
(SIDE A)**

Responsible Party for Inspection Maintenance: _____ Signature: _____
Date: _____ Print Name/Title

Facility Name: _____

BMP Type	Location Lat/Lon or Inlet	Date of Construction	Inspection Date(s)	Condition of BMP Indicate whether the BMP is present and in working condition, requires cleaning or replacement.	Maintenance required (Y/N) If yes, complete reverse side.

* Maintenance is to be carried out as needed and in accordance with approved Operation and Maintenance Plan.

**URBAN STORMWATER MITIGATION PLAN REPORTING FORM
ANNUAL INSPECTION AND MAINTENANCE OF TREATMENT CONTROL BMPS
(SIDE B)**

BMP Type	BMP Location (lat/lon or Inlet)	Date of Maintenance Activity	Description of maintenance performed	If applicable, describe any additional work required.

* Maintenance is to be carried out as needed and in accordance with the City of Oceanside's Operation and Maintenance Plan.

ATTACHMENT 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.



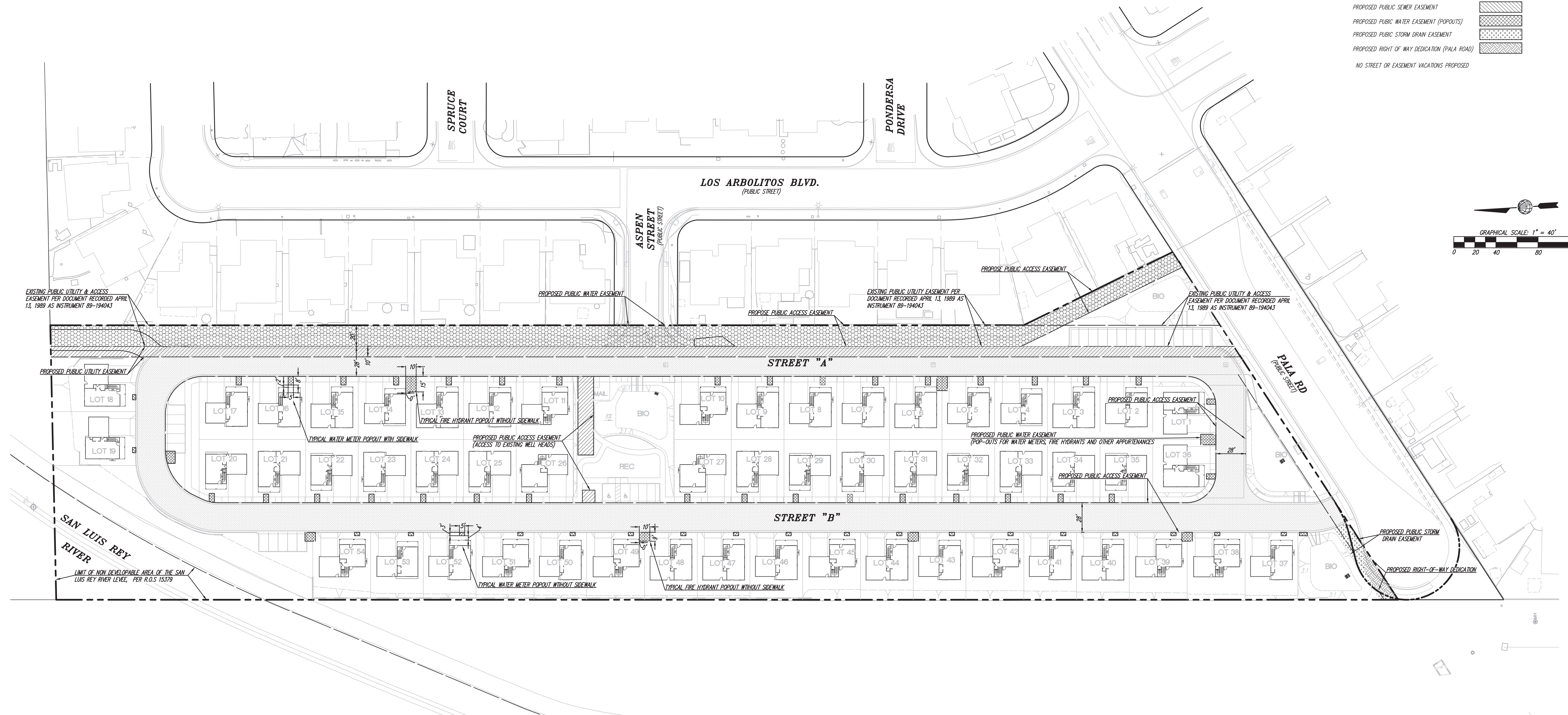
Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☒ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☒ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☒ Details and specifications for construction of structural BMP(s)
- ☒ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☒ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Brochure photocopies are not allowed.



-



PREPARED BY:  OMEGA ENGINEERING CONSULTANTS 43-40 VIEWBRIDGE AVE. SUITE B SAN DIEGO, CA 92123 PH: (619) 634-0620		NO.	REVISIONS	DATE	BY
		SECOND SUBMITTAL		03/29/21	
		FIRST SUBMITTAL		01/05/21	DEC

EASEMENTS AND DEDICATIONS FOR:

CYPRESS POINT

CITY OF OCEANSIDE, CALIFORNIA

SHEET

C-2

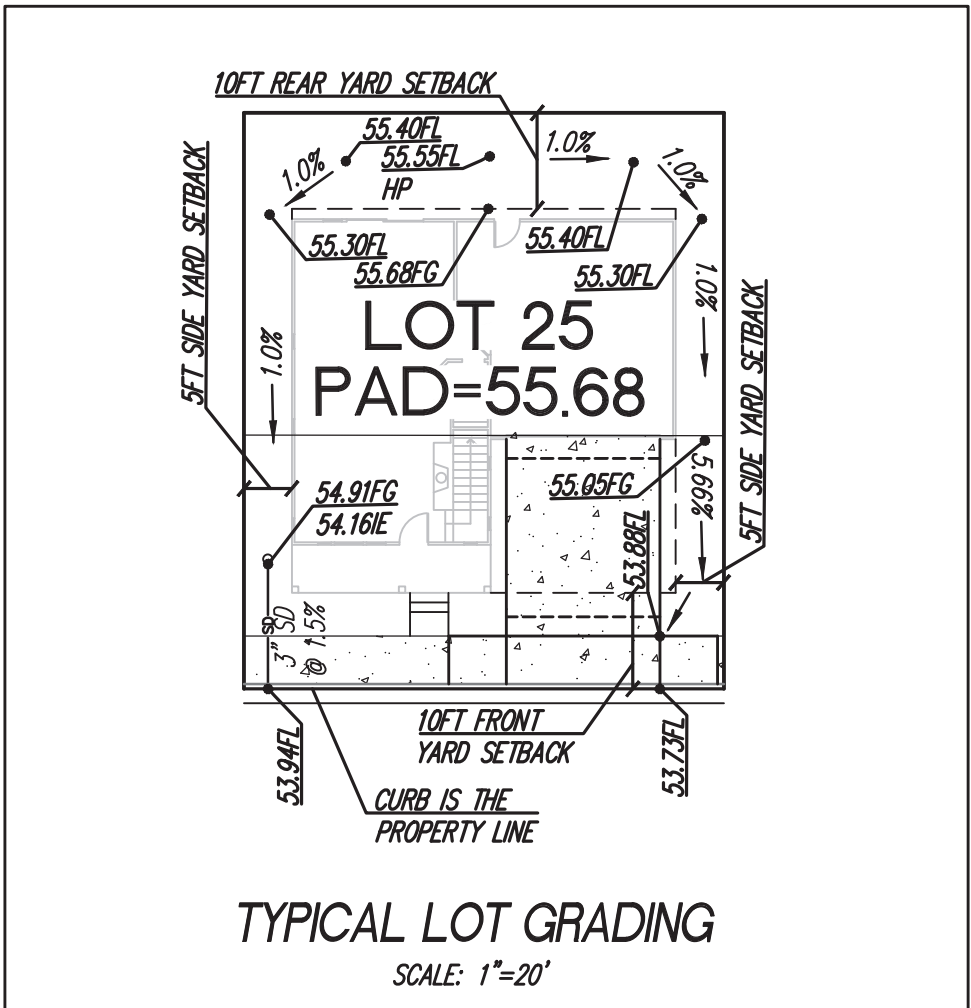
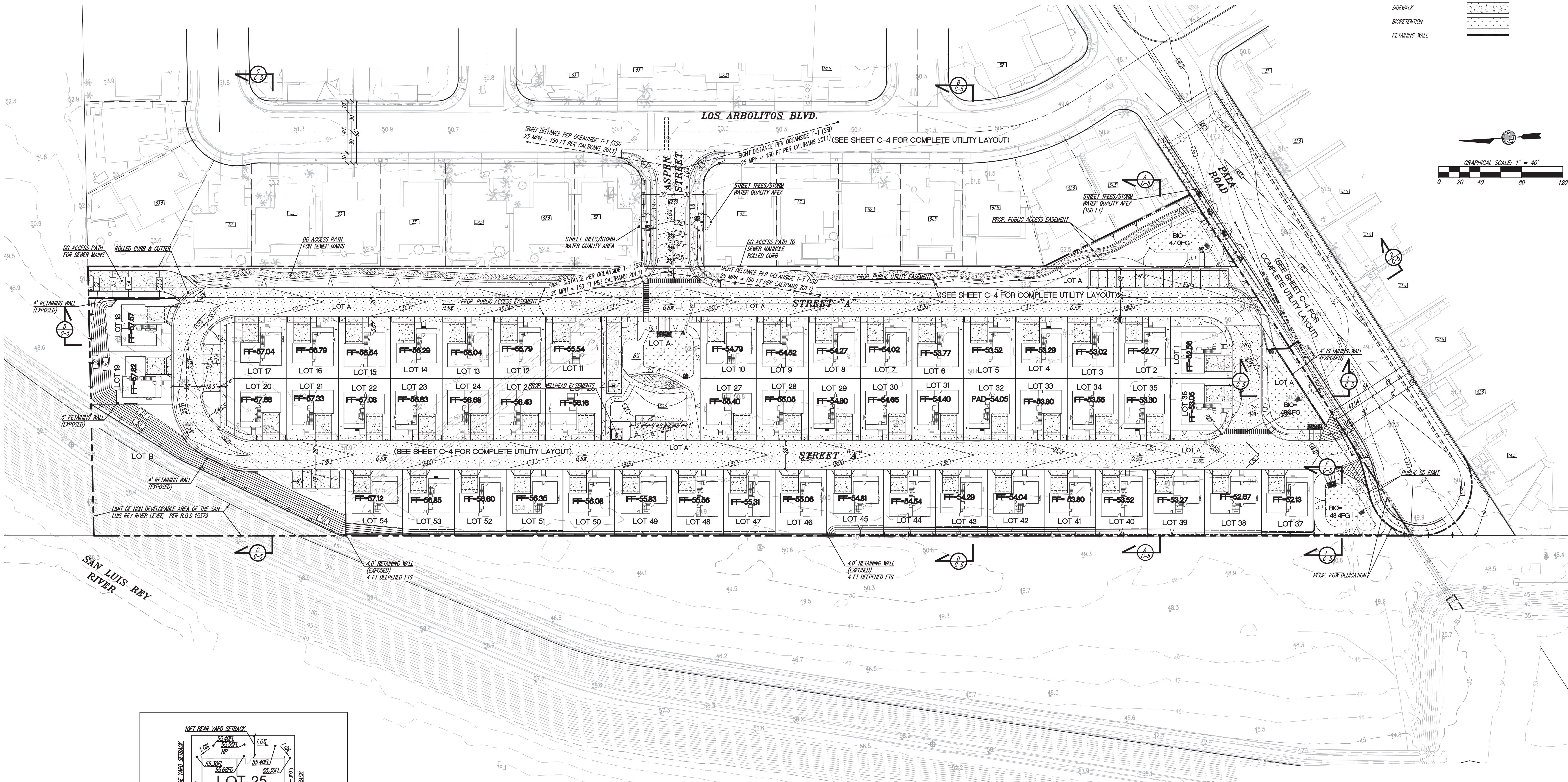
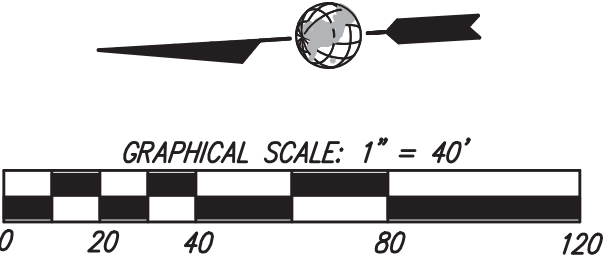
PRELIMINARY GRADING QUANTITIES

GRADED AREA	8.05 [AC]	MAX. CUT DEPTH	6 FT
CUT QUANTITIES	3,139 [CY]	MAX. CUT SLOPE RATIO	2:1 MAX
FILL QUANTITIES	29,898 [CY]	MAX. FILL DEPTH	9.5 FT
UNDERCUT QUANTITIES	7,431 [CY]	MAX. FILL SLOPE RATIO	2:1 MAX
SHRINKAGE QUANTITIES	13,765 [CY]		
IMPORT QUANTITIES	33,093 [CY]		

RETAINING WALLS: 5 TOTAL WALLS, MAX LENGTH = 1,000', MAX HEIGHT = 5' (EXPOSED)
THIS PROJECT PROPOSES TO IMPORT 34,366 CUBIC YARDS OF MATERIAL TO THIS SITE.
ANY EXCESS MATERIAL SHALL BE DISCHARGED TO A LEGAL DISPOSAL SITE. THE
APPROVAL OF THIS PROJECT DOES NOT ALLOW PROCESSING AND SALE OF THE
MATERIAL. ALL SUCH ACTIVITIES REQUIRE A SEPARATE CONDITIONAL USE PERMIT.

