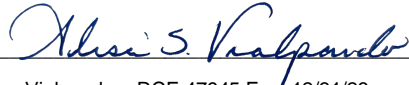


(GPA22-00001)

CITY OF OCEANSIDE ENGINEERING DIVISION
PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN FOR PACIFICA ELEMENTARY SCHOOL
ENGINEER OF WORK  Alisa Vialpando – RCE 47945 Exp. 12/31/23

PREPARED FOR:

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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.

Applicable elements of SWQMP were update in accordance with the January 2022 city of Oceanside BMP Design Manual.

Template Date: February 16, 2016

Assembled By:



Quick Reference Guide

Item	Project Information
Project Name	Pacifica Elementary School
Application Number(s)	GPA22-00001
Project Address	Roja Drive and Macario Drive, Oceanside, CA 92054
Total Parcel Area	633,638 sq. ft.
Project Description	Pacifica Elementary School property is a 14.55-acre site located in the City of Oceanside, CA, East of I-5. Existing site is partially developed with a large concrete pad and empty land. The Proposed site will include multi-family buildings incorporating 164 residential units.
Proposed Disturbed Area	443,150 sq. ft.
Created or Replaced Impervious	312,149 sq. ft.
Project Hydrologic Unit Watershed	<input type="checkbox"/> Santa Maria <input checked="" type="checkbox"/> San Luis Rey <input type="checkbox"/> Carlsbad
Required to implement HMP	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No



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CERTIFICATION PAGE

Project Name: Pacifica Elementary School
Permit Application Number: (GPA22-00001)

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.



Alisa Vialpando, RCE 47945, Exp. 12/31/23

Alisa Vialpando

Print Name

Hunsaker & Associates

Company

03/22/2023

Date

Engineer's Seal:



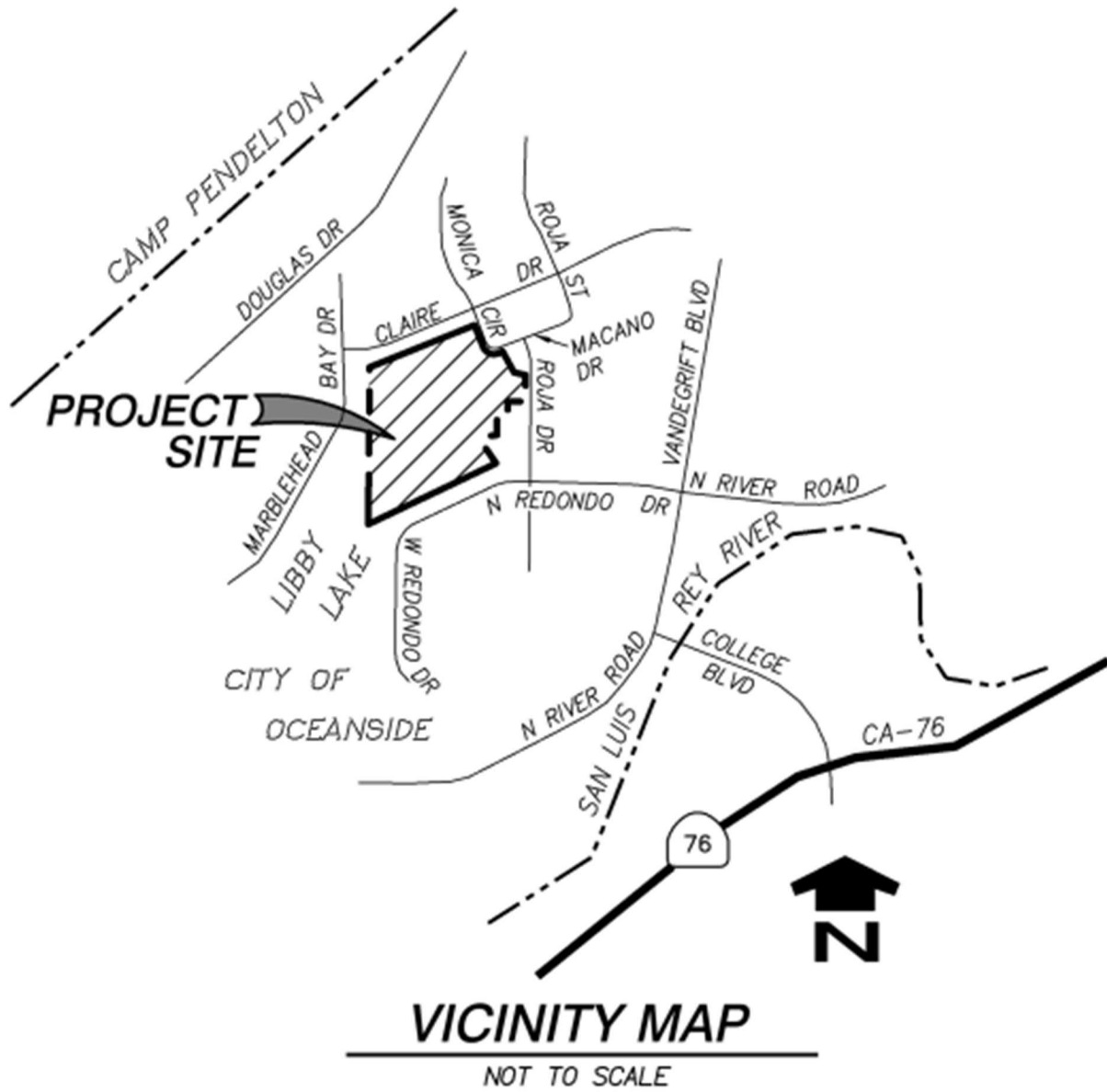
SUBMITTAL RECORD

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	[06/13/22]	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	SWQMP Initial Submittal
2	[11/15/22]	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	2nd Submittal
3	[03/22/23]	<input checked="" type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	3rd Submittal
4	[MM/DD/YY]	<input type="checkbox"/> Preliminary Design/ Planning/ CEQA <input type="checkbox"/> Final Design	Click here to enter text.



Placeholder – 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: Pacifica Elementary School		
Permit Application Number: GPA22-00001		Date: 6/13/22
Determination of Requirements		
<p>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.</p> <p>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.</p>		
Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual for guidance.	<input checked="" type="checkbox"/> Yes	Go to Step 2.
	<input type="checkbox"/> 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.	<input type="checkbox"/> Standard Project	Stop. Standard Project requirements apply, including Standard Project SWQMP.
	<input checked="" type="checkbox"/> PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	<input type="checkbox"/> 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:		



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.	<input type="checkbox"/> Yes	Consult the [City Engineer] to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	<input checked="" type="checkbox"/> 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>):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual for guidance.	<input checked="" type="checkbox"/> Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	<input type="checkbox"/> 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:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual for guidance.	<input type="checkbox"/> Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	<input checked="" type="checkbox"/> 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:		



Project Type Determination Checklist		Form I-2	
Project Information			
Project Name: Pacifica Elementary School			
Permit Application Number: GPA22-00001			
Project Type Determination: Standard Project or PDP			
The project is (select one): <input type="checkbox"/> New Development <input checked="" type="checkbox"/> Redevelopment			
The total proposed newly created or replaced impervious area is: 312,149 ft ² (7.17) acres			
Is the project in any of the following categories, (a) through (f)?			
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(c)	<p>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:</p> <ul style="list-style-type: none"> (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.



Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(d)	<p>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).</p> <p><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 SDRWOCB; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and SDRWOCB; and any other equivalent environmentally sensitive areas which have been identified by the Copermitttees. See manual Section 1.4.2 for additional guidance.</u></p>
Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	(e)	<p>New development projects that support one or more of the following uses:</p> <p>(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.</p> <p>(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.</p>
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	(f)	<p>New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction.</p> <p><i>Note: See manual Section 1.4.2 for additional guidance.</i></p>
<p>Does the project meet the definition of one or more of the PDP categories (a) through (f) listed above?</p> <p><input type="checkbox"/> No – the project is not a PDP (Standard Project).</p> <p><input checked="" type="checkbox"/> Yes – the project is a PDP.</p>			
<p>The following is for redevelopment PDPs only:</p> <p>The area of existing (pre-project) impervious area at the project site is: 203,317 ft² (A) The total proposed newly created or replaced impervious area is: 312,149 ft² (B) Percent impervious surface created or replaced (A/B)*100: 65%</p> <p>The percent impervious surface created or replaced is (select one based on the above calculation):</p> <p><input type="checkbox"/> less than or equal to fifty percent (50%) – only new impervious areas are considered PDP OR <input checked="" type="checkbox"/> greater than fifty percent (50%) – the entire project site is a PDP</p>			



Site Information Checklist For PDPs		Form I-3B (PDPs)
Project Summary Information		
Project Name	Pacifica Elementary School	
Project Address	Roja Drive & Macario Drive, Oceanside, CA 92054	
Assessor's Parcel Number(s)	157-070-42, 122-190-19, 122-190-22	
Permit Application Number	GPA22-00001	
Project Watershed (Hydrologic Unit)	Select One: <input type="checkbox"/> Santa Margarita 902 <input checked="" type="checkbox"/> San Luis Rey 903 <input type="checkbox"/> Carlsbad 904	
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	14.55 Acres (633,638 Square Feet)	
Area to be disturbed by the project (Project Area)	10.17 Acres (443,150 Square Feet)	
Project Proposed Impervious Area (subset of Project Area)	7.17 Acres (312,149 Square Feet)	
Project Proposed Pervious Area (subset of Project Area)	3.007 Acres (131,001 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	<input type="checkbox"/> Ysidora 902.10	<input type="checkbox"/> Lower Ysidora 902.11
San Luis Rey 903.00	<input checked="" type="checkbox"/> Lower San Luis 903.10	<input checked="" type="checkbox"/> Mission 903.11
		<input type="checkbox"/> Bonsall 903.12
Carlsbad 904.00	<input type="checkbox"/> Loma Alta 904.10	Not Applicable
	<input type="checkbox"/> Buena Vista Creek 904.20	<input type="checkbox"/> El Salto 904.21
		<input type="checkbox"/> Vista 904.22
	<input type="checkbox"/> Agua Hedionda 4.30	<input type="checkbox"/> 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 site is an old school development with no buildings, and it is partially occupied with a parking lot, driveways, and large concrete pad while the western portion consists of vacant land.