CONCEPTUAL GRADING LEGEND

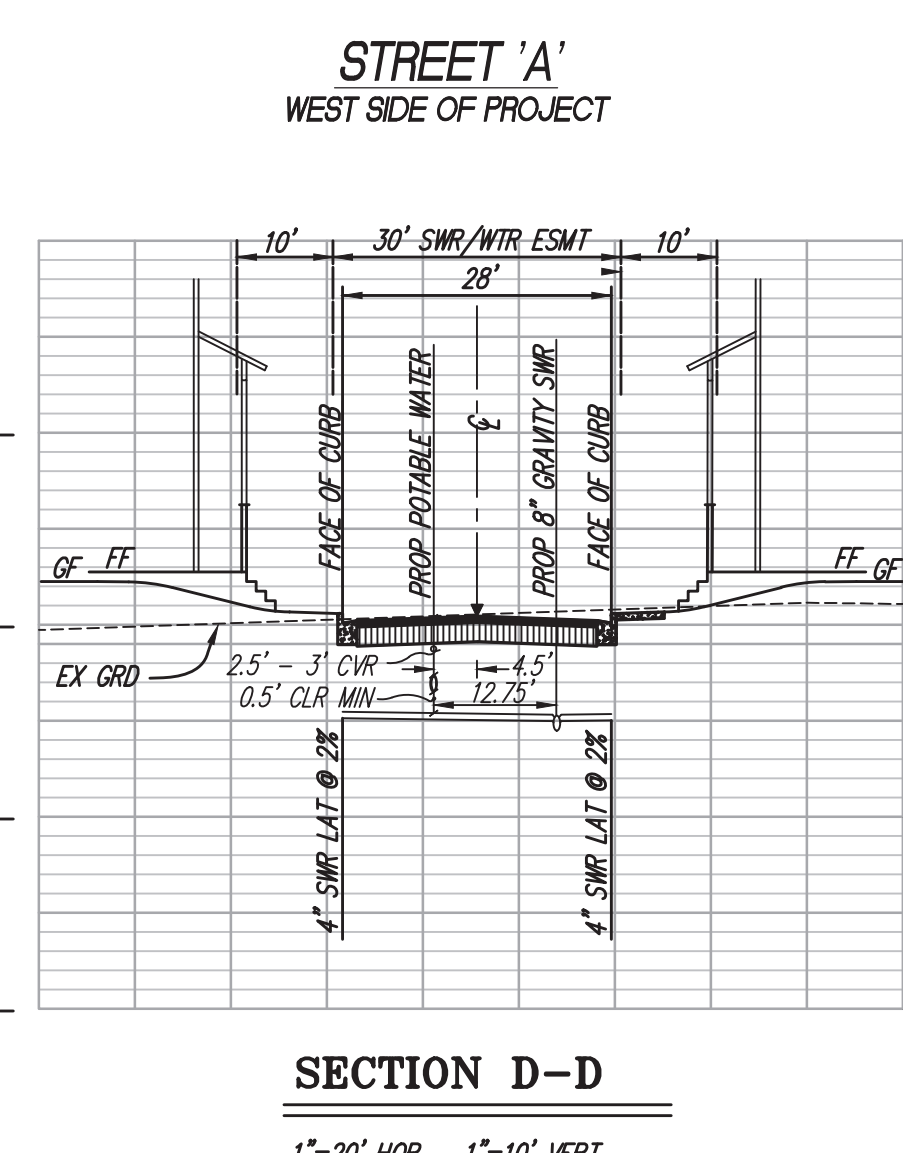
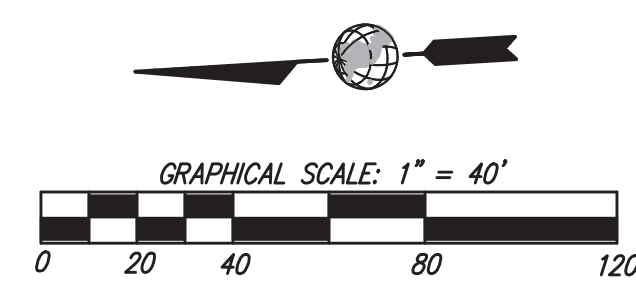
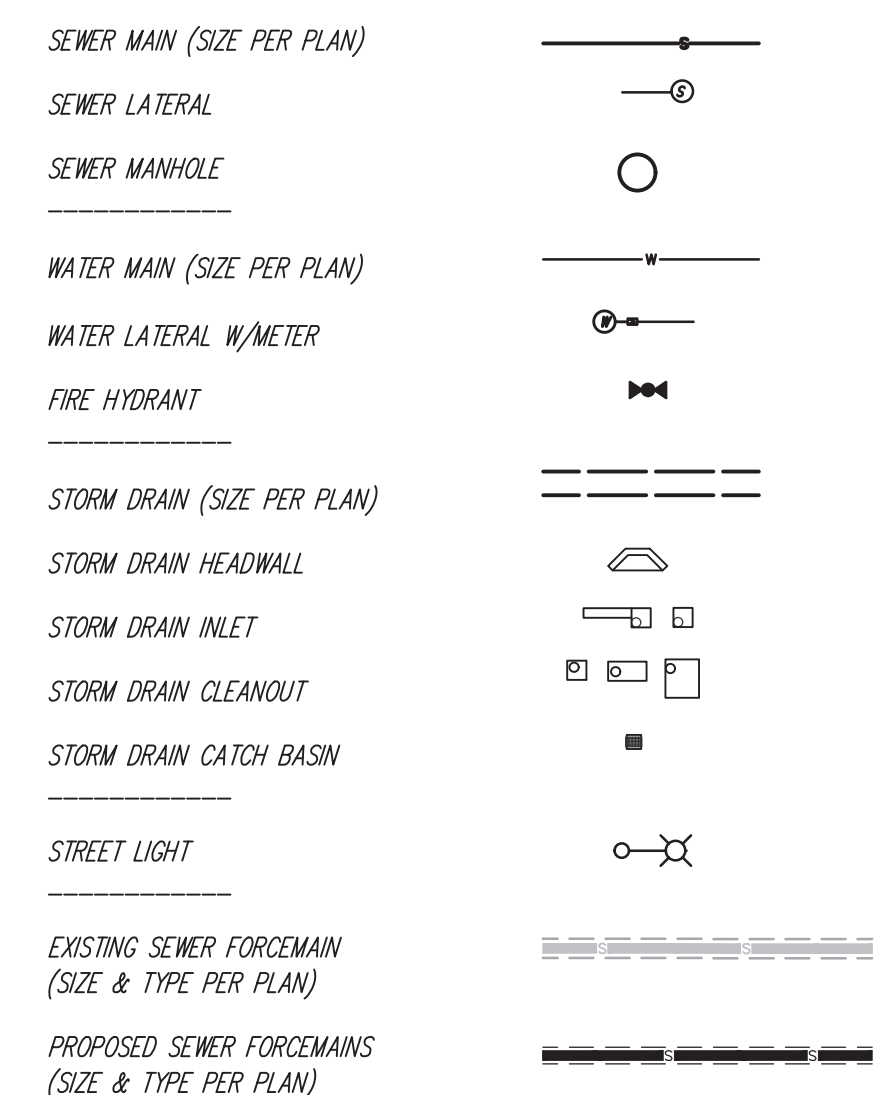
SLOPE	
PROPOSED CONTOUR	
EXISTING CONTOUR	
RIP RAP	
GRADIENT	
DRIVEWAY	
CURB RAMP	
ASPHALT	
DG (WALKING)	
DG (ROADWAY)	
SIDEWALK	
BIORETENTION	
RETAINING WALL	



DATE: 3/15/2021 4:51:39 PM

FILENAME: P:\ONE OMEGA\0071 LAS ARBOLITOS SUB\0201\TENTATIVE MAP\0071-TM-02-GRADING.dwg

PREPARED BY:	NO. REVISIONS	DATE BY
 OMEGA ENGINEERING CONSULTANTS 4340 VIEWBRIDGE AVE. SUITE B SAN DIEGO, CA 92123 PH: (619) 634-8620		
	SECOND SUBMITTAL	03/15/21
	FIRST SUBMITTAL	01/05/21 DEC
CONCEPTUAL GRADING PLAN FOR:		SHEET
CYPRESS POINT		C-3
CITY OF OCEANSIDE, CALIFORNIA		



DESIGN EXCEPTIONS

GENERAL

1. THE LOCATION OF THE SEWER, WATER AND STORM DRAIN MAINS (PUBLIC OR PRIVATE) SHALL BE AS SHOWN HEREON AND THE STANDARD LOCATIONS PER THE CITY STANDARDS WILL NOT APPLY FOR ON-SITE OR OFF-SITE SEWER MAINS.
2. THE HORIZONTAL MINIMUM SEPARATION OF THE SEWER MAINS TO OTHER SEWER MAINS AND STORM DRAIN MAINS SHALL BE 4.0 FT MINIMUM (OUTSIDE OF PIPE TO OUTSIDE OF PIPE).

EASEMENTS:

1. THE ON-SITE EASEMENT FOR THE PUBLIC WATER MAIN SHALL BE CURB TO CURB WITH POP OUT EASEMENTS FOR THE WATER METERS, FIRE HYDRANTS AND OTHER MISCELLANEOUS APPURTENANCES. MINIMUM DROP IN STRUCTURES SHALL BE 0.1 FT
2. MINIMUM CLEARANCE OF STORM DRAIN TO SEWER MAINS SHALL BE 0.5 FT.
3. THE OUTSIDE EDGE OF BUILDING FOOTINGS AND OVERHANGS SHALL BE A MINIMUM OF 2 FT FROM THE EDGE OF THE WATER EASEMENT.

WATER:

1. MINIMUM COVER OVER MAINS OR LATERALS SHALL BE 30" (2.5 FT)
2. FIRE HYDRANT VALVES SHALL BE ALLOW TO BE IMMEDIATELY ADJACENT TO THE EDGE OF THE CONCRETE GUTTER.
3. MINIMUM CLEARANCE BETWEEN THE WATER MAIN AND HOUSE SEWER LATERALS SHALL BE 0.5 FT.

SEWER:

1. THE LOCATION OF THE SEWER MAINS SHALL BE AS SHOWN HEREON AND THE STANDARD LOCATIONS ON-PER THE CITY STANDARDS WILL NOT APPLY FOR ON-SITE OFF-SITE SEWER MAINS.
2. THE MINIMUM MINIMUM SEPARATION OF THE SEWER MAINS TO OTHER SEWER MAINS AND STORM DRAIN MAINS SHALL BE 4.0 FT MINIMUM (OUTSIDE OF PIPE TO OUTSIDE OF PIPE).
3. SLOPE SEWER MAINS SHALL BE ALLOWED TO BE 0.35% MINIMUM. THE MINIMUM SLOPE OF 1.5% TO ACHIEVE A VELOCITY OF 2.0 FPS WILL NOT BE REQUIRED.
4. MINIMUM DEPTH OF SEWER MAINS SHALL BE 4.0 FT MINIMUM. DEPTH IN MANHOLES SHALL BE 0.7 FT FOR BOTH STRAIGHT THROUGH AND 90 DEGREE TURNS. SEWER LATERAL RISE AT THE MAIN SHALL BE 0.5 FT MINIMUM.
5. SEWER LATERAL AT CURB/PROPERTY LINE SHALL BE 4.0 FT.
6. SEWER MANHOLES SHALL BE ALLOWED IN AREAS OF FLOODING.
7. MINIMUM CLEARANCE BETWEEN THE WATER MAIN AND THE SEWER LATERAL SHALL BE 0.5 FT.