Existing Land Cover Includes (select all that apply):

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

Description / Additional Information:

The existing impervious area consists of parking lot, driveways, and a large concrete pad. Pervious area consists of vacant undeveloped area, vegetative cover and slopes.

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]:

The Existing Site Topography and Drainage of Pacifica Elementary School consists of partial urban and partial natural drainage that delivers flow to the San Luis Rey River. An existing Storm Drain runs through the center of the site with two catch basin in the center and in the Southwest corner of the site. There are portions of offsite runoff that is conveyed through the sight from the Southeast corner of the site. (0.60 acres).



Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

the proposed site will consist of 164 residential units (25 buildings), multiple outdoor community recreational areas, tennis-courts, and a dog park. In addition, the project proposes a biofiltration basin to provide a pollutant control for the majority of the project area, and meet the hydromodification and peak flow detention for the entire site. A proprietary biofiltration BMP is proposed northeast of the site to treat a small portion that drains away from the biofiltration basin. The existing impervious area onsite will be replaced.

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

Building rooftops, roadways, sidewalks, walkways, parking, patios and other hardscapes areas/impervious features, e.g. pickle ball court.

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

Flow through planters and landscaped areas.

Does the project include grading and changes to site topography?

Yes

No

Description / Additional Information:

Grading will be performed on 70% of the site , which includes the proposed biofiltration basin, grading to accommodate the pvt drives, building pads, and ensure the drainage slope on all of the landscaped areas.

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

Yes

No

Description / Additional Information:

The site will include new dual storm drain system, bypass system to replace the existing storm drain pipe that will be abandoned, and onsite storm drain system to capture the runoff from the proposed development and the southeast offsite area that commingles with the onsite flows and route it to the biofiltration basin. The bypass storm drain system will convey run-on from the offsite area, treated flows from the proprietary biofiltration BMP east of the site (DMA2), and runoff from the slopes that drain to the proposed brow ditches to commingle with the outfall from the biofiltration basin southwest of the site prior to discharge to POC similarly to existing conditions.



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):

The site drains to Libby Lake, which is pumped to gravity drain to Pilgrim Creek, then to San Luis Rey River lower and ultimately to Pacifica Ocean Shoreline, San Luis Rey HU, at San Luis Rey River Outlet. Libby lake and Pilgrim Creek are not listed in the 303 d list.

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 Oxygen, Dissolved, Phosphorus Pyrethroids Toxicity Nitrogen, Dissolved solids Benthic Community Effect Bifenthrin	Bacteria
Pacifica Ocean Shoreline, San Luis Rey HU, at San Luis Rey River Outlet	Indicator Bacteria	Bacteria



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:



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.

POC1 is the only point of compliance and it is located offsite near the Southwest corner of the Project Boundary.

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:

Discussion / Additional Information: (optional)



Source Control BMP Checklist for All Development Projects (Standard Projects and PDPs)		Form I-4	
Project Identification			
Project Name: Pacifica Elementary School			
Permit Application Number: GPA22-00001			
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.			
<ul style="list-style-type: none"> • "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		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Discussion / justification if SC-1 not implemented: All proposed impervious areas drain to proposed landscaped areas where applicable, and eventually to structural Biofiltration BMPs, thus mitigating non-storm water discharge to the MS4. Efficient irrigation will also be proposed.			
SC-2 Storm Drain Stenciling or Signage		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
Discussion / justification if SC-2 not implemented:			
<ul style="list-style-type: none"> • Locations of inlets are shown on exhibits. • All inlets will be marked with the words "No dumping! Flows to Bay" or similar. • Maintain and periodically repaint or replace inlet markings. • Provide storm water pollution prevention information to new owners, lessees, or operations. 			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal		<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Discussion / justification if SC-3 not implemented:			
There's no "Outdoor Materials Storage Areas" contemplated for this project.			



Source Control Requirement	Implemented?		
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SC-4 not implemented: There's no "Materials Stored in Outdoor Work Areas" contemplated for this project.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SC-5 not implemented: There's no "Trash Storage Areas " contemplated for this project.			



SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	Implemented?		
	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Onsite storm drain inlets	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Interior floor drains and elevator shaft sump pumps	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Interior parking garages	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Need for future indoor & structural pest control	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Landscape/outdoor pesticide use	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Pools, spas, ponds, decorative fountains, and other water features	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Food service	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Refuse area	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Industrial processes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Outdoor storage of equipment or materials	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Vehicle and equipment cleaning	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Vehicle/equipment repair and maintenance	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Fuel dispensing areas	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Loading docks	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Fire sprinkler test water	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Miscellaneous drain or wash water	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Plazas, sidewalks, and parking lots	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
<p>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.</p>			



Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.

- SC-6A: All onsite storm drain inlets to be marked with legend “NO DUMPING, FLOWS TO BAY”, or similar.
- SC-6B: There’s no “Interior floor drains and elevator shaft sump pumps” contemplated for this project.
- SC-6C: There’s no “Interior parking garages” contemplated for this project.
- SC-6D1: There’s no “Need for future indoor & structural pest control” contemplated for this project.
- SC-6D2: Final landscape plans will accomplish all of the following:
 - Preserve existing drought tolerant trees, shrubs, and ground cover to the maximum extent possible.
 - Landscaping designed to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution.
 - Where landscaped areas are used to retain or detain storm water, use plants that are tolerant of periodic saturated soil conditions.
 - Use pest-resistant plants, especially adjacent to hardscape.
 - Ensure successful establishment, appropriate selection of plants to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.
- SC-6E: There’s no “Pools, spas, ponds, decorative fountains, and other water features” contemplated for this project.
- SC-6F: There’s no “Food Service” contemplated for this project.
- SC-6G: There’s no “Refuse areas” contemplated for this project.

- SC-6H: There’s no “Industrial processes” contemplated for this project.
- SC-6I: There’s no “Outdoor storage of equipment or materials” contemplated for this project.
- SC-6J: There’s no “Vehicle and equipment cleaning” contemplated for this project.
- SC-6K: There’s no “Vehicle/equipment repair and maintenance” contemplated for this project.
- SC-6L: There’s no “Fuel dispensing areas” contemplated for this project.
- SC-6M: There’s no “Loading Docks” contemplated for this project.
- SC-6N: “Fire Sprinkler Test Water” will drain to sanitary sewer
- SC-6O: Final architect’s and engineer’s plans will accomplish all the following:
 - Boiler drain lines will be directly or indirectly connected to the sanitary sewer system and will not discharge to the storm drain system.
 - Rooftop mounted equipment with potential to produce pollutants will be roofed and/or have secondary containment.
 - Roofing, gutters, and trim made won't be made of copper or other unprotected metals that may leach into runoff.
- SC-6P: Plazas, sidewalks, and parking lots will be swept regularly to prevent the accumulation of litter and debris.



Site Design BMP Checklist for All Development Projects (Standard Projects and PDPs)	Form I-5
--	-----------------

Project Identification

Project Name: Pacfica Elementary School

Permit Application Number: GPA22-00001

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	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
---	---	-----------------------------	------------------------------

Discussion / justification if SD-1 not implemented:
Natural permeable soil on the existing slopes (30% of the parcels area) was maintained. The slopes adjacent to the existing pathway west of the side was maintained

SD-2 Conserve Natural Areas, Soils, and Vegetation	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
--	---	-----------------------------	------------------------------

Discussion / justification if SD-2 not implemented:
Natural soil and vegetation on the existing slopes (30% of the parcels area) was maintained.

SD-3 Minimize Impervious Area	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
-------------------------------	---	-----------------------------	------------------------------

Discussion / justification if SD-3 not implemented:
 Streets, sidewalks & parking aisles were designed with widths minimized as much as possible.

SD-4 Minimize Soil Compaction	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
-------------------------------	---	-----------------------------	------------------------------

Discussion / justification if SD-4 not implemented:
 Proposed landscaped areas will be compacted as minimally as possible.



Site Design Requirement	Applied?		
SD-5 Impervious Area Dispersion	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-5 not implemented: Pervious areas included where project design allows in order to disperse impervious areas. However, dispersion is not implemented such that the DCV can be confidently reduced. Roofs, driveways and hardscape are routed through landscaped areas where possible.			
SD-6 Runoff Collection	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-6 not implemented: Small collection strategies located as close as possible to the sources (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to the MS4 and receiving waters			
SD-7 Landscaping with Native or Drought Tolerant Species	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Discussion / justification if SD-7 not implemented: Native and drought tolerant species will be included in landscape design			
SD-8 Harvesting and Using Precipitation	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Discussion / justification if SD-8 not implemented: The maintenance cost and effort to monitor and clean the rain barrels regularly to ensure that they do not become clogged with leaves and other debris, while they have a limited use as they may fill only a few times each year, due to San Diego's arid climate. Therefore, harvesting and using were not used and all the roof areas have been routed to the structural BMPs to treat the DCV. Harvest and use is determined to be infeasible per Form I-4			



Summary of PDP Structural BMPs	Form I-6 (PDPs)
Project Identification	
Project Name: Pacifica Elementary School	
Permit Application Number: GPA22-00001	
PDP Structural BMPs	
<p>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).</p> <p>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).</p> <p>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).</p>	



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 selection, sizing, and preliminary design of the storm water treatment and other control measures in this plan was done based on City of Oceanside's BMP Design Manual.

Step 1 of section 5.1 is to determine the DCV. The DCV of both DMA 1 and DMA 2 were determined using Worksheet B.1. Step 2 of Section 5.1 is to determine retention requirements. The retention requirements for both DMA's were determined using Worksheet B.2. Step 3 of section 5.1 is to determine BMP performance. The BMP performance for DMA 1 was determined using Worksheet B.3 and both pollutant control and flow control were implemented in the proposed Biofiltration basin. The BMP performance for DMA 2 was determined using Worksheet B.6-2 and pollutant control was implemented in the proposed Filterra Unit.

Harvest and use deemed infeasible using form I-7 (and Line 7 of Worksheet B.2)

Infiltration is determined to be infeasible. See for I-8 for details.

Operation and Maintenance forms have been filled out using the City of Oceanside BMP Operations and Maintenance Plan and the required checklist are provided. This O&M is a place holder. Final O&M will be provided with Final Engineering SWQMP

(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. BF-1-1 (DMA 1)

Construction Plan Sheet No. 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)

Alisa Vialpando, RCE.
AVialpando@HunsakerSD.com

Who will be the final owner of this BMP?

Meritage Homes

Who will maintain this BMP into perpetuity?

Meritage Homes

What is the funding mechanism for maintenance?

Meritage Homes



Structural BMP Summary Information

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No. BF-3-2 (DMA 2)

Construction Plan Sheet No. 5

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)
- Proprietary Biofiltration (BF-3)
- 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)

Alisa Vialpando, RCE.
AVialpando@HunsakerSD.com

Who will be the final owner of this BMP?

Meritage Homes

Who will maintain this BMP into perpetuity?

Meritage Homes

What is the funding mechanism for maintenance?

Meritage Homes





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.: Click here to enter text.	
Project Applicant: Click here to enter text.		Phone: Click here to enter text.	
Project Address: Click here to enter text.			
Project Engineer: Click here to enter text.		Phone: Click here to enter text.	
<p>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.</p> <p>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.</p>			
<p>ENGINEER'S CERTIFICATION:</p> <p>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.</p> <p>I understand that this BMP certification statement does not constitute an operation and maintenance verification.</p> <p>Signature: _____</p>			



Date of Signature: _ [Click here to enter text.](#)_

Printed Name: _ [Click here to enter text.](#)_

Title: _ [Click here to enter text.](#)_

Phone No. _ [Click here to enter text.](#)_

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: _ [Click here to enter text.](#)_

Printed Name: _ [Click here to enter text.](#)_

Title: _ [Click here to enter text.](#)_

Phone No. _ [Click here to enter text.](#)_



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.	<input checked="" type="checkbox"/> 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	<input type="checkbox"/> Included on DMA Exhibit in Attachment 1a <input checked="" type="checkbox"/> Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Design Capture Volume Worksheet	<input checked="" type="checkbox"/> 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.	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included because the entire project will use infiltration BMPs <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">Feasibility addressed by Line 7 of Worksheet B.2</div>
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.	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not included because the entire project will use harvest and use BMPs <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;">Feasibility addressed by Line 4 of Worksheet B.2</div>
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	<input checked="" type="checkbox"/> Included



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

The DMA Exhibit must identify:

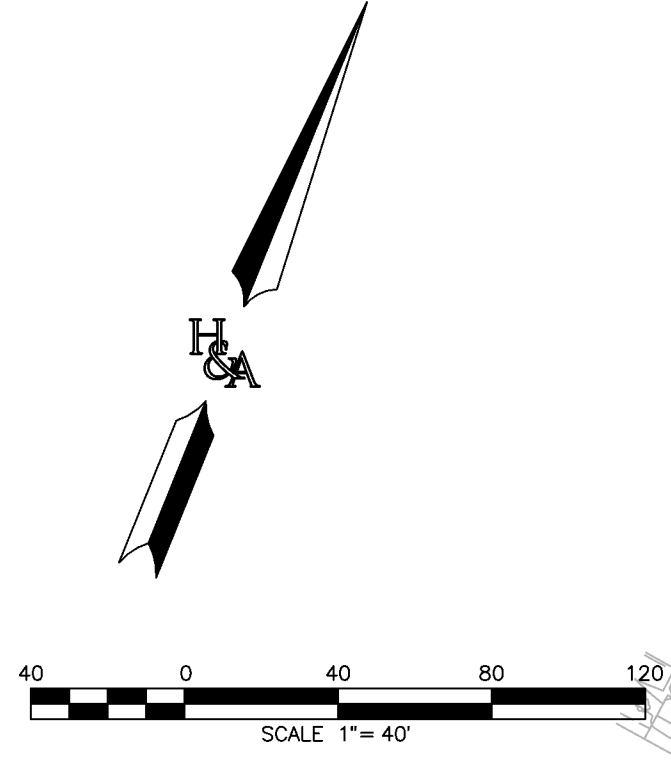
- Underlying hydrologic soil group
- Approximate depth to groundwater
- Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- Critical coarse sediment yield areas to be protected
- Existing topography and impervious areas
- Existing and proposed site drainage network and connections 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.





LEGEND

- PROJECT BOUNDARY
- DMA BOUNDARY
- FLOW DIRECTION
- BYPASS STORM DRAIN
- STORM DRAIN
- ON-SITE STORM DRAIN INLETS
- SUBAREA ACREAGE
- DMA 1** DMA ICON
- IMPERVIOUS - ROAD/SIDEWALK/ DRIVEWAY
- IMPERVIOUS - ROOF/BUILDING
- PERVIOUS - LANDSCAPE
- BIOFILTRATION BASIN
- HYDROLOGIC SOIL TYPE
- POINT OF COMPLIANCE
- STRUCTURAL BMP
- SOIL BOUNDARY
- EXISTING IMPERVIOUS AREA
- DECOMPOST GRANIEL
- DISTURBED AREA BOUNDARY

- SITE DESIGN BMPs**
- SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
 - SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
 - SD-3 MINIMIZE IMPERVIOUS AREAS
 - SD-4 MINIMIZE SOIL COMPACTION
 - SD-5 IMPERVIOUS AREA DISPERSION
 - SD-6 RUNOFF COLLECTION
 - SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