STORM DRAIN:
1. MANHOLE CLOSE

1. MINIMUM SLOPE OF THE STORM DRAIN SHALL BE 0.3%
2. MINIMUM DROP IN STRUCTURES SHALL BE 0.1 FT
3. MINIMUM CLEARANCE OF STORM DRAIN TO SEWER MAINS SHALL BE 0.5 FT.

PREPARED BY:



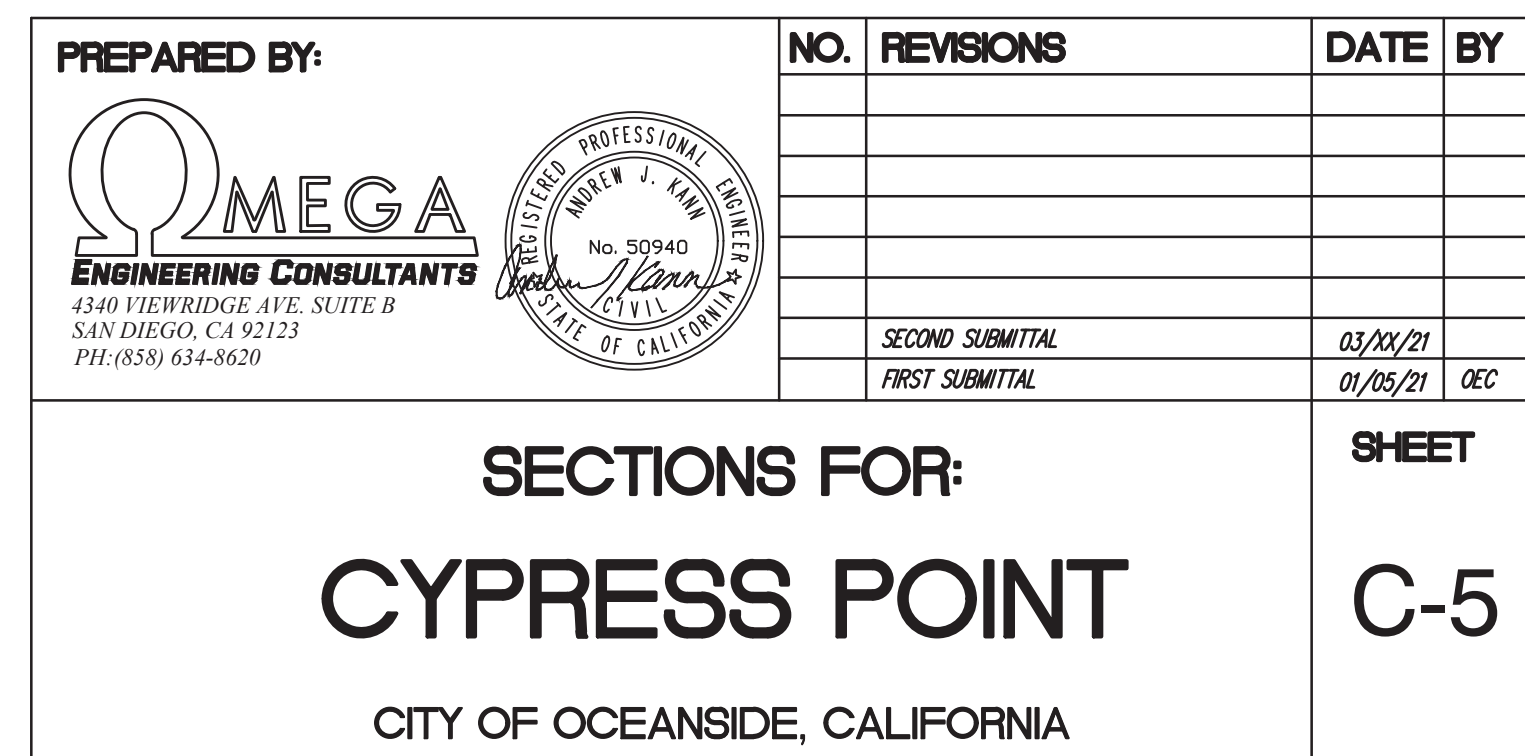
NO.	REVISIONS	DATE	BY
	SECOND SUBMITTAL	03/09/21	
	FIRST SUBMITTAL	01/05/21	DEC

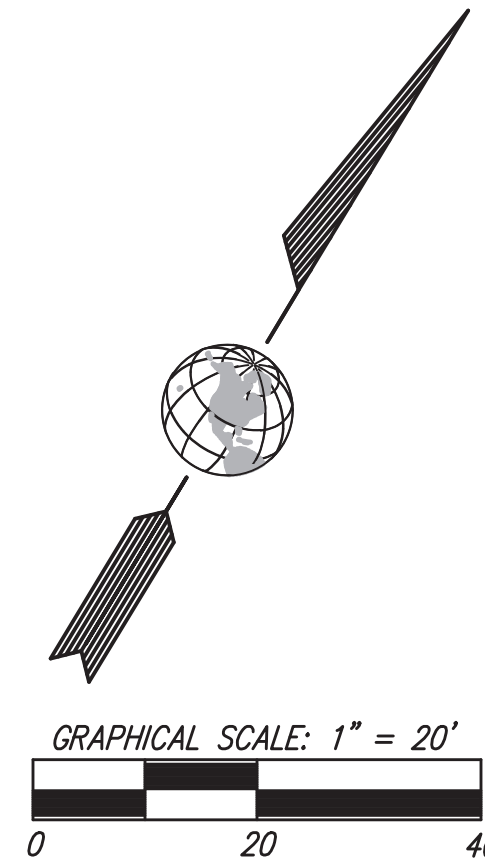
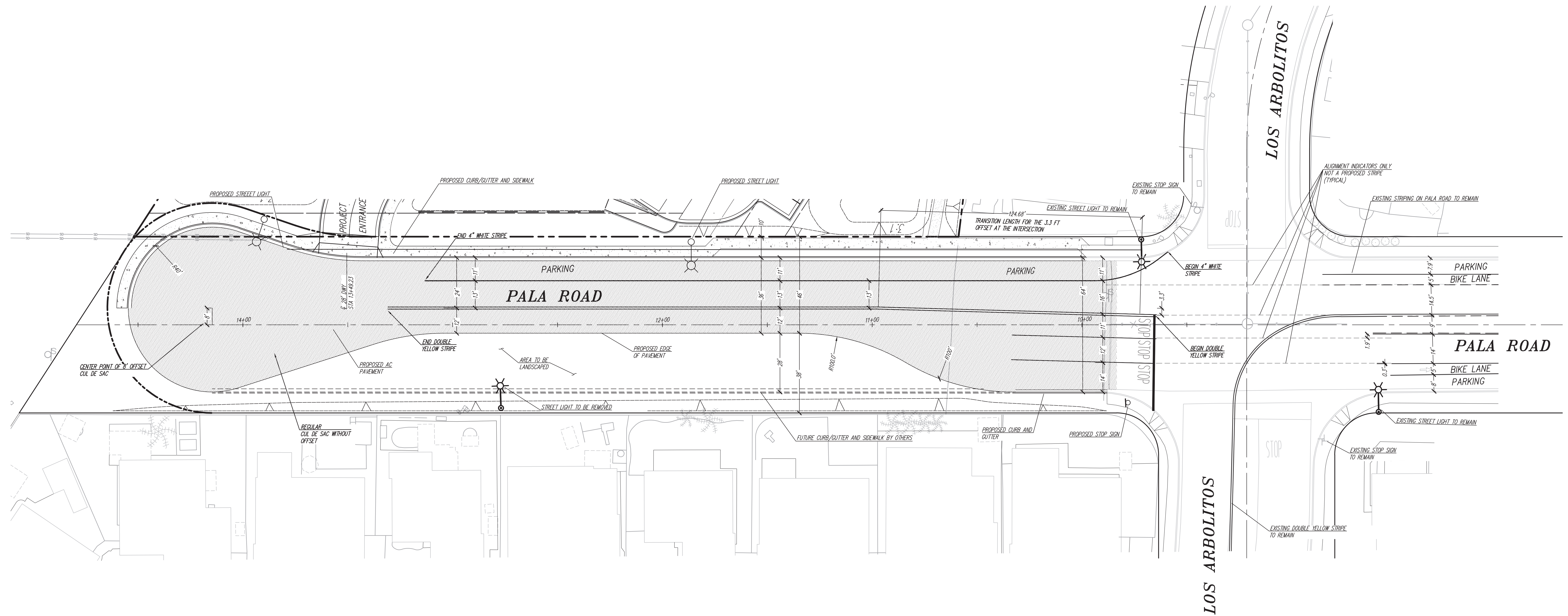
CONCEPTUAL UTILITY PLAN FOR:

CYPRESS POINT

CITY OF OCEANSIDE, CALIFORNIA

C-4





PREPARED BY:		NO.	REVISIONS	DATE	BY
 OMEGA ENGINEERING CONSULTANTS 4340 VIEWBRIDGE AVE. SUITE B SAN DIEGO, CA 92123 PH: (658) 634-8620					
PALA ROAD		SECOND SUBMITTAL		03/01/21	
CYPRESS POINT		FIRST SUBMITTAL		01/05/21	DEC
CITY OF OCEANSIDE, CALIFORNIA					SHEET
					C-7

BF-1

Biofiltration

BMP MAINTENANCE FACT SHEET FOR STRUCTURAL BMP BF-1 BIOFILTRATION

Biofiltration facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Biofiltration facilities have limited or no infiltration. They are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Typical biofiltration components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

BF-1

Biofiltration

Other Special Considerations

Biofiltration is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, routine maintenance is key to preventing this scenario.

BF-1

Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	- Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. - Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	- Inspect monthly and after every 0.5-inch or larger storm event. - Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	- Inspect annually. - Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	- Inspect monthly. - Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	- Inspect monthly. - Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	- Inspect monthly. - Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	- Inspect monthly. - Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as $\frac{1}{4}$ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

BF-1

Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION (Continued from previous page)		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	- Inspect monthly. - Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	- Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	- Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	- Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.
Underdrain clogged	Clear blockage.	- Inspect if standing water is observed for longer than 24-96 hours following a storm event. - Maintenance when needed.

BF-1

Biofiltration

References

American Mosquito Control Association.

<http://www.mosquito.org/>

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.

<https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>

County of San Diego. 2014. Low Impact Development Handbook.

<http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html>

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet BF-1.

http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

BF-1

Biofiltration

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BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:		Responsible Party Name and Phone Number:
Property Address of BMP:		Responsible Party Address:

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 1 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 2 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 3 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 4 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

BF-1

Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 5 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Standing water in BMP for longer than 24-96 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

SD-1

Tree Wells

BMP MAINTENANCE FACT SHEET FOR SITE DESIGN BMP SD-1 TREE WELLS

Tree wells as site design BMPs are trees planted in configurations that allow storm water runoff to be directed into the soil immediately surrounding the tree. The tree may be contained within a planter box or structural cells. The surrounding area will be graded to direct runoff to the tree well. There may be features such as tree grates, suspended pavement design, or shallow surface depressions designed to allow runoff into the tree well. Typical tree well components include:

- Trees of the appropriate species for site conditions and constraints
- Available growing space based on tree species, soil type, water availability, surrounding land uses, and project goals
- Entrance/opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression)
- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Normal Expected Maintenance

Tree health shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the tree well as designed. That is, the opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression) shall not be blocked, filled, re-graded, or otherwise changed in a manner that prevents storm water from draining into the tree well. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

Tree wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected maintenance described above ensures the BMP functionality. If changes have been made to the tree well entrance / opening such that runoff is prevented from draining into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well, or a surface depression has been filled so runoff flows away from the tree well), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the tree well as designed.

Surface ponding of runoff directed into tree wells is expected to infiltrate/evapotranspire within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils surrounding the tree. Loosen or replace the soils to restore drainage.