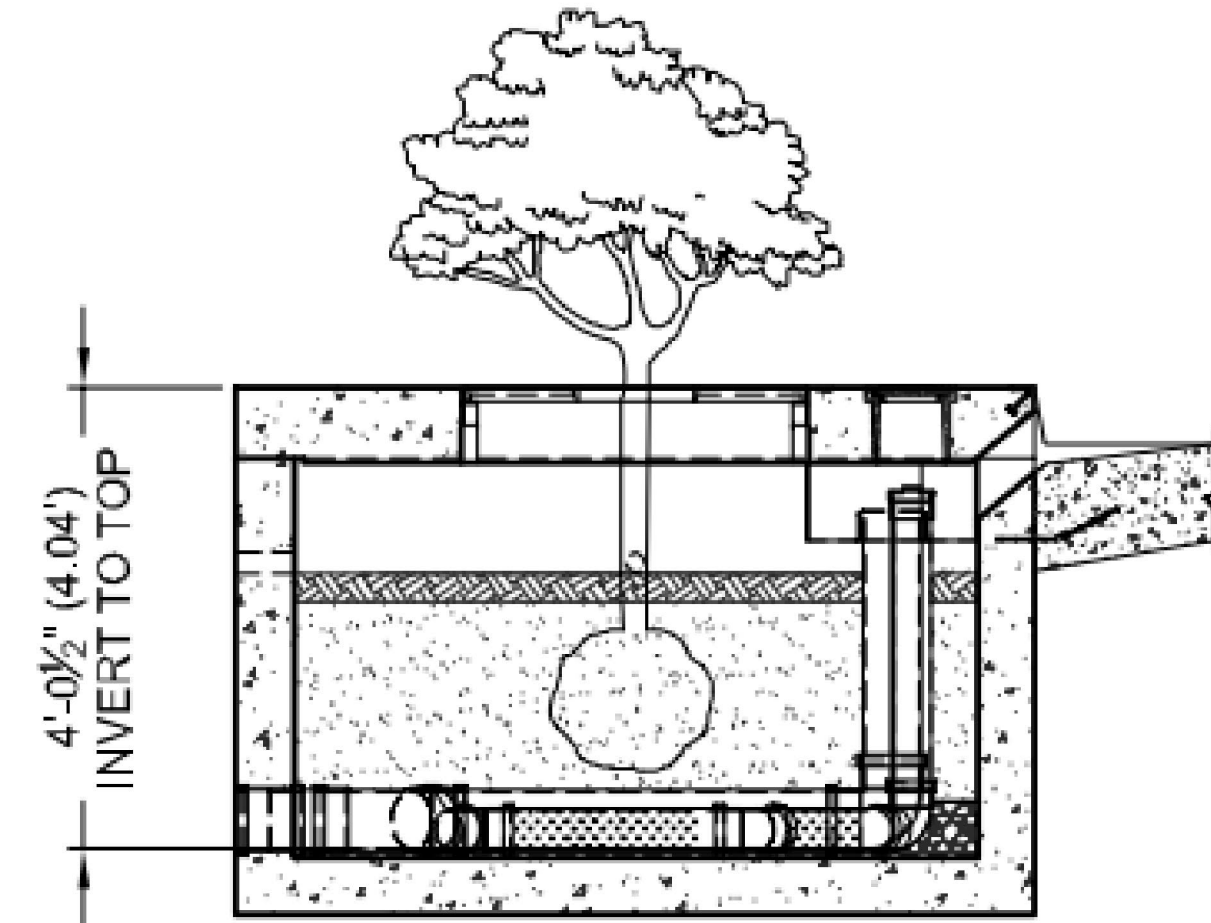
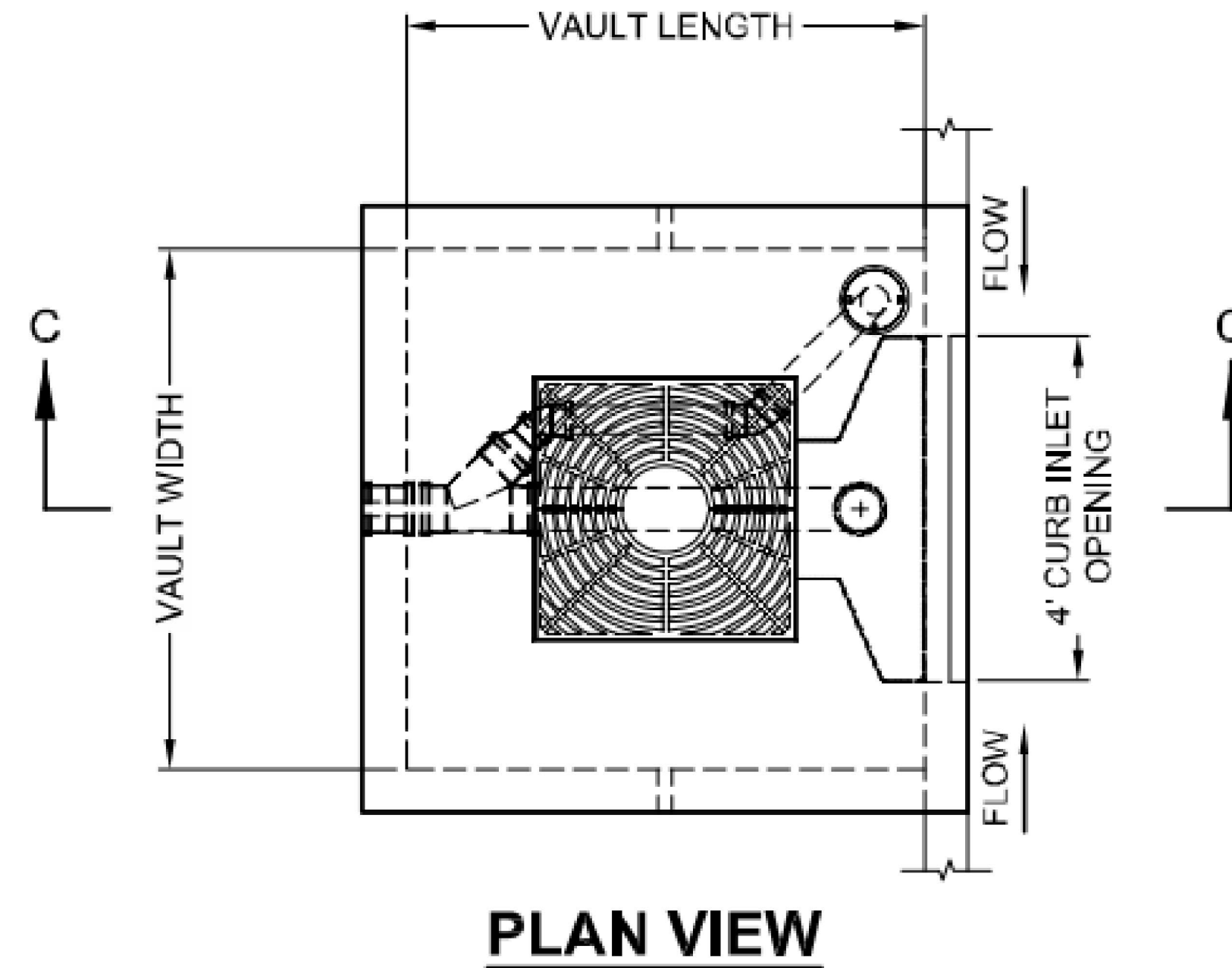
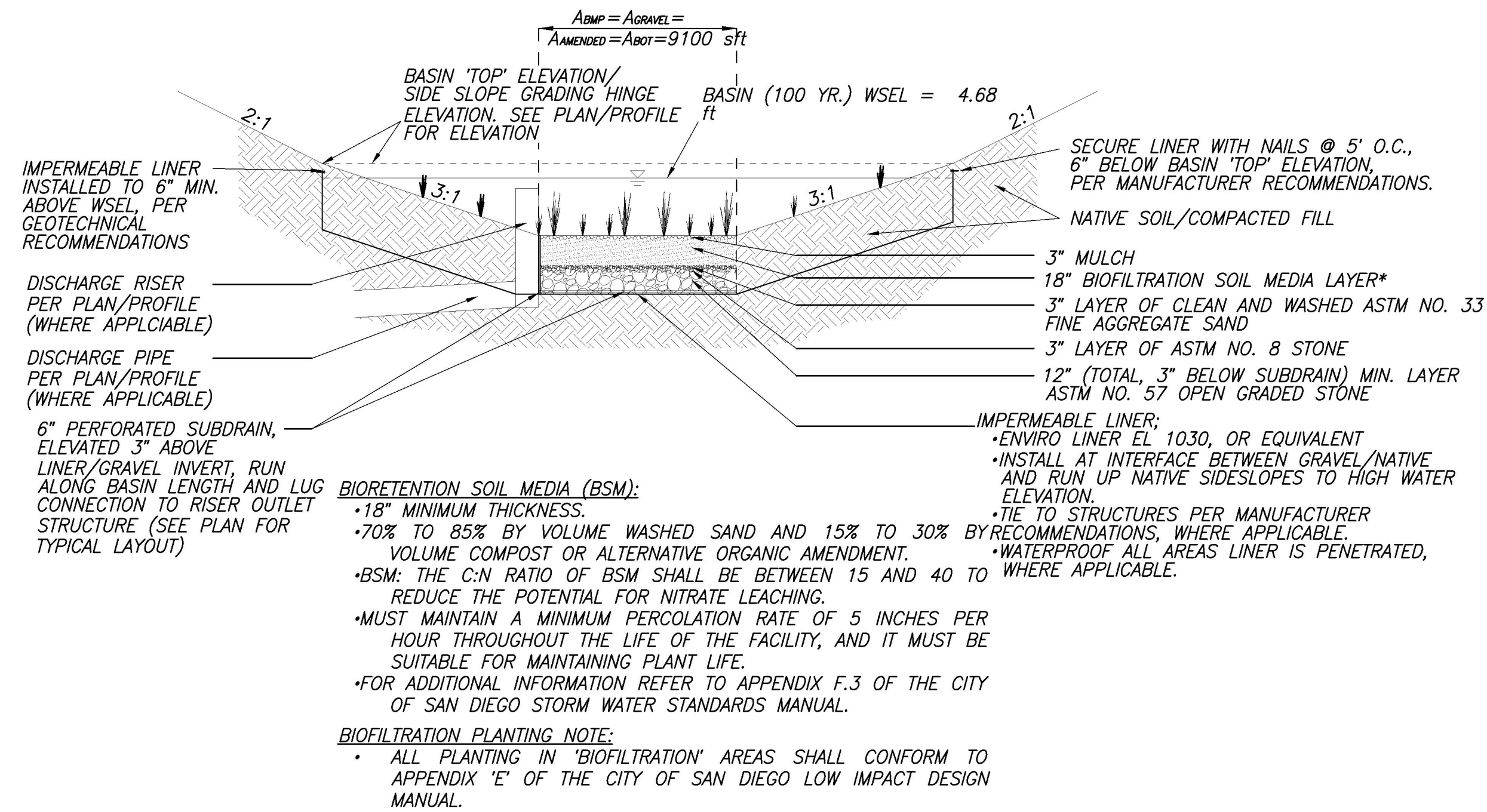
- SOURCE CONTROL BMPs**
- SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
 - SC-2 STORM DRAIN STENCILING OR SIGNAGE
 - SC-6 ADDITIONAL BMPs BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
 - SC-6A ON-SITE STORM DRAIN INLETS
 - SC-6D2 LANDSCAPE/OUTDOOR PESTICIDE USE
 - SC-6N FIRE SPRINKLE TEST WATER
 - SC-6O MISCELLANEOUS DRAIN OR WASH WATER
 - SC-6P PLAZAS, SIDEWALKS, AND PARKING LOTS

UNDERLYING SOIL GROUP : B & D
 APPROXIMATE DEPTH TO GROUNDWATER > 20'
 NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

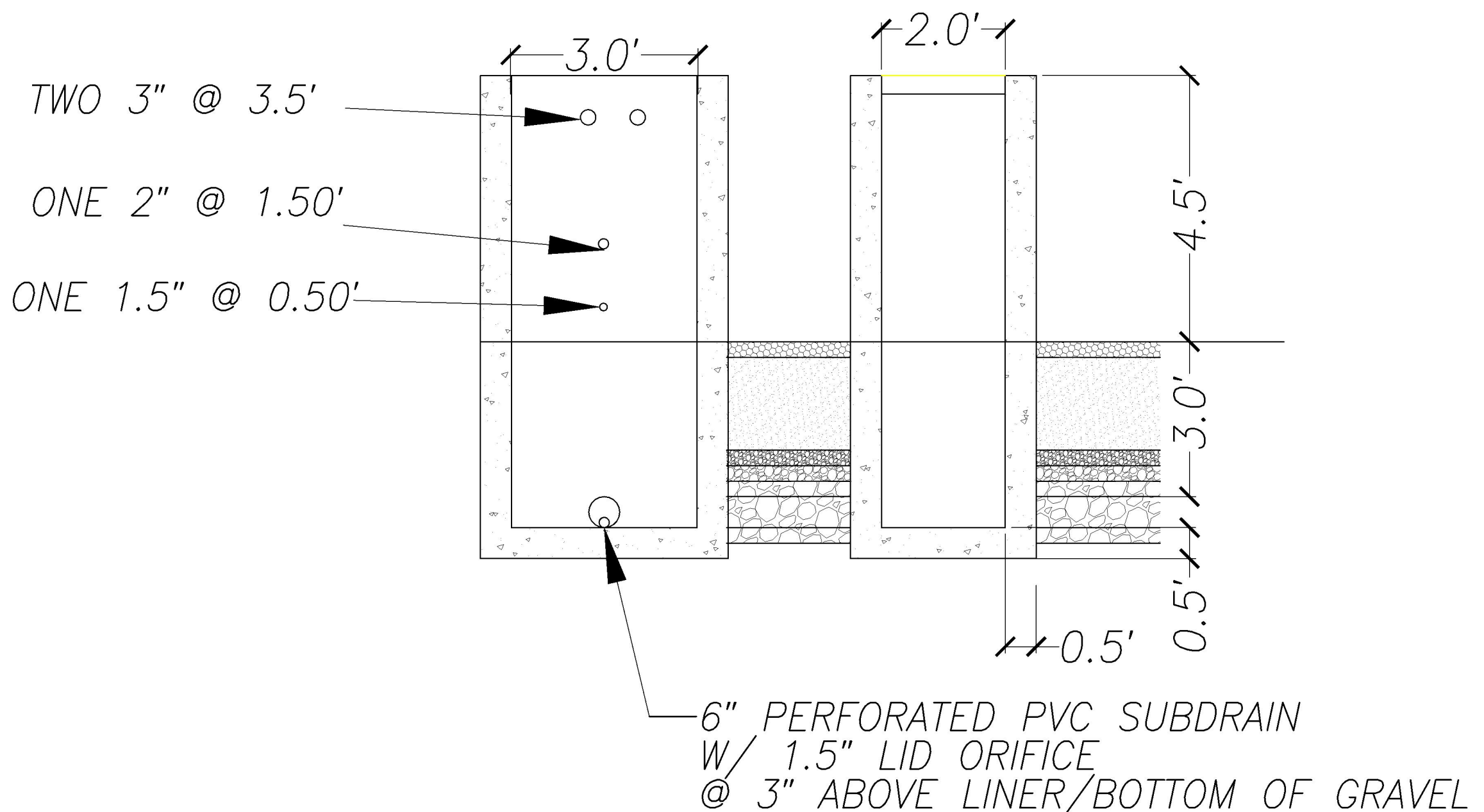


PREPARED BY: HUNSAKER & ASSOCIATES SAN DIEGO, INC. <small>PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(858)558-4500 - FX(858)558-1414</small>	<h2 style="margin: 0;">DMA MAP</h2> <h2 style="margin: 0;">PACIFIC SITE</h2> <p style="margin: 0;">CITY OF OCEANSIDE, CALIFORNIA</p>	MAP 1 OF 2 <small>W.C.# 2027-2010</small>
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BIOFILTRATION BASIN CROSS SECTION



**PROPRIETARY BIOFILTRATION BASIN BMP BF-3-2
FILTERRA UNIT FTIBC0608**



PREPARED BY: HUNSAKER & ASSOCIATES SAN DIEGO, INC. PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(619)558-4500 - FX(619)558-1414	DMA MAP PACIFIC SITE CITY OF OCEANSIDE, CALIFORNIA	MAP 2 OF 2 I.C.# 3097-0010
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Tubular Summary of DMAs



BIOFILTRATION BMP DMA CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		Imp. RF	Pervious RF	% Imp	DMA 1	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	DMA 2	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
2					SQFT		SQFT	SQFT		SQFT		SQFT	SQFT	
3	BASIN	0.90	0.10	0	9100	0.00	0	9100	910	0	0.00	0	0	0
4	Sidewalk	0.90	0.10	100	36681	0.11	36681	0	33013	3473	0.12	3473	0	3126
5	Landscape/Slopes	0.90	0.10	0	102068	0.03	0	102068	10207	7274	0.03	0	7274	727
6	ROOFS*	0.90	0.10	100	145776	0.45	145776	0	131199	16074	0.57	16074	0	14466
7	ROAD/DRIVEWAY	0.90	0.10	100	102213	0.31	102213	0	91992	7932	0.28	7932	0	7139
8	Existing offsite landscape and slopes	0.90	0.30	0	12791	0.01	0	12791	3837	0	0.00	0	0	0
9	Existing on site slope (not to be disturbed) \ proposed DG**	0.90	0.30	0	29406	13608.84	0	29406	8822	0	0.00	0	0	0
10	Existing roof \ SW\Road	0.90	0.10	100	15784	0.05	15784	0	14206	0	0.00	0	0	0
11					453820	13609.81	300454	153366	294185	34753	1.00	27479	7274	25458
12									Weighted C =		0.65		Weighted C = 0.73	
13	* 15% OF THE BUILDING FOOTPRINT HAS BEEN ADDED TO THE ROOF AREA TO BE MORE CONSERVATIVE IN THE IMPERVIOUS AREA CALCULATIONS AND COUNT FOR ANY ADDITIONAL FLATWORK													
14	** 2,200 sft proposed DG													
15		SFT	AC											
16	Total Impervious area	327,933	7.53											
17	newly Created or replaced impervious area	312,149	7.17											
18	Existing impervious Drains to the proposed BMP	15783.9	0.36											
19	Parcel Area	633,638	14.55											
20	Disturbed area by the project that drains to BMPs	432,792	9.94											
21	proposed landscaped slopes that drains directly to the brow ditches and bypass system (Self Mitigating)	10,358	0.24											
22	Project Proposed Pervious area (including Self mitigating slopes)	131,001	3.01											
23	Total Disturbed Area	443,150	10.17											

Infiltration Feasibility Checklists



Appendix D: Approved Infiltration Rate Assessment Methods

Infiltration Restrictions		Form 4	
Retention is required at the project site to the maximum extent practicable. Complete this form to summarize applicable infiltration restrictions. Supporting documentation must be provided in the Attachments.			
Restriction Element		Applicable?	
Mandatory Considerations	BMP is within 100 feet of contaminated soils	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 100 feet of industrial activities lacking source control	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 100 feet of well/groundwater basin	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 50 feet of septic tanks/leach fields	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of structures/tanks/walls	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of sewer utilities	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 10 feet of groundwater table	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within hydric soils	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within highly liquefiable soils and has connectivity to structures	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	BMP is within 1.5 times the height of adjacent steep slopes ($\geq 25\%$)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
	City staff has assigned "Restricted" Infiltration Category	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Optional Considerations	BMP is within predominantly Type D soil	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	BMP is within 10 feet of property line	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	BMP is within fill depths of ≥ 5 feet (existing or proposed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	BMP is within 10 feet of underground utilities	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	BMP is within 250 feet of ephemeral stream	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other (provide detailed geotechnical support in Attachment 6)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Result	Unrestricted – No restriction elements are applicable	<input type="checkbox"/>	
	Restricted – One or more restriction elements are applicable	<input checked="" type="checkbox"/>	




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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.

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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.



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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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.</p> <p>Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</p>			
Part 1 Result *	<p>If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration</p> <p>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</p>	<input type="checkbox"/> Full Infiltration <input checked="" type="checkbox"/> 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



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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Provide basis: Assumed “No” but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.

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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Provide basis: Assumed “No” but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.