SD-1

Tree Wells

Other Special Considerations

Site design BMPs, such as tree wells, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the [City Engineer] may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the [City Engineer] to determine requirements.

SD-1

Tree Wells

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR SD-1 TREE WELLS		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Tree health	Routine actions as necessary to maintain tree health.	- Inspect monthly. - Maintenance when needed.
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	- Inspect monthly. - Maintenance when needed.
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health	Loosen or replace soils surrounding the tree to restore drainage.	- Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any standing water from the tree well to nearby landscaping. Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water).	- Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. - Maintenance when needed
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well)	Make repairs as appropriate to restore drainage into the tree well.	- Inspect monthly. - Maintenance when needed.

SD-1

Tree Wells

References

American Mosquito Control Association.

<http://www.mosquito.org/>

County of San Diego. 2014. Low Impact Development Handbook.

<http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html>

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet SD-1.

http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

SD-1

Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 1 of 2			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Dead or diseased tree Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased tree ☐ Replace per original plans ☐ Other / Comments:		
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Loosen or replace soils surrounding the tree to restore drainage ☐ Other / Comments:		

SD-1

Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 2 of 2			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Disperse any standing water from the tree well to nearby landscaping ☐ Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water) ☐ Other / Comments:		
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make repairs as appropriate to restore drainage into the tree well ☐ Other / Comments:		

ATTACHMENT 5
Drainage Report

This is the cover sheet for Attachment 5.



Cypress Point Subdivision Drainage Study

Los Arbolitos Boulevard and Pala Road

Date Prepared:

March 19, 2021

Prepared for:

Concordia Homes
380 Stevens Avenue, Suite 307
Solana Beach, CA 92075

Prepared By:



4340 Viewridge Ave, Suite B
San Diego, CA 92113
Ph: (858) 634-8620

Declaration of Responsible Charge:

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards. I understand that the check of the project drawings and specifications by the City of Oceanside is confined to a review only and does not relieve me, as an engineer of work, of my responsibilities for project design.


Patric T. de Boer RCE 83583
Registration Expires 3-31-2023



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100-yr 6-hr Storm Isopluvial Map	Appendix 2
100-yr 24-hr Storm Isopluvial Map.....	Appendix 3
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Site & Project Description

This drainage study has been prepared for the development of vacant lot at the west end of Pala Road.

The project will involve the regrading of the 7.28 acre site, and the construction 54 single family homes. The project will also include four biofiltration basins, for stormwater quality and Hydromodification Compliance.

The project will also extend Pala Road to a proposed cul-de-sac at the southeast corner of the site. The project will include storm drains on and off -site to intercept runoff and convey it to a discharge point to a vegetated basin adjacent to San Luis Rey River.

Offsite runoff currently enters the site from the Aspen Street and Pala Road. Private and public storm drains will intercept this flow and convey it through the site to the discharge point.

Methodology

This drainage report has been prepared in accordance with current City of Oceanside regulations and procedures. The Modified Rational Method was used to determine the peak flowrates generated by the existing and proposed site conditions. The flowrates generated by sub-basins were confluenced according to the junction equations as detailed on page 3-24 of the San Diego County Hydrology Manual.

Initial Time of Concentration was determined via Table 3-2 of the County Hydrology Manual. Travel Time was determined via the Kirpich Formula for natural drainage areas. For developed drainage areas, the Travel Time was determined by the specific pipe hydraulics, or when applicable, the Gutter and Roadway Discharge Velocity Chart from the San Diego County Hydraulic Design Manual.

See the attached calculations for particulars. The following references have been used in preparation of this report:

- (1) Handbook of Hydraulics, E.F. Brater & H.W. King, 6th Ed., 1976.
- (2) County of San Diego Hydrology Manual, 2003

Existing Conditions

The existing site is a bare, pad with no permanent improvements. Ground surface conditions consist of seasonal grasses and shrubs. Onsite drainage is overland flow and concentrated natural flow.

Runoff from the residential area to the west flows onto the site at the dead-end of Aspen Street. It then flows across the site in a graded channel and enters a concrete drainage channel that runs along the east side of the site, discharging to a vegetated area adjacent to San Luis Rey River

Runoff from Pala road enters the site immediately south of the intersection of Los Arbolitos Boulevard and Pala Road. This runoff flows east across the undeveloped right-of-way and discharges to the same vegetated area as the onsite flows.

The County of San Diego Soil Hydrologic Group Map indicates Group 'A' Soil on the site, but the entire site has a layer of artificial fill. As a conservative measure the soils onsite are assumed to be Type 'D'.

The project is in a Special Flood Hazard Area, as designated by the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) map number 06073C0752G.

Proposed Conditions

In the proposed conditions, 54 single family homes will be constructed. Onsite areas will surface drain to the proposed private streets, and then to one of four onsite biofiltration BMPs. The BMPs will drain via a private storm drain system.

Flow from offsite areas that drain to the site will be intercepted and conveyed through the site. Runoff from offsite tributary areas and onsite areas will confluence in the proposed storm drain under Pala Road and will be discharged via a 60" storm drain to a headwall located at the existing point of discharge southwest of the site.

Existing Rational Analysis

The existing area of analysis was modeled as 8 separate basins, 4 onsite, and 4 offsite. Basins O-1 and O-2 contain the neighborhood immediately east of the site. This runoff enters the site at the dead end of Aspen Street. Basins O-3 and O-4 contain areas that drain to both sides of Pala Road extending east of the site for approximately 1/2 mile. This project does not propose changes within Basins O-1 through O-4.

Basins E-1, E-2, E-3 are entirely onsite. Basin E-4 contains the offsite extension of Pala road.

C values were determined using table 3-1 of the county hydrology manual, included as Appendix 5 of this report. The initial time of concentration (Ti) and maximum overland flow length (Lm) were determined using Table 3-2 of the Hydrology Manual. Travel Time (Tt) was determined via the kirpich method, Manning's Equation for Pipes, and the Gutter and Roadway Discharge Velocity Chart. The 100-yr, 6-hr storm depth (P6) was determined using the isopluvial map included as Appendix 2 of this report.

The total time of concentration was determined by adding the Ti value to the travel time (Tt).

$$T_c = T_i + T_t$$

The T_c and the P_6 values were entered into the peak intensity formula from page 3-7 of the hydrology manual to determine the intensity of the rainfall during the peak of the 100-year, 6-hr storm.

$$I = 7.44 \times P_6 \times T_c^{-0.645}$$

$$I = 7.44 \times 3.6 \times 8.0^{-0.645}$$

The peak discharge rate was determine using the Rational Method Formula.

$$Q = C \times I \times A$$

Below is a summary of the input data for the 100-year, 6- hour storm.

Existing Rational Calculation Summary

Basin	Impervious %	C	Area (ac)
E-1	0	0.35	1.65
E-2	0	0.35	1.17
E-3	0	0.35	3.95
E-4	0	0.35	0.64
O-1	50	0.63	8.72
O-2	50	0.63	0.63
O-3	50	0.63	25.17
O-4	50	0.63	31.88

The peak flowrates determined for each basin were conflued according to the junction equations from page 3-24 of the San Diego County Hydrology Manual.

Junction Equations:

$$T_1 < T_2 < T_3$$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2$$

$$Q_{T2} = Q_2 + \frac{I_1}{I_2} Q_1$$

The conflued flowrate from all basins is 93.11 cfs

Proposed Rational Analysis

The proposed site was modeled as 11 separate basins. 7 onsite basins, and the same 4 offsite basins that were included in the existing analysis. The proposed basins are referred to as P-1.1, P-1.2, P-1.3, P-1.4, P-1.5, P-1.6 and P-2.1.

The average slope of the basins varies from 0.5% to 0.7%. Weighted runoff coefficients vary from 0.35 to 0.83 The initial time of concentration (T_i) and maximum overland flow length (L_m) were

determined using Table 3-2 of the Hydrology Manual. The total time of concentration was determined by adding the T_i value to the travel time (T_t). T_t was calculated by determining the flow velocity in the gutters and storm drains and dividing the travel length by the velocity.

The time of concentration, peak intensity and the peak flowrate were determined using the same formulas and methods as in the existing conditions. Below is a summary of the input data and resulting flowrates generated by each basin for the 100-year, 6-hr storm.

Proposed Rational Calculation Summary

Basin	Impervious %	C	Area (ac)
P-1.1	59	0.68	0.91
P-1.2	0	0.35	0.21
P-1.3	58	0.67	0.92
P-1.4	67	0.72	2.73
P-1.5	87	0.83	0.53
P-1.6	60	0.68	1.75
P-2.1	0	0.35	0.37
O-1	50	0.63	8.72
O-2	50	0.63	0.63
O-3	50	0.63	25.17
O-4	50	0.63	31.88

The peak flowrates determined for each basin were confluent according to the junction equations from page 3-24 of the San Diego County Hydrology Manual.

Junction Equations:

$$T_1 < T_2 < T_3$$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2$$

$$Q_{T2} = Q_2 + \frac{I_1}{I_2} Q_1$$

The confluent, unmitigated peak runoff at the discharge point is 107.40 cfs. This is an increase of 14.29 cfs over existing conditions.

Results and Conclusions

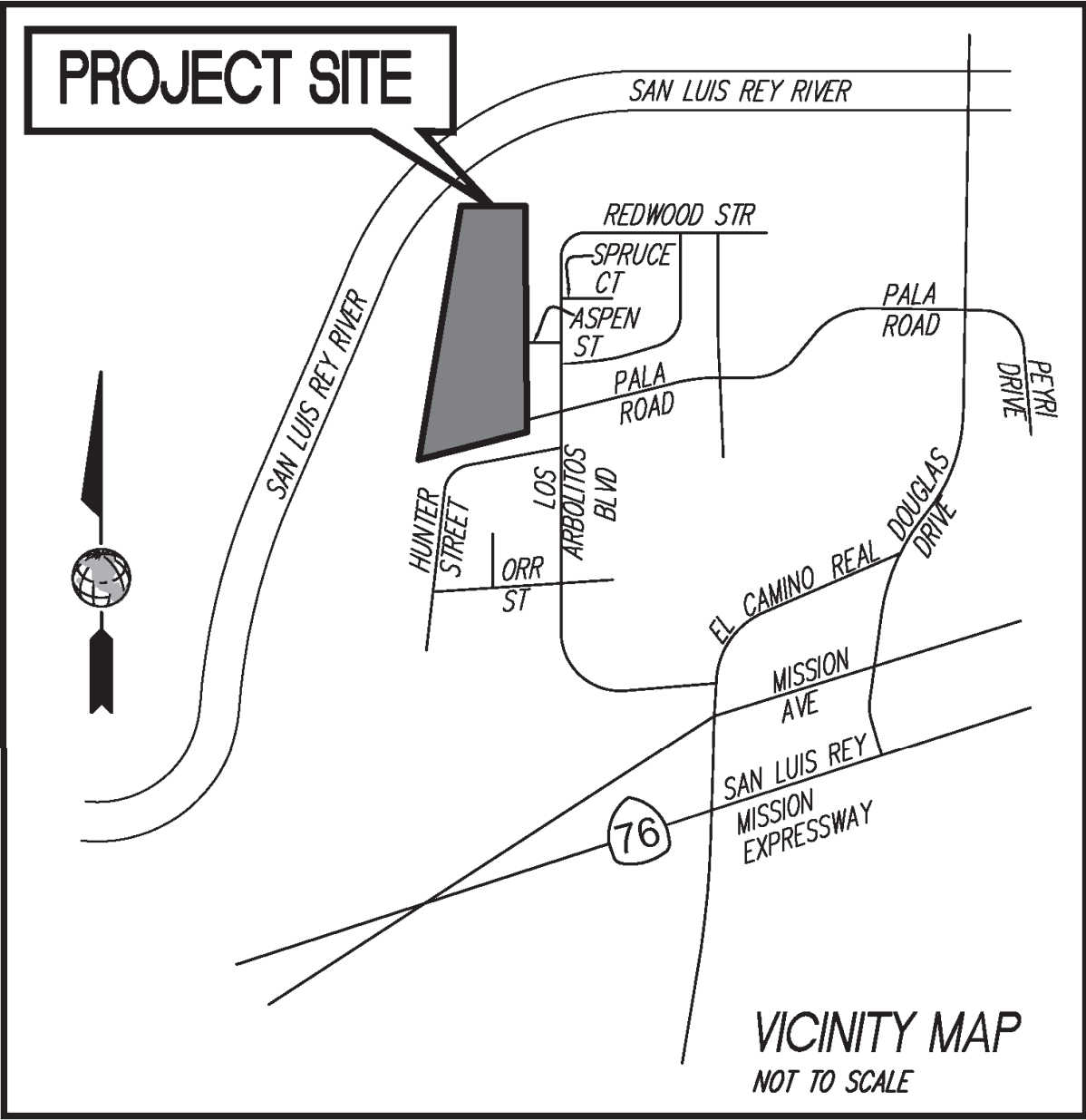
The proposed improvements result in an increase in the peak runoff flowrate generated by the area of analysis by approximately 15%.