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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.</p> <p>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.</p>			
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Provide basis: Assumed "No" but not confirmed. Infiltration deemed infeasible by the Geotechnical Engineer. See Form 4.</p> <p>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.</p>			
Part 2 Result*	<p>If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration.</p> <p>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.</p>	<input type="checkbox"/> Partial Infiltration <input checked="" type="checkbox"/> 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



Pollutant Control BMP Design Calculations



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

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 1	DMA 2									unitless	
	2	85th Percentile 24-hr Storm Depth	0.67	0.67									inches	
	3	Impervious Surfaces <u>Not Directed to Dispersion Area</u> (C=0.90)	300,454	27,479										sq-ft
	4	Semi-Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.30)	0	0										sq-ft
	5	Engineered Pervious Surfaces <u>Not Serving as Dispersion Area</u> (C=0.10)	102,068	7,274										sq-ft
	6	Natural Type A Soil <u>Not Serving as Dispersion Area</u> (C=0.10)	0	0										sq-ft
	7	Natural Type B Soil <u>Not Serving as Dispersion Area</u> (C=0.14)	0	0										sq-ft
	8	Natural Type C Soil <u>Not Serving as Dispersion Area</u> (C=0.23)	0	0										sq-ft
	9	Natural Type D Soil <u>Not Serving as Dispersion Area</u> (C=0.30)	42,012	0										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	No	No	No	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												#
	19	Average Mature Tree Canopy Diameter												ft
	20	Number of Rain Barrels Proposed per SD-E												#
Initial Runoff Factor Calculation	21	Average Rain Barrel Size											gal	
	22	Total Tributary Area	444,534	34,753	0	0	0	0	0	0	0	0	sq-ft	
	23	Initial Runoff Factor for Standard Drainage Areas	0.66	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	unitless
	25	Initial Weighted Runoff Factor	0.66	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	26	Initial Design Capture Volume	16,381	1,416	0	0	0	0	0	0	0	0	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	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	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.66	0.73	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	32	Design Capture Volume After Dispersion Techniques	16,381	1,416	0	0	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	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	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	36	Final Effective Tributary Area	293,392	25,370	0	0	0	0	0	0	0	0	0	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	16,381	1,416	0	0	0	0	0	0	0	0	0	cubic-feet

No Warning Messages

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

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units	
Basic Analysis	1	Drainage Basin ID or Name	DMA 1	DMA 2	-	-	-	-	-	-	-	-	unitless	
	2	85th Percentile Rainfall Depth	0.67	0.67	-	-	-	-	-	-	-	-	inches	
	3	Predominant NRCS Soil Type Within BMP Location	B	D									unitless	
	4	Is proposed BMP location Restricted or Unrestricted for Infiltration Activities?	Restricted	Restricted									unitless	
	5	Nature of Restriction	Slopes	n/a									unitless	
	6	Do Minimum Retention Requirements Apply to this Project?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes/no
	7	Are Habitable Structures Greater than 9 Stories Proposed?	no	No										yes/no
Advanced Analysis	8	Has Geotechnical Engineer Performed an Infiltration Analysis?	No	No									yes/no	
	9	Design Infiltration Rate Recommended by Geotechnical Engineer											in/hr	
Result	10	Design Infiltration Rate Used To Determine Retention Requirements	0.000	0.000	-	-	-	-	-	-	-	-	in/hr	
	11	Percent of Average Annual Runoff that Must be Retained within DMA	1.5%	1.5%	-	-	-	-	-	-	-	-	percentage	
	12	Fraction of DCV Requiring Retention	0.01	0.01	-	-	-	-	-	-	-	-	ratio	
	13	Required Retention Volume	164	14	-	-	-	-	-	-	-	-	cubic-feet	
No Warning Messages														

14 CFT REQUIRED MINIMU RETENTION FOR DMA 2 IS PROVIDED WITHIN THE BIOFILTRATION AREA IN BF-1-1
 TOTAL REQUIRED RETENTION VOLUME FOR THE PROJECT (DMA1 + DMA 2) = 164+14= 178 CFT
 VOLUME RETAINED BY BF-1-1 (LINE 27 IN STEP 3: WORKSHEET B.3 : BMP PERFORMANCE)= 2,143 CFT > 178 CFT

Automated Worksheet B.3: BMP Performance (V2.0)

Category	#	Description	i	ii	iii	iv	v	vi	vii	viii	ix	x	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA 1	DMA 2	-	-	-	-	-	-	-	-	sq-ft
	2	Design Infiltration Rate Recommended	0.000	0.000	-	-	-	-	-	-	-	-	in/hr
	3	Design Capture Volume Tributary to BMP	16,381	1,416	-	-	-	-	-	-	-	-	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated										unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined										unitless
	6	Does BMP Have an Underdrain?	Underdrain										unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard										unitless
	8	Provided Surface Area	9,100										sq-ft
	9	Provided Surface Ponding Depth	6										inches
	10	Provided Soil Media Thickness	24										inches
	11	Provided Gravel Thickness (Total Thickness)	12										inches
	12	Underdrain Offset	3										inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	1.50										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	1.00	1.00	1.00	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	0.40	0.40	0.40	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	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	25	Calculated Retention Storage Drawdown Time	120	0	0	0	0	0	0	0	0	0	hours
	26	Efficacy of Retention Processes	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	2,143	0	0	0	0	0	0	0	0	0	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	14,238	1,416	0	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	0.1055	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.50	0.00	0.00	0.00	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	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	0.00	0.00	0.00	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	14.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	38	Drawdown Time for Surface Ponding	12	0	0	0	0	0	0	0	0	0	hours
	39	Drawdown Time for Effective Biofiltration Depth	29	0	0	0	0	0	0	0	0	0	hours
	40	Total Depth Biofiltered	17.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	21,357	2,124	0	0	0	0	0	0	0	0	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	13,199	0	0	0	0	0	0	0	0	0	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	10,678	1,062	0	0	0	0	0	0	0	0	cubic-feet
	44	Option 2 - Provided Storage Volume	10,678	0	0	0	0	0	0	0	0	0	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	No	-	-	-	-	-	-	-	-	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	48	Deficit of Effectively Treated Stormwater	0	-1,416	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

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.

ALTA OCEANSIDE

COMPACT BIOFILTRATION SIZING CALCULATION

DMA 1: Compact Biofiltration Design Flows		Worksheet B.6-1		
1	DCV	DCV	1,416	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	1,416	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.80	acres
8	using Appendix B.2)	C=	0.73	unitless
9	Calculate Flow Rate = AF x (C x i x A) x1.5	Q=	0.175	cfs

- Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of Compact Biofiltration BMPs. That is, if the Compact Biofiltration BMP is upstream of the project's retention and biofiltration BMPs then the Compact Biofiltration BMP shall be sized using an adjustment factor of 1.
- Volume based (e.g., dry extended detention basin) Compact Biofiltration treatment control BMPs shall be sized to the volume in Line 4 and flow based (e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow rate in Line 9
- Proprietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.
- Compact Biofiltration treatment control BMPs shall be sized to filter or treat the maximum flow rate of runoff produced from a rainfaill intensity of 0.2 inch of rainfall per hour, or each hour of every storm event



Filterra Sizing Spreadsheet
San Diego Region
Uniform Intensity Approach
Storm Intensity = 0.20 in/hr

Filterra Infiltration Rate = 175 (in/hr)
 Filterra Flow per Square Foot = 0.00405 (ft³/sec/ft²)

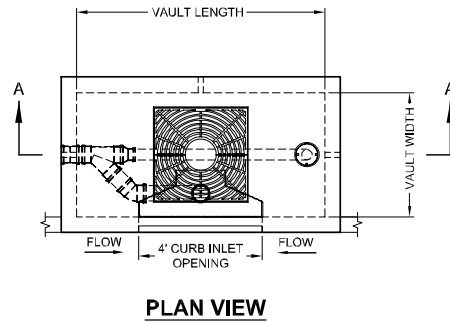
Filterra Flow Rate, Q = 0.00405 ft³/sec x Filterra Surface Area
 Rational Method, Q = C x I x A
 San Diego Multiplier, M = 1.5

OR Site Flowrate, Q = (C x DI x DA x M x 43560) / (12 x 3600)
 DA = (12 x 3600 x Q) / (C x 43560 x DI x M)

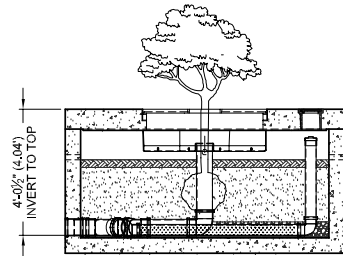
where Q = Flow (ft³/sec)
 DA = Drainage Area (acres)
 DI = Design Intensity (in/hr)
 C = Runoff coefficient (dimensionless)
 M = Multiplier (dimensionless)

			DI 0.2	C 0.95	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra Flow Rate, Q (ft ³ /sec)	100% Imperv. DA (acres)	Commercial max DA (acres)	Residential max DA (acres)
L (ft)	W (ft)	Filterra Surface Area (ft ²)				
4	4	16	0.0648	0.226	0.252	0.429
6	4	24	0.0972	0.338	0.378	0.643
6.5	4	26	0.1053	0.367	0.410	0.696
8	4	32	0.1296	0.451	0.504	0.857
12	4	48	0.1944	0.677	0.756	1.286
6	6	36	0.1458	0.507	0.567	0.964
8	6	48	0.1944	0.677	0.756	1.286
10	6	60	0.2431	0.846	0.945	1.607
12	6	72	0.2917	1.015	1.134	1.928
13	7	91	0.3686	1.283	1.434	2.437
12	8	96	0.3889	1.353	1.512	2.571
14	8	112	0.4537	1.579	1.765	3.000
16	8	128	0.5185	1.804	2.017	3.428
18	8	144	0.5833	2.030	2.269	3.857
20	8	160	0.6481	2.255	2.521	4.285
22	8	176	0.7130	2.481	2.773	4.714

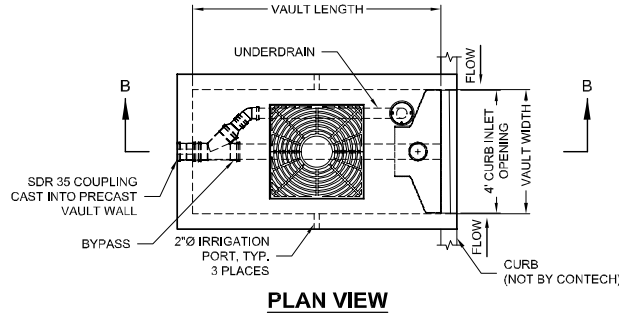
FTIBFC LONG SIDE CURB INLET LAYOUT DETAIL/SDR35 FTIBFC FILTERRA INTERNAL BYPASS CURB INLET CONFIG DETAIL/DWG #180017 8/14/AM



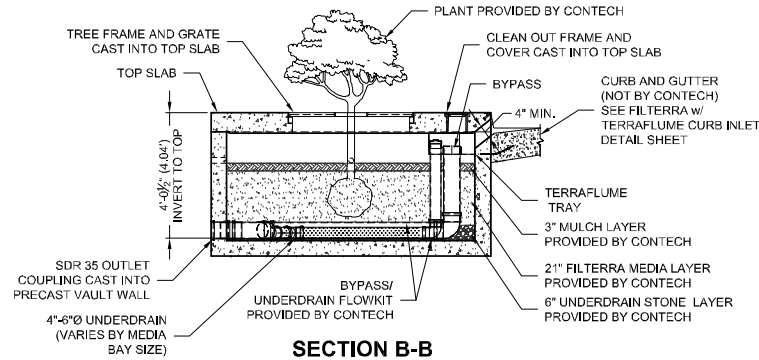
PLAN VIEW



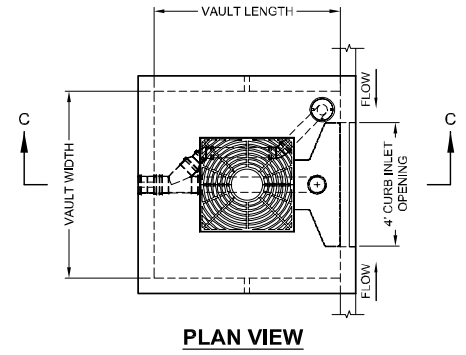
SECTION A-A



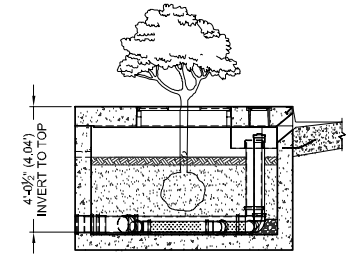
PLAN VIEW



SECTION B-B



PLAN VIEW



SECTION C-C

FTIBFC LONG SIDE CURB INLET

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	MAX. OUTLET/BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBFC0604	N/A CA	6 x 4	6 x 4	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC06504	CA ONLY	6.5 x 4	6.5 x 4	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC078045	MID-ATL ONLY	7.83 x 4.5	7.83 x 4.5	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC0804	N/A MID-ATL	8 x 4	8 x 4	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC0806	ALL	8 x 6	8 x 6	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBFC1006	ALL	10 x 6	10 x 6	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBFC1206	ALL	12 x 6	12 x 6	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'
FTIBFC1307	ALL	13 x 7	13 x 7	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE

FTIBFC SHORT SIDE CURB INLET

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (W x L)	MAX. OUTLET/BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBFC0406	N/A CA	4 x 6	4 x 6	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC04065	CA ONLY	4 x 6.5	4 x 6.5	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC0408	N/A MID-ATL	4 x 8	4 x 8	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC045078	MID-ATL ONLY	4.5 x 7.83	4.5 x 7.83	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'
FTIBFC0608	ALL	6 x 8	6 x 8	10" SDR 35	2.37	4" SDR 35	(1) 4' x 4'
FTIBFC0610	ALL	6 x 10	6 x 10	10" SDR 35	2.37	6" SDR 35	(1) 4' x 4'
FTIBFC0612	ALL	6 x 12	6 x 12	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'
FTIBFC0713	ALL	7 x 13	7 x 13	10" SDR 35	2.37	6" SDR 35	(2) 4' x 4'

N/A = NOT AVAILABLE

FTIBFC SQUARE CURB INLET

DESIGNATION	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (L x W)	MAX. OUTLET/BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF)	TREE GRATE QTY. & SIZE
FTIBFC0404	ALL	4 x 4	4'-0"	6" SDR 35	1.42	4" SDR 35	(1) 3' x 3'
FTIBFC0606	ALL	6 x 6	6'-0"	8" SDR 35	1.89	4" SDR 35	(1) 3' x 3'

N/A = NOT AVAILABLE

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE.



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 9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
 800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA INTERNAL BYPASS CURB (FTIBFC) CONFIGURATION DETAIL

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC or one of its affiliated companies ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use. If discrepancies between the specified information upon which this drawing is based and actual field conditions are encountered as the work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for decisions based on whether incomplete or inaccurate information supplied by others.

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)	<input checked="" type="checkbox"/> 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.	<input type="checkbox"/> Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination <input type="checkbox"/> 6.2.1 Verification of Geomorphic Landscape Units Onsite <input type="checkbox"/> 6.2.2 Downstream Systems Sensitivity to Coarse Sediment <input type="checkbox"/> 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.	<input type="checkbox"/> Not performed <input type="checkbox"/> Included <input type="checkbox"/> 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	<input type="checkbox"/> Included <input type="checkbox"/> Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	<input type="checkbox"/> Included <input type="checkbox"/> 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.




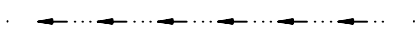







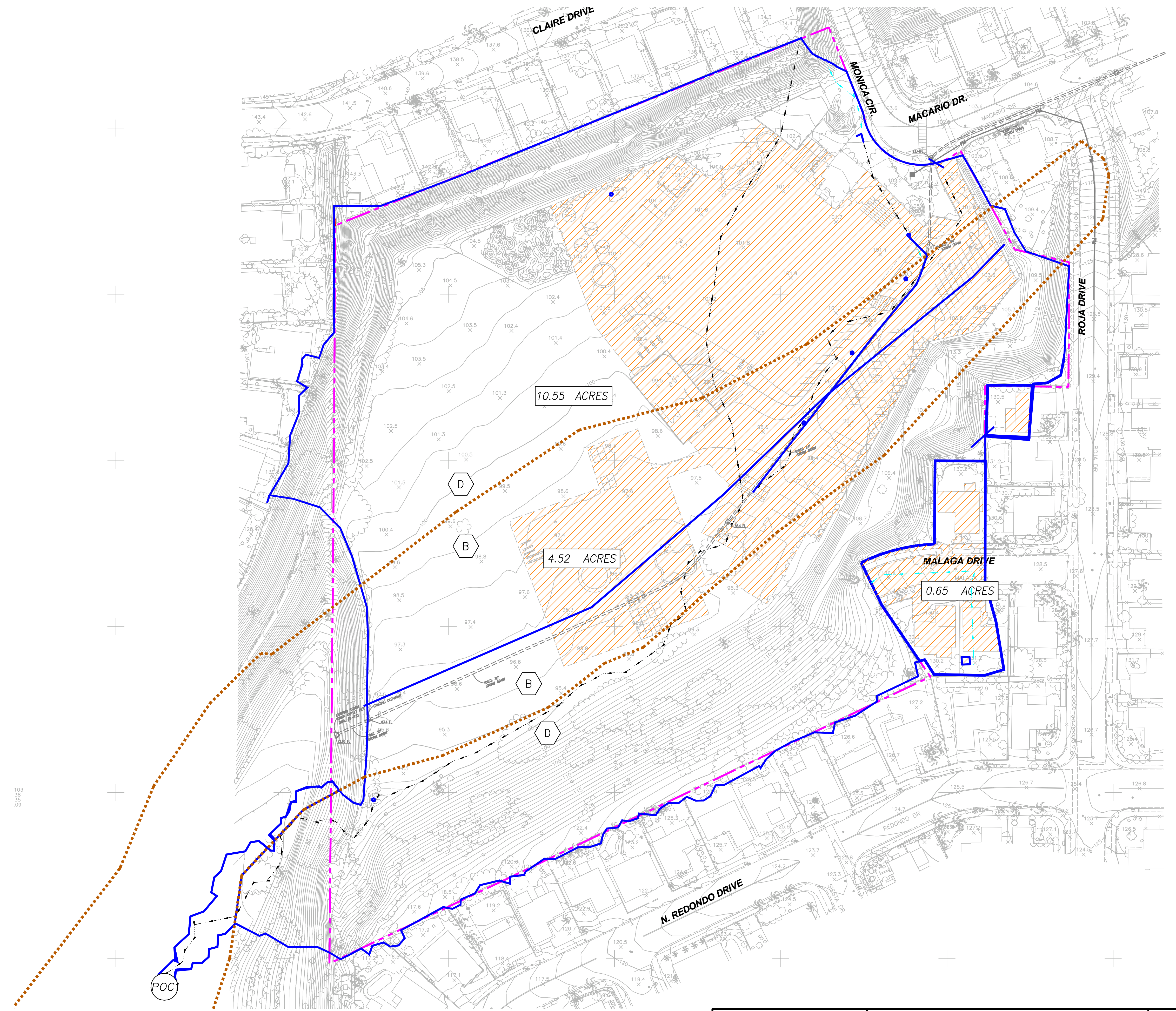
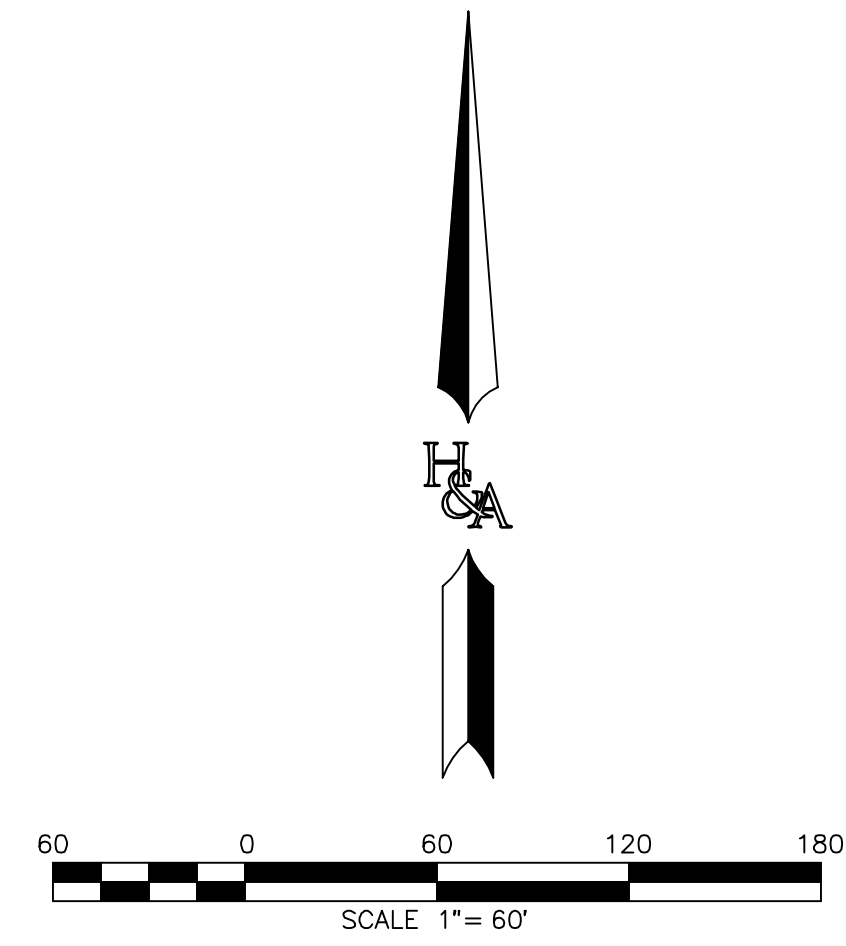
Placeholder – **Hydromodification Management Exhibit**