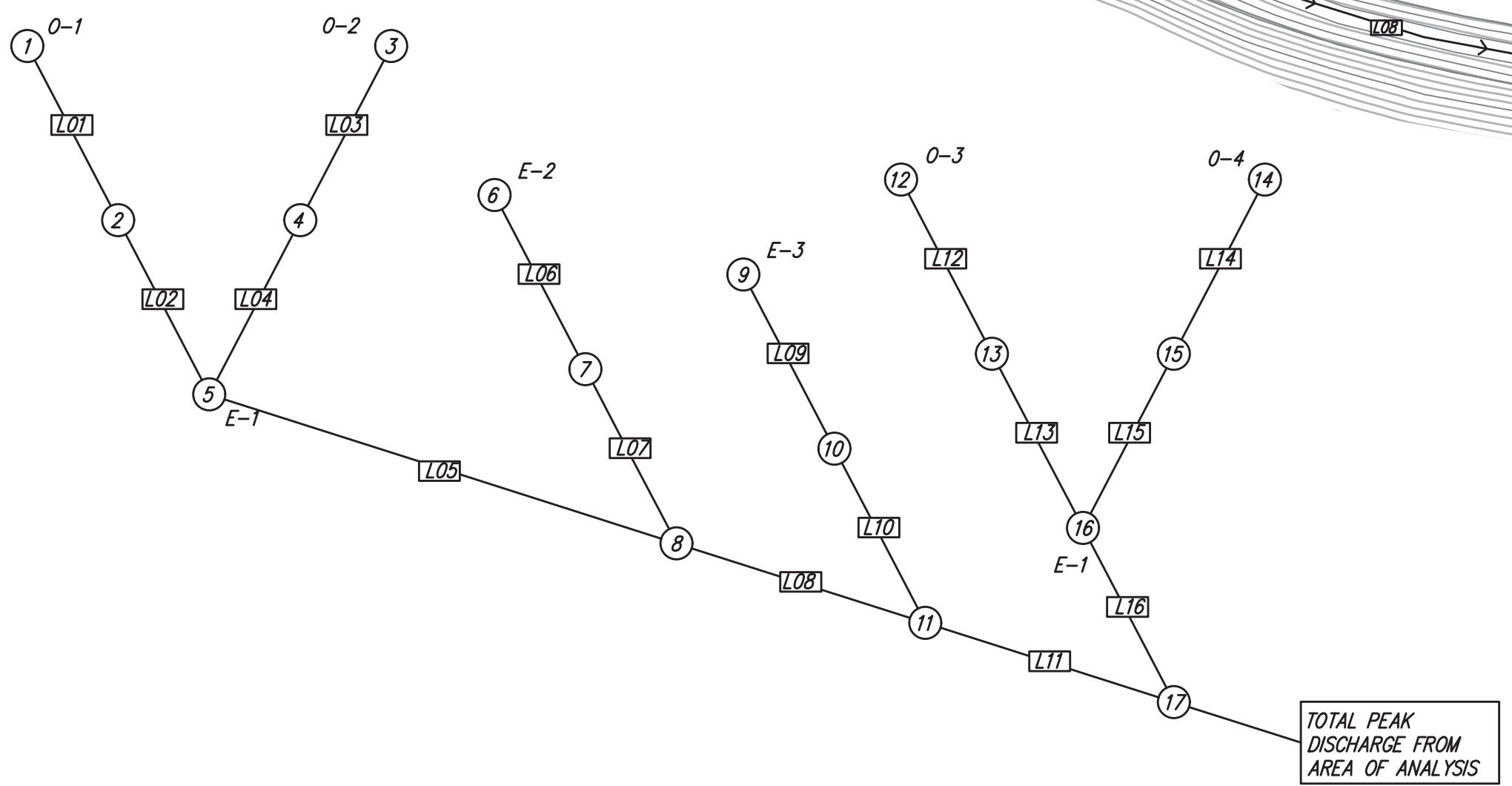
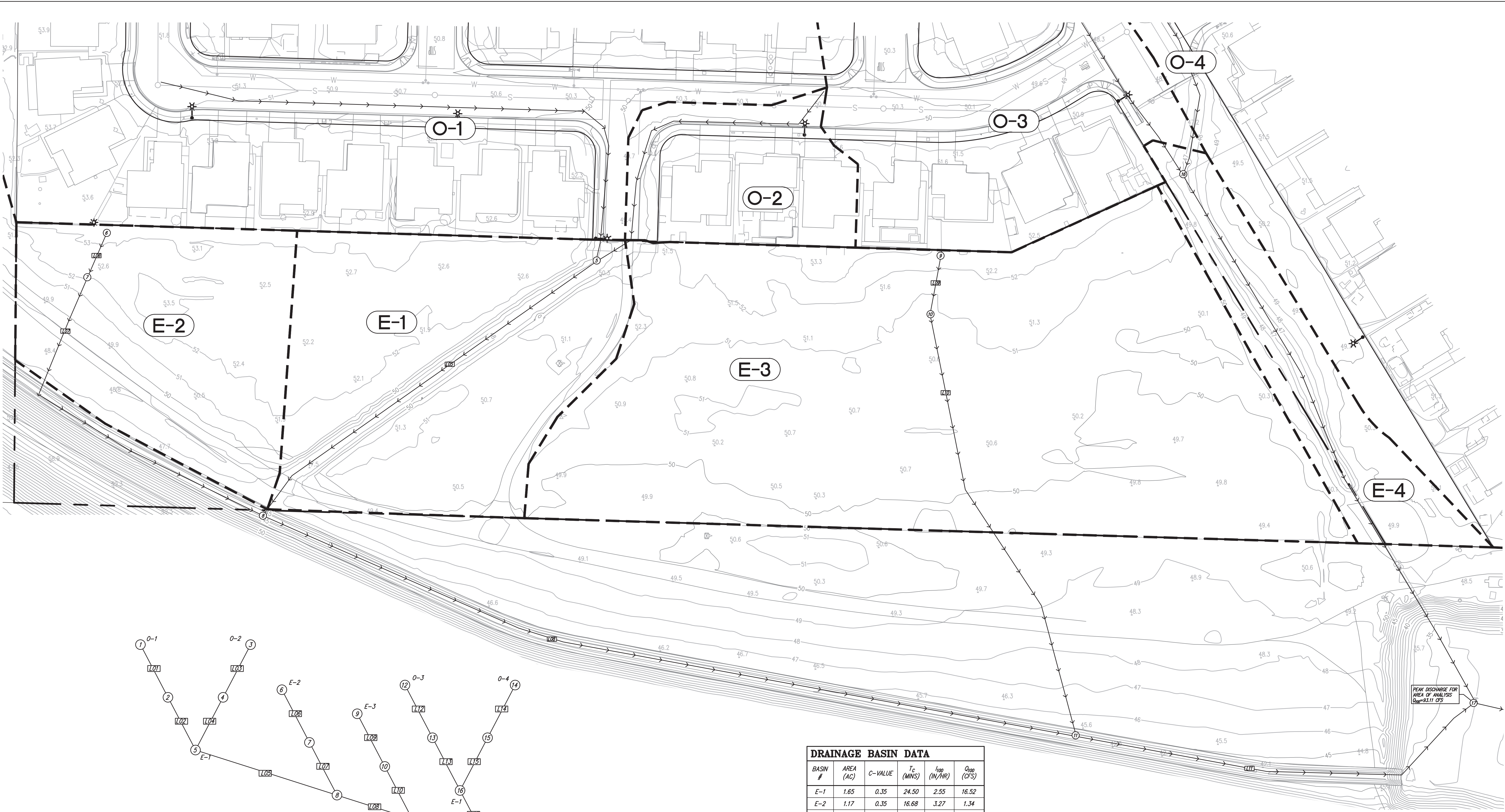
This increase is not anticipated to create adverse downstream conditions, as all the proposed storm drains are designed with sufficient capacity to convey the flow to the outfall location.

No negative effects to downstream water ways are anticipated as a result of the increased flow during the peak of the 100 year storm. The outfall of the proposed 60" storm drain will have an invert that is below the 100-year flood elevation (per the FEMA Flood Profile for San Luis Rey River)

It is the opinion of Omega Engineering Consultants that the project will not cause flow related adverse effects to the downstream facilities or receiving waters during the peak of the 100-yr, 6-hr storm. A separate Storm Water Quality Management Plan has been prepared to discuss the water quality impacts for the proposed development.

Project Vicinity Map

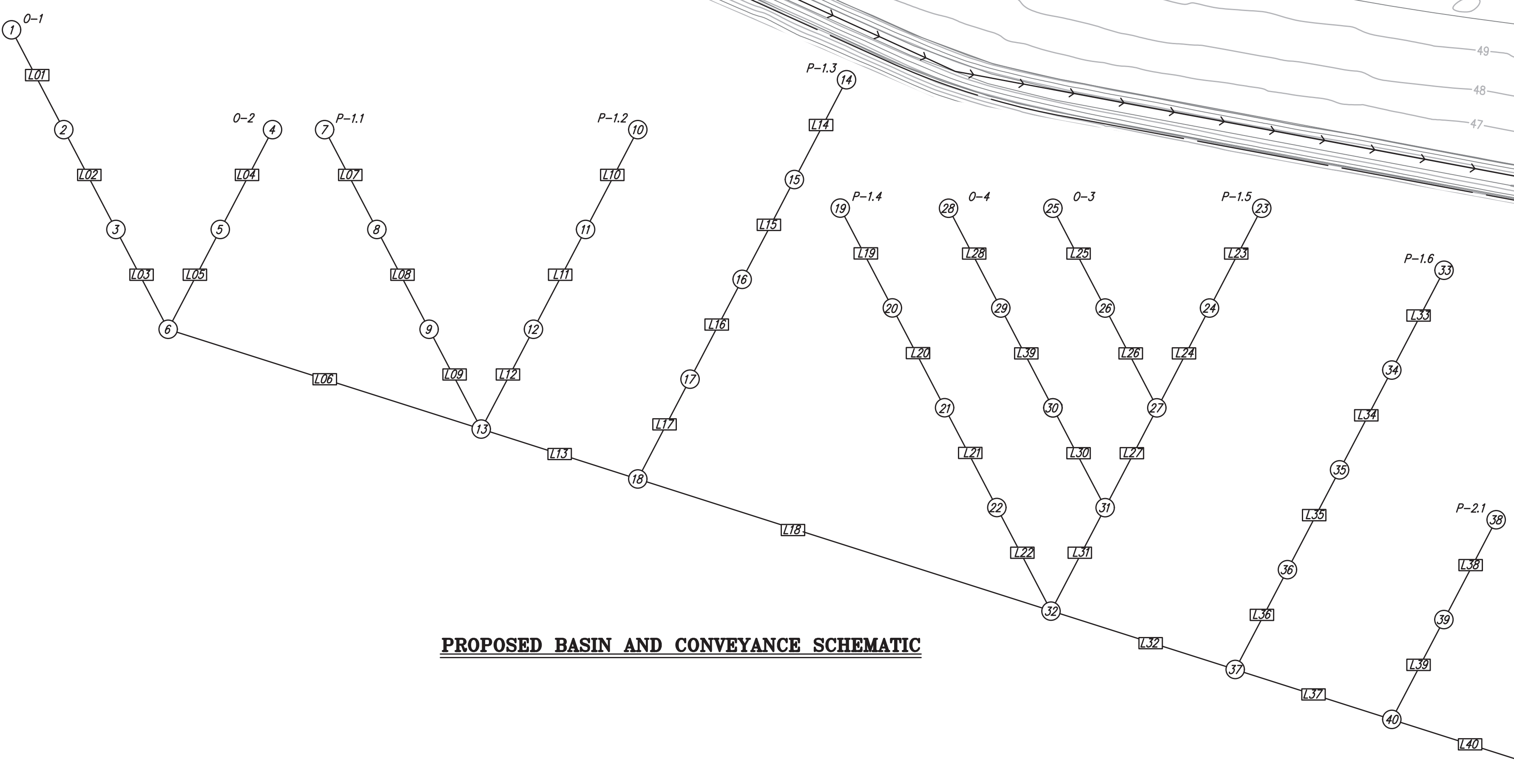
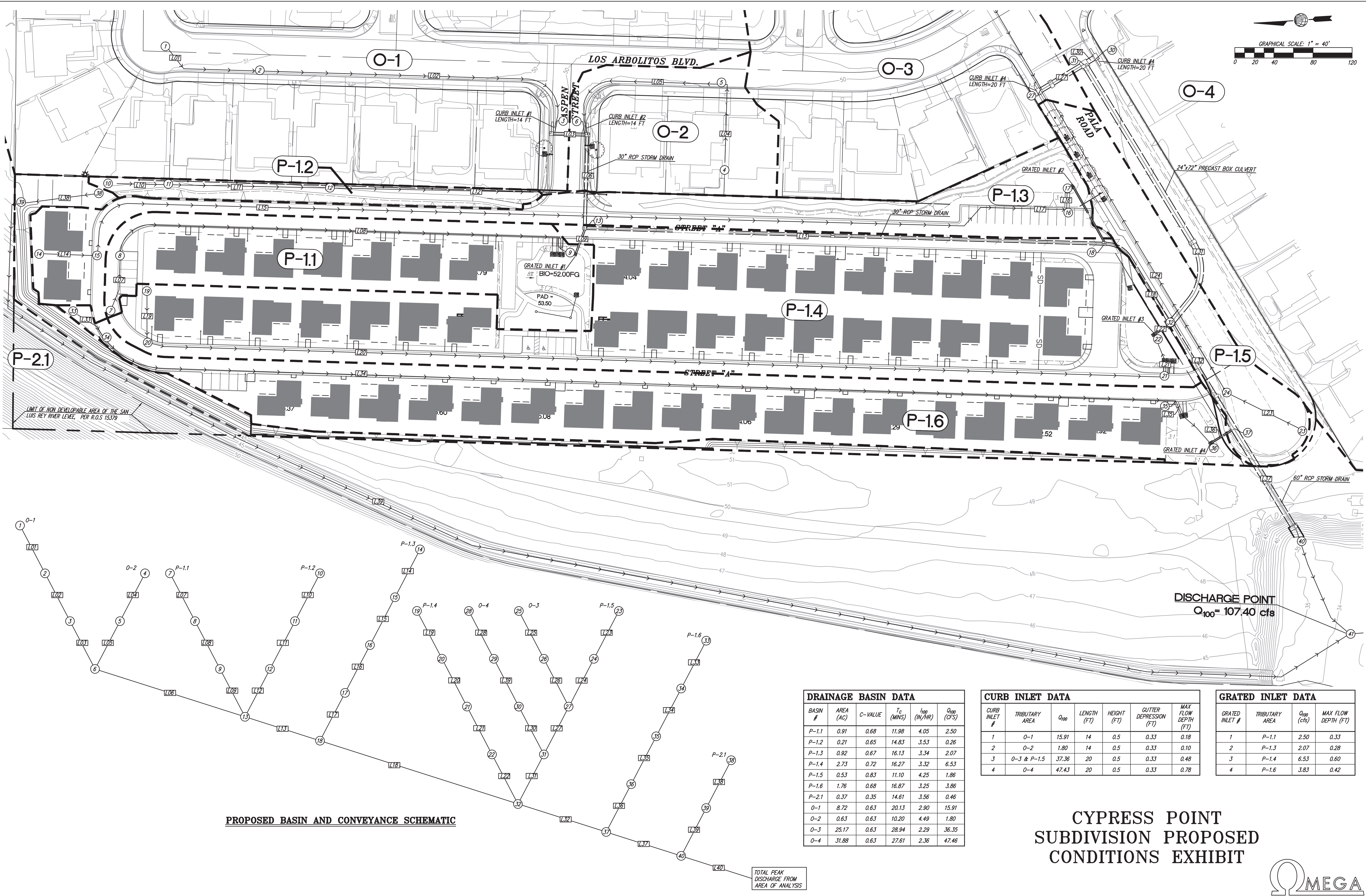




DRAINAGE BASIN DATA					
BASIN #	AREA (AC)	C-VALUE	T _c (MINS)	100 (IN/HR)	Q ₁₀₀ (CFS)
E-1	1.65	0.35	24.50	2.55	16.52
E-2	1.17	0.35	16.68	3.27	1.34
E-3	3.95	0.35	14.67	3.55	4.91
E-4	0.64	0.35	32.71	2.12	76.60
O-1	8.72	0.63	20.13	2.90	15.91
O-2	0.63	0.63	10.20	4.49	1.80
O-3	25.17	0.63	28.94	2.29	36.35
O-4	31.88	0.63	27.61	2.36	47.46

EXISTING BASIN AND CONVEYANCE SCHEMATIC

CYPRESS POINT
SUBDIVISION EXISTING
CONDITIONS EXHIBIT



PROPOSED BASIN AND CONVEYANCE SCHEMATIC

DRAINAGE BASIN DATA					
BASIN #	AREA (AC)	C-VALUE	T _c (MINS)	I ₁₀₀ (IN/HR)	Q ₁₀₀ (CFS)
P-1.1	0.91	0.68	11.98	4.05	2.50
P-1.2	0.21	0.65	14.83	3.53	0.26
P-1.3	0.92	0.67	16.13	3.34	2.07
P-1.4	2.73	0.72	16.27	3.32	6.53
P-1.5	0.53	0.83	11.10	4.25	1.86
P-1.6	1.76	0.68	16.87	3.25	3.86
P-2.1	0.37	0.35	14.61	3.56	0.46
O-1	8.72	0.63	20.13	2.90	15.91
O-2	0.63	0.63	10.20	4.49	1.80
O-3	25.17	0.63	28.94	2.29	36.35
O-4	31.88	0.63	27.61	2.36	47.46

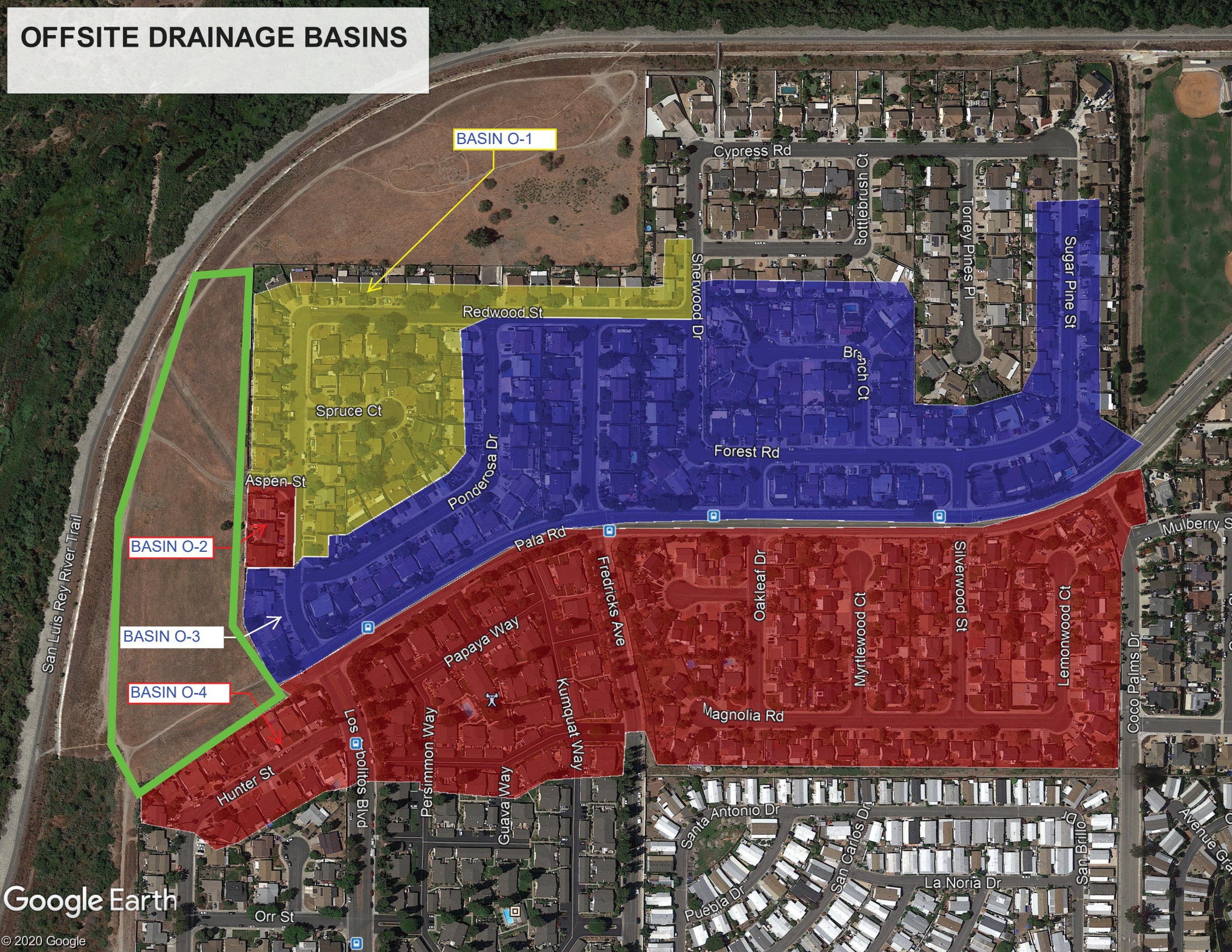
CURB INLET DATA					
CURB INLET #	TRIBUTARY AREA	Q ₁₀₀	LENGTH (FT)	HEIGHT (FT)	GUTTER DEPRESSION (FT)
1	O-1	15.91	14	0.5	0.33
2	O-2	1.80	14	0.5	0.33
3	O-3 & P-1.5	37.36	20	0.5	0.33
4	O-4	47.43	20	0.5	0.33

GRATED INLET DATA			
GRATED INLET #	TRIBUTARY AREA	Q ₁₀₀ (cfs)	MAX FLOW DEPTH (FT)
1	P-1.1	2.50	0.33
2	P-1.3	2.07	0.28
3	P-1.4	6.53	0.60
4	P-1.6	3.83	0.42

CYPRESS POINT
SUBDIVISION PROPOSED
CONDITIONS EXHIBIT



OFFSITE DRAINAGE BASINS



**CYPRESS POINT SUBDIVISION
EXISTING CONDITIONS**

12/23/2020

Sub-Basin	Upstream Node	Downstream Node	AREA Ac.	C	ΣA	CA	ΣCA	S(%) (avg.)	Ti mins	Tt mins	T _c mins	ΣT mins	I in/hr	Q cfs	Conduit V (fps)	Conduit L (ft)	Conduit T (mins)	NOTES 100-year, 6 hr storm
																		P(6) 2.7
O-1	1	2							8.20									Link 01 - Overland flow
	2	5	8.72	0.63	8.72	5.49	5.49	0.5%		11.93	20.13	20.13	2.90	15.91				Link 02 - Gutter Flow
O-2	3	4							8.20									Link 03 - Overland flow
	4	5	0.63	0.63	0.63	0.40	0.40	0.5%		2.00	10.20	10.20	4.49	1.80				Link 04 - Gutter Flow
					9.35		5.89					20.13	2.90	17.07				Confluence at Node 5
E-1									0.00									
	5	8	1.65	0.35	11.01	0.58	6.47	1.1%		4.37		24.50	2.55	16.52				Flow through basin, Tt and CA added to incoming flow. Tt per Kirpich
E-2	6	7							12.50									Link 06 - Overland flow
	7	8	1.17	0.35	1.17	0.41	0.41	1.0%		4.18	16.68	16.68	3.27	1.34				Link 07 - Kirpich Flow
					12.18		6.88					24.50	2.55	17.56				Confluence at Node 8
	8	11			12.18		6.88			7.50		32.00	2.15	14.78				Link 08 - Kirpich Flow
E-3	9	10							10.90									
	10	11	3.95	0.35	3.95	1.38	1.38	1.7%		3.77	14.67	14.67	3.55	4.91				
					16.13		8.26					32.00	2.15	17.76				Confluence at Node 11
	11	17			16.13		8.26			3.82		35.82	2.00	16.51				Link 08 - Kirpich Flow
O-3	3	4							8.20									Link 12 - Overland flow
	4	5	25.17	0.63	25.17	15.86	15.86	0.5%		20.74	28.94	28.94	2.29	36.35				Link 13- Gutter Flow
O-4	3	4							8.20									Link 14 - Overland flow
	4	5	31.88	0.63	31.88	20.08	20.08	0.5%		19.41	27.61	27.61	2.36	47.46				Link 15- Gutter Flow
					57.05		35.94					28.94	2.29	82.39				Confluence at Node 16

CYPRESS POINT SUBDIVISION EXISTING CONDITIONS

12/23/2020

[illegible]

**CYPRESS POINT SUBDIVISION
PROPOSED CONDITIONS**

3/22/2021

Sub-Basin	Upstream Node	Downstream Node	AREA Ac.	C	ΣA	CA	ΣCA	S(%) (avg.)	Ti mins	Tt mins	Tc mins	ΣT mins	I in/hr	Q cfs	Conduit V (fps)	Conduit L (ft)	Conduit T (mins)	NOTES 100-year, 6 hr storm
																		P(6) 2.7
O-1	1	2							8.20									Link 01 - Overland flow
	2	3	8.72	0.63	8.72	5.49	5.49	0.5%		11.93	20.13	20.13	2.90	15.91				Link 02 - Gutter Flow
	3	6			8.72		5.49			0.11		20.23	2.89	15.86	4.97	32	0.11	Link 03 - 24" pipe
O-2	4	5							8.20									Link 04 - Overland flow
	5	6	0.63	0.63	0.63	0.40	0.40	0.5%		2.00	10.20	10.20	4.49	1.80				Link 05 - Gutter Flow
					9.35		5.89					20.23	2.89	17.01				Confluence at Node 7
	6	12			9.35		5.89			0.30		20.54	2.86	16.85	5.04	92	0.30	Link 06 - 24" pipe
P-1.1	7	8							8.20									Link 07 - Overland flow
	8	9	0.91	0.68	0.91	0.62	0.62	0.4%		3.78	11.98	11.98	4.05	2.50				Link 08 - Gutter Flow
	9	13			0.91		0.62			0.11		12.08	4.03	2.49	3.15	20	0.11	Link 09 - 18" pipe
P-1.2	10	11							8.20									Link 10 - Overland flow
	11	12	0.21	0.35	0.21	0.07	0.07	0.5%		6.63	14.83	14.83	3.53	0.26				Link 11 - Kirpich Flow
	12	13			0.21		0.07			2.41		17.24	3.20	0.23	1.87	270	2.41	Link 12 - 8" pipe
					10.47		6.58					20.54	3.53	18.80				Confluence at Node 13
	13	18			10.47		6.58			1.49		22.03	2.73	17.99	5.14	461	1.49	Link 13 - 30" pipe
P-1.3	14	15							8.20									Link 14 - Overland flow
	15	16	0.92	0.67	0.92	0.62	0.62	0.5%		7.93	16.13	16.13	3.34	2.07				Link 15 - Gutter Flow
	16	17			0.92		0.62			0.07		16.19	3.33	2.06	3.03	12	0.07	Link 16 - 18" pipe
	17	18			0.92		0.62			0.28		16.47	3.30	2.04	3.03	50	0.28	Link 17 - 18" pipe
					11.40		7.20					22.03	3.33	19.68				Confluence at Node 18
	18	32			11.40		7.20			0.93		22.96	2.66	19.16	5.21	290	0.93	Link 18 - 30" pipe

**CYPRESS POINT SUBDIVISION
PROPOSED CONDITIONS**

3/22/2021

Sub-Basin	Upstream Node	Downstream Node	AREA Ac.	C	ΣA	CA	ΣCA	S(%) (avg.)	Ti mins	Tt mins	T _c mins	ΣT mins	I in/hr	Q cfs	Conduit V (fps)	Conduit L (ft)	Conduit T (mins)	NOTES 100-year, 6 hr storm		
																			P(6)	2.6
P-1.4	19	20							8.20											Link 19 - Overland flow
	20	21	2.73	0.72	2.73	1.97	1.97	0.5%		8.07	16.27	16.27	3.32	6.53						Link 20 - Gutter Flow
	21	22			2.73		1.97			0.08		16.36	3.31	6.51	4.05	20	0.08			Link 21 - 18" pipe
	22	32			2.73		1.97			0.12		16.48	3.30	6.48	4.04	30	0.12			Link 22 - 18" pipe
P-1.5	23	24							8.20											Link 23 - Overland flow
	24	27	0.53	0.83	0.53	0.44	0.44	0.5%		2.90	11.10	11.10	4.25	1.86						Link 24 - Gutter Flow
O-3	25	26							8.20											Link 25 - Overland flow
	26	27	25.17	0.63	25.17	15.86	15.86	0.5%		20.74	28.94	28.94	2.29	36.35						Link 26 - Gutter Flow
					25.70		16.30					28.94	2.29	37.36						Confluence at Node 27
	27	31			25.70		16.30			0.11		29.05	2.29	37.26	7.41	50	0.11			Link 27 - 24"x72" box
O-4	28	29							8.20											Link 28- Overland flow
	29	30	31.88	0.63	31.88	20.08	20.08	0.5%		19.41	27.61	27.61	2.36	47.46						Link 29 - Gutter Flow
	30	31			31.88		20.08			0.03		27.64	2.36	47.43	5.99	10	0.03			Link 30 - 24"x72" box
					57.58		36.38					27.64	2.36	84.69						Confluence at Node 31
	31	32			57.58		36.38			1.17		28.81	2.30	83.64	5.99	422	1.17			Link 32 - 60" box
					71.71		45.55					28.81	2.30	104.71						Confluence at Node 23
P-1.6	33	34							8.20											Link 33- Overland flow
	34	35	1.75	0.68	1.75	1.19	1.19	0.6%		8.67	16.87	16.87	3.25	3.86						Link 34 - Gutter Flow
	35	36			1.75		1.19			0.02		16.89	3.24	3.86	3.56	5	0.02			Link 35 - 18" pipe
	36	37			1.75		1.19			0.12		17.01	3.23	3.84	3.56	25	0.12			Link 36 - 18" pipe
					73.46		46.74					28.81	3.23	106.98						Confluence at Node 37

CYPRESS POINT SUBDIVISION PROPOSED CONDITIONS

3/22/2021

[illegible]

Rectangular Channel Sizing Calculation

K'= Discharge Factor

n= Mannings coefficient

D=depth of water in channel

b=width of bottom of channel (ft)

Q= Discharge (cfs)

s=Pipe Slope (ft/ft)

n= 0.013

Rectangular Conduit

$$Q = (K'/n) * b^{8/3} * s^{0.5}$$

Q per conduit (cfs)	S (%)	Width (inches)	K'	D/b	Depth of water in conduit (inches)	Cross sectional area of flow (sf)	Velocity (ft/ sec)
37.36	0.30	72	0.0746	0.14	10.08	5.04	7.41
47.46	0.30	72	0.0948	0.22	15.84	7.92	5.99
84.69	0.30	72	0.1691	0.33	23.76	11.88	7.13

STEADY UNIFORM FLOW IN OPEN CHANNELS 7-43

Table 7-11. Values of K' in Formula $Q = \frac{K'}{n} b^{5/3} s^{1/2}$ for

Trapezoidal Channels

D = depth of water b = bottom width of channel

$\frac{D}{b}$	Side slopes of channel, ratio of horizontal to vertical									
	Vertical	$\frac{1}{4}-1$	$\frac{1}{2}-1$	$\frac{3}{4}-1$	1-1	$1\frac{1}{2}-1$	2-1	$2\frac{1}{2}-1$	3-1	4-1
.01	.00068	.00068	.00069	.00069	.00069	.00069	.00069	.00069	.00070	.00070
.02	.00213	.00215	.00216	.00217	.00218	.00220	.00221	.00222	.00223	.00225
.03	.00414	.00419	.00423	.00426	.00428	.00433	.00436	.00439	.00443	.00449
.04	.00660	.00670	.00679	.00685	.00691	.00700	.00708	.00716	.00723	.00736
.05	.00946	.00964	.00979	.00991	.01002	.01019	.01033	.01047	.01060	.01086
.06	.0127	.0130	.0132	.0134	.0136	.0138	.0141	.0143	.0145	.0150
.07	.0162	.0166	.0170	.0173	.0175	.0180	.0183	.0187	.0190	.0197
.08	.0200	.0206	.0211	.0215	.0219	.0225	.0231	.0236	.0240	.0250
.09	.0241	.0249	.0256	.0262	.0267	.0275	.0282	.0289	.0296	.0310
.10	.0284	.0294	.0304	.0311	.0318	.0329	.0339	.0348	.0358	.0376
.11	.0329	.0343	.0354	.0364	.0373	.0387	.0400	.0413	.0424	.0448
.12	.0376	.0393	.0408	.0420	.0431	.0450	.0466	.0482	.0497	.0527
.13	.0425	.0446	.0464	.0480	.0493	.0516	.0537	.0556	.0575	.0613
.14	.0476	.0502	.0524	.0542	.0559	.0587	.0612	.0636	.0659	.0706
.15	.0528	.0559	.0585	.0608	.0627	.0662	.0692	.0721	.0749	.0805
.16	.0582	.0619	.0650	.0676	.0700	.0740	.0777	.0811	.0845	.0912
.17	.0638	.0680	.0716	.0748	.0775	.0823	.0866	.0907	.0947	.1026
.18	.0695	.0744	.0786	.0822	.0854	.0910	.0960	.1008	.1055	.1148
.19	.0753	.0809	.0857	.0899	.0936	.1001	.1059	.1115	.1169	.1277
.20	.0812	.0876	.0931	.0979	.1021	.1096	.1163	.1227	.1290	.1414
.21	.0873	.0945	.101	.106	.111	.120	.127	.135	.142	.156
.22	.0934	.1015	.109	.115	.120	.130	.139	.147	.155	.171
.23	.0997	.1087	.117	.124	.130	.141	.150	.160	.169	.187
.24	.1061	.1161	.125	.133	.140	.152	.163	.173	.184	.204
.25	.1125	.1236	.133	.142	.150	.163	.176	.188	.199	.222
.26	.119	.131	.142	.152	.160	.175	.189	.202	.215	.241
.27	.126	.139	.151	.162	.171	.188	.203	.218	.232	.260
.28	.132	.147	.160	.172	.182	.201	.217	.234	.249	.281
.29	.139	.155	.170	.182	.194	.214	.232	.250	.268	.302
.30	.146	.163	.179	.193	.205	.228	.248	.267	.287	.324
.31	.153	.172	.189	.204	.218	.242	.264	.285	.306	.347
.32	.160	.180	.199	.215	.230	.256	.281	.304	.327	.371
.33	.167	.189	.209	.227	.243	.271	.298	.323	.348	.396
.34	.174	.198	.219	.238	.256	.287	.316	.343	.370	.423
.35	.181	.207	.230	.251	.269	.303	.334	.363	.392	.450
.36	.189	.216	.241	.263	.283	.319	.353	.385	.416	.478
.37	.196	.225	.252	.275	.297	.336	.372	.406	.440	.507
.38	.203	.234	.263	.288	.312	.353	.392	.429	.465	.537
.39	.211	.244	.274	.301	.326	.371	.413	.452	.491	.568
.40	.218	.253	.286	.315	.341	.389	.434	.476	.518	.600
.41	.226	.263	.297	.328	.357	.408	.456	.501	.546	.633
.42	.233	.273	.309	.342	.373	.427	.478	.526	.574	.668
.43	.241	.283	.321	.357	.389	.447	.501	.553	.603	.703
.44	.248	.293	.334	.371	.405	.467	.525	.580	.633	.740
.45	.256	.303	.346	.386	.422	.488	.549	.607	.664	.777

CONDUIT SIZING CALCULATIONS

The following chart details the sizing parameters and for conduits that convey runoff on the site.

Flow parameters from *Handbook of Hydraulics, King & Brater* were used, see following page.

$$K' = \text{Discharge factor} = (Q^* n) / (d^{8/3} * s^{1/2})$$

n= Mannings coefficient = 0.013 for PVC & HDPE

d=diameter of conduit (ft) = per chart

Q= Discharge = based off portions of basins tributary to outlet

s=Minimum Pipe Slope (ft/ft) = per chart

D=depth of flow = From table 7-4 of the *Handbook of Hydraulics, King & Brater* See right

C_a = Flow factor = From table 7-14 of the *Handbook of Hydraulics, King & Brater* See right

$$A = \text{Cross sectional area of flow} = \frac{\pi}{4} * d^2$$
$$V = \text{Velocity} = Q/A$$

Pipe Flow

Link	Q (cfs)	S (%)	d (in)	K'	D/d	C _a	A (sf)	V (fps)
3 to 6	15.91	0.3	30	0.328	0.62	0.512	3.200	4.97
6 to 12	17.01	0.3	30	0.351	0.65	0.54	3.375	5.04
9 to 13	2.50	0.3	18	0.201	0.46	0.3527	0.794	3.15
12 to 13	0.26	0.3	8	0.179	0.43	0.3229	0.144	1.78
13 to 18	18.86	0.3	30	0.389	0.70	0.587	3.669	5.14
16 to 17	2.07	0.3	18	0.167	0.41	0.3032	0.682	3.03
17 to 18	2.06	0.3	18	0.166	0.41	0.3032	0.682	3.03
18 to 27	19.68	0.3	30	0.406	0.72	0.605	3.781	5.21
21 to 22	6.53	0.3	24	0.244	0.51	0.403	1.612	4.05
22 to 23	6.51	0.3	24	0.243	0.51	0.403	1.612	4.04
23 to 37	24.40	0.3	30	0.495	0.90	0.745	4.656	5.24
35 to 36	3.86	0.3	18	0.306	0.59	0.482	1.085	3.56
36 to 37	3.86	0.3	18	0.306	0.59	0.482	1.085	3.56
37 to 38	107.80	0.3	60	0.344	0.64	0.531	13.275	8.12

Table 7-4. For Determining the Area a of the Cross Section of a Circular Conduit Flowing Part Full

Let $\frac{\text{depth of water}}{\text{diameter of channel}} = \frac{D}{d}$ and C_a = the tabulated value. Then $a = C_a d^2$.

$\frac{D}{d}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0013	.0037	.0069	.0105	.0147	.0192	.0242	.0294	.0350
.1	.0409	.0470	.0534	.0600	.0668	.0739	.0811	.0885	.0961	.1039
.2	.1118	.1199	.1281	.1365	.1449	.1535	.1623	.1711	.1800	.1890
.3	.1982	.2074	.2167	.2260	.2355	.2450	.2546	.2642	.2739	.2836
.4	.2934	.3032	.3130	.3229	.3328	.3428	.3527	.3627	.3727	.3827
.5	.393	.403	.413	.423	.433	.443	.453	.462	.472	.482
.6	.492	.502	.512	.521	.531	.540	.550	.559	.569	.578
.7	.587	.596	.605	.614	.623	.632	.640	.649	.657	.666
.8	.674	.681	.689	.697	.704	.712	.719	.725	.732	.738
.9	.745	.750	.756	.761	.766	.771	.775	.779	.782	.784

Table 7-14. Values of K' for Circular Channels in the Formula

$$Q = \frac{K'}{n} d^{8/3} s^{1/2}$$

D = depth of water d = diameter of channel

[illegible]

3.2.2.4 Grated Inlets in Sag

A grated inlet in a sag location operates as a weir at shallower depths and as an orifice at larger depths. The designer shall estimate the capacity of the inlet under both weir flow and orifice flow conditions, then adopt a design capacity equal to the smaller of the two results. Figure 3-5 provides a nomograph for calculating the capacity of grated inlets in sag locations.

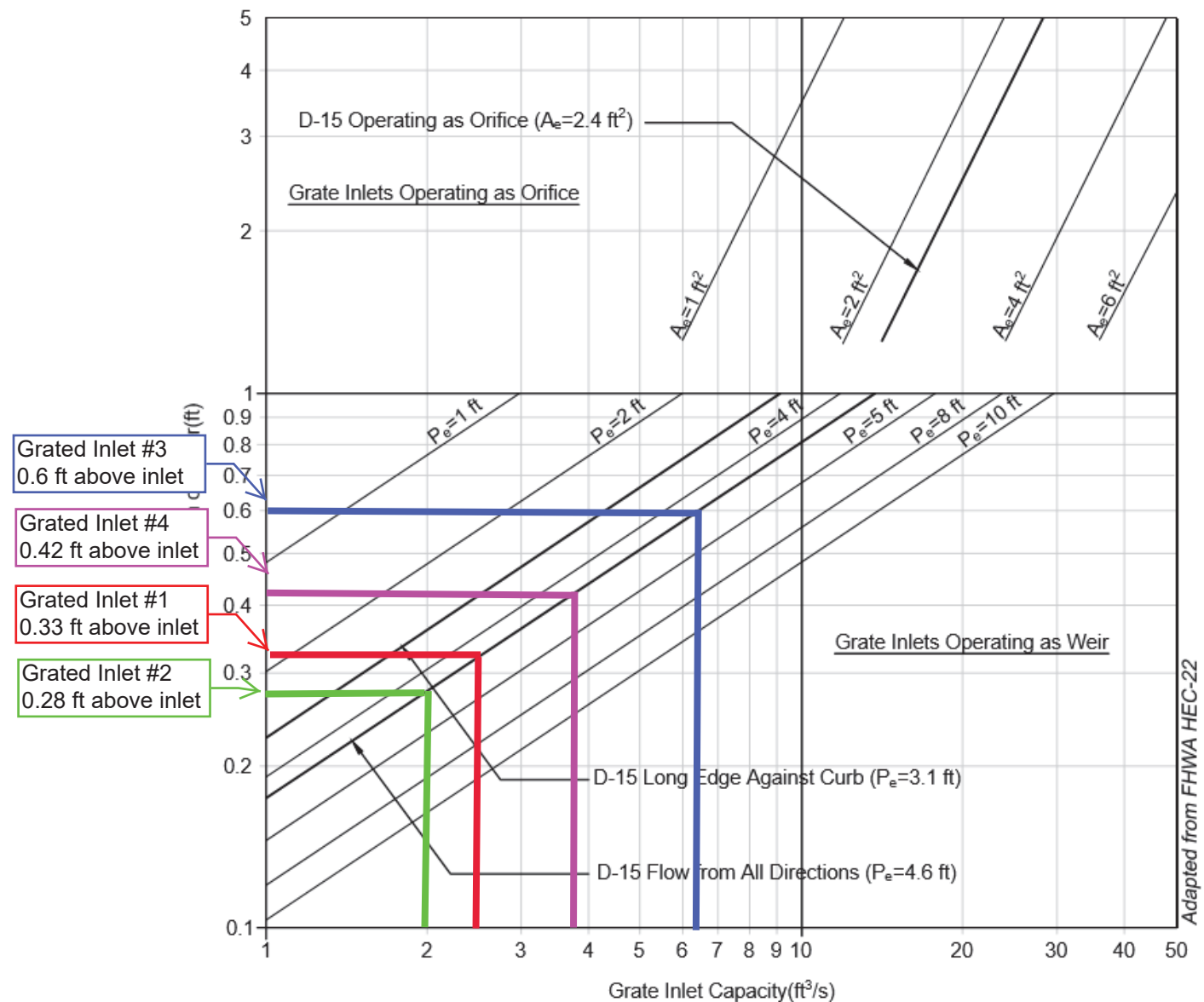


Figure 3-5. Capacity of Grate Inlets in Sag Locations

- Step 1.** Calculate the capacity of a grate inlet operating as a weir using the weir equation (Equation 3-10) with a length equivalent to perimeter of the grate. When the grate is located next to a curb, disregard the length of the grate against the curb.

Curb Inlet Sizing

	Opening Length (ft)	Opening Height (ft)	Q ₁₀₀	Depth (ft)
Inlet #1	14	0.5	15.91	0.179
Inlet #2	14	0.5	1.80	0.002
Inlet #3	20	0.5	37.36	0.483
Inlet #4	20	0.5	47.43	0.778

$$Q = 0.67hL(2gd_o)^{1/2}$$

where:

Q	=	inlet capacity (ft ³ /s)
h	=	curb opening height (ft)
L	=	curb opening length (ft)
g	=	gravitational acceleration (32.2 ft/s ²)
d _o	=	effective depth of flow at curb face (ft)

Appendix 1

County of San Diego Hydrology Manual



Soil Hydrologic Groups

Legend

Soil Groups

Group A

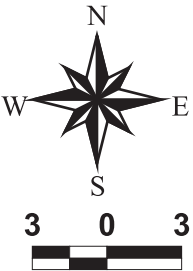
Group B

Group C

Group D

Undetermined

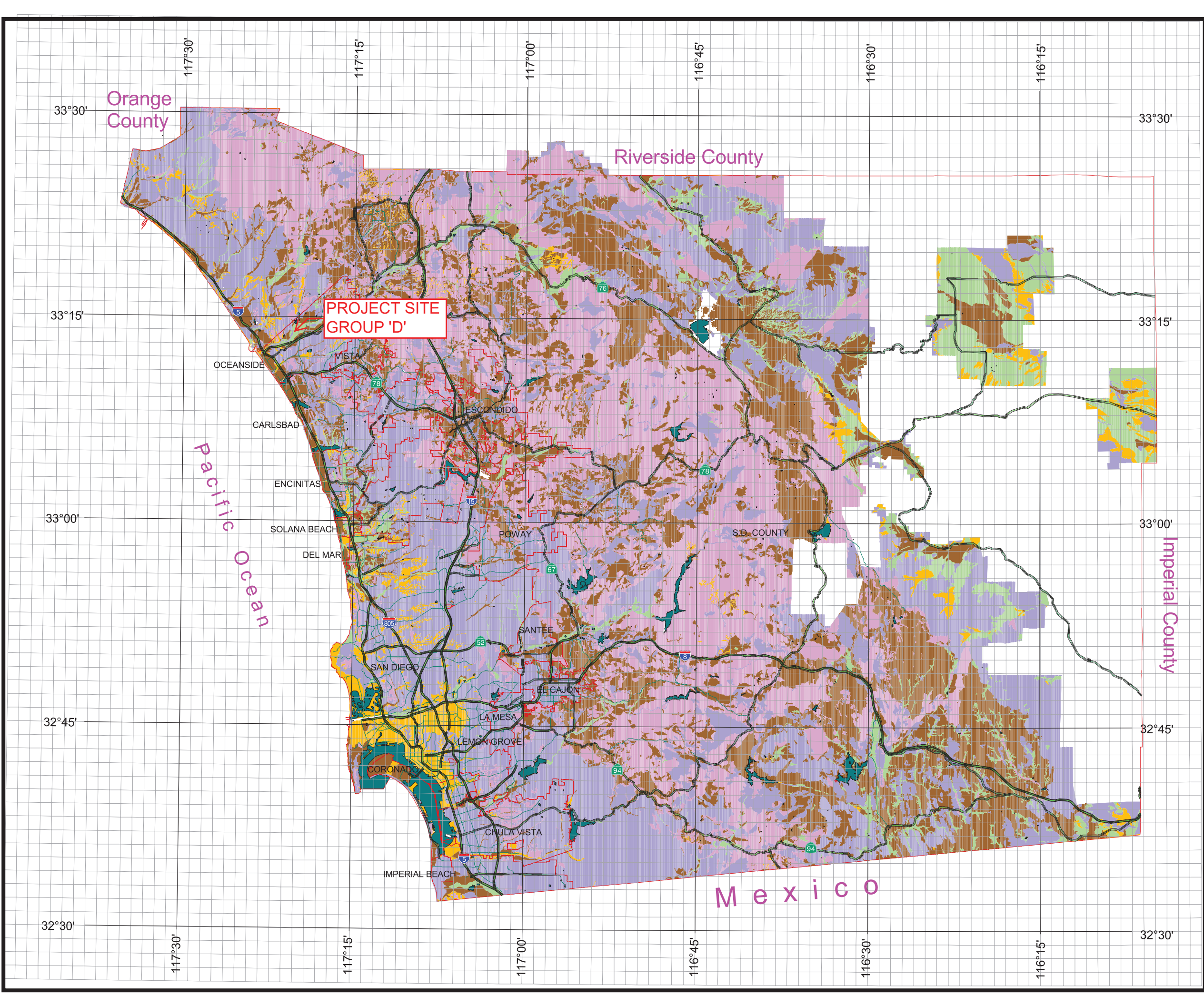
Data Unavailable



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Appendix 2