Replace placeholder with required exhibit.





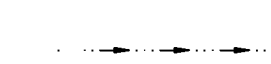



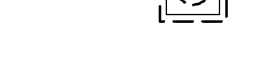
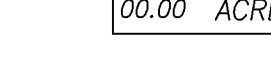










LEGEND

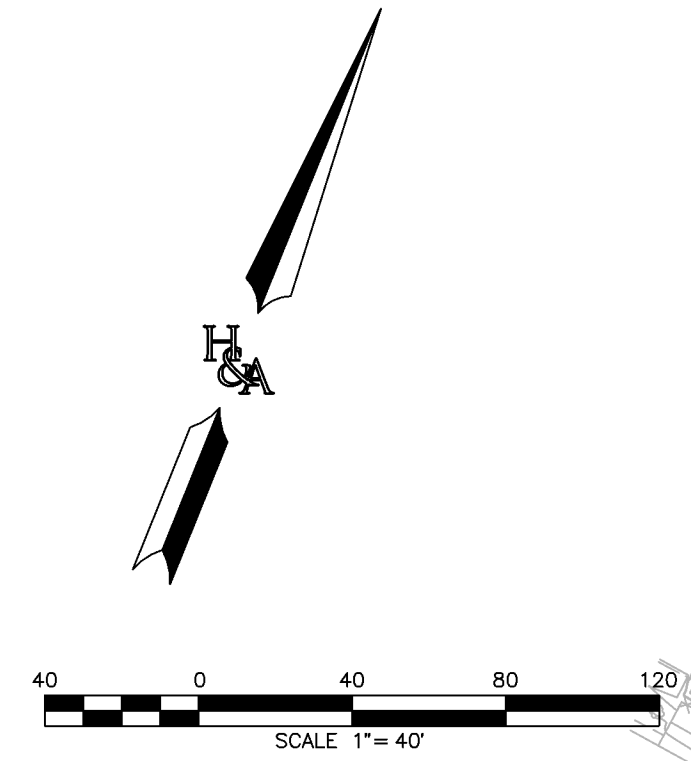
-  PROJECT BOUNDARY
-  DRAINAGE BOUNDARY
-  INITIAL SUBAREA
-  FLOW DIRECTION
-  AREA
-  HYDROLOGIC SOIL TYPE
-  NODE NUMBER
-  SOIL BOUNDARY
-  EXISTING IMPERVIOUS AREA




<p>PREPARED BY:</p>  <p>HUNSAKER & ASSOCIATES SAN DIEGO, INC</p> <p>PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(619)558-4500 FX(619)558-1414</p>	<p>HMP EXISTING PACIFIC SITE</p> <p>CITY OF OCEANSIDE, CALIFORNIA</p>	<p>MAP 1 OF 1</p>
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LEGEND

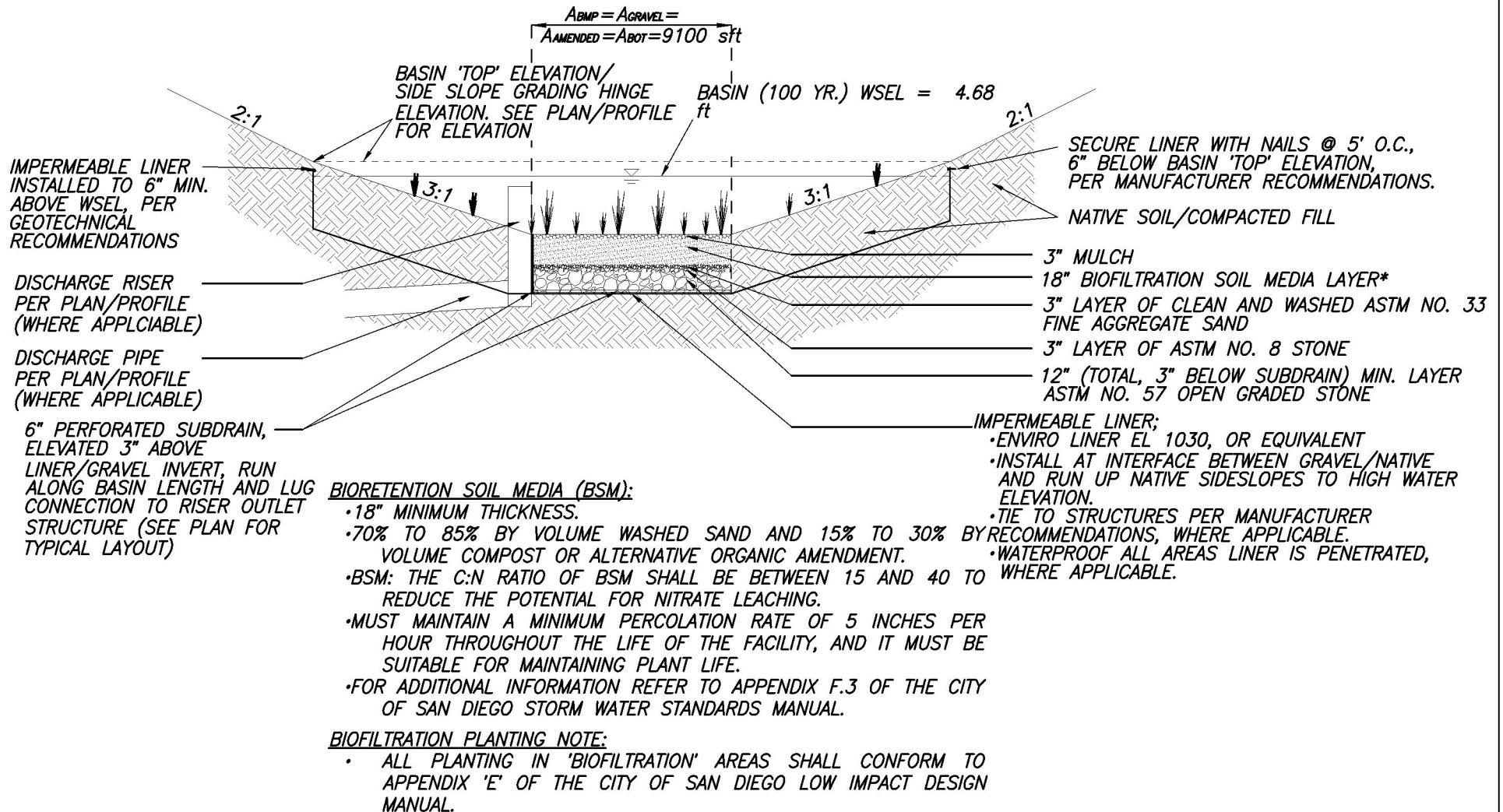
-  PROJECT BOUNDARY
-  DMA BOUNDARY
-  FLOW DIRECTION
-  BYPASS STORM DRAIN
-  STORM DRAIN
-  ON-SITE STORM DRAIN INLETS
-  SUBAREA ACREAGE
- DMA 1** DMA ICON
-  IMPERVIOUS - ROAD/SIDEWALK/ DRIVEWAY
-  IMPERVIOUS - ROOF/BUILDING
-  PERVIOUS - LANDSCAPE
-  BIOFILTRATION BASIN
-  HYDROLOGIC SOIL TYPE
-  POINT OF COMPLIANCE
-  STRUCTURAL BMP
-  SOIL BOUNDARY
-  EXISTING IMPERVIOUS AREA
-  DECOMPOST GRANULET
-  DISTURBED AREA BOUNDARY



UNDERLYING SOIL GROUP : B & D
 APPROXIMATE DEPTH TO GROUNDWATER > 20'
 NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

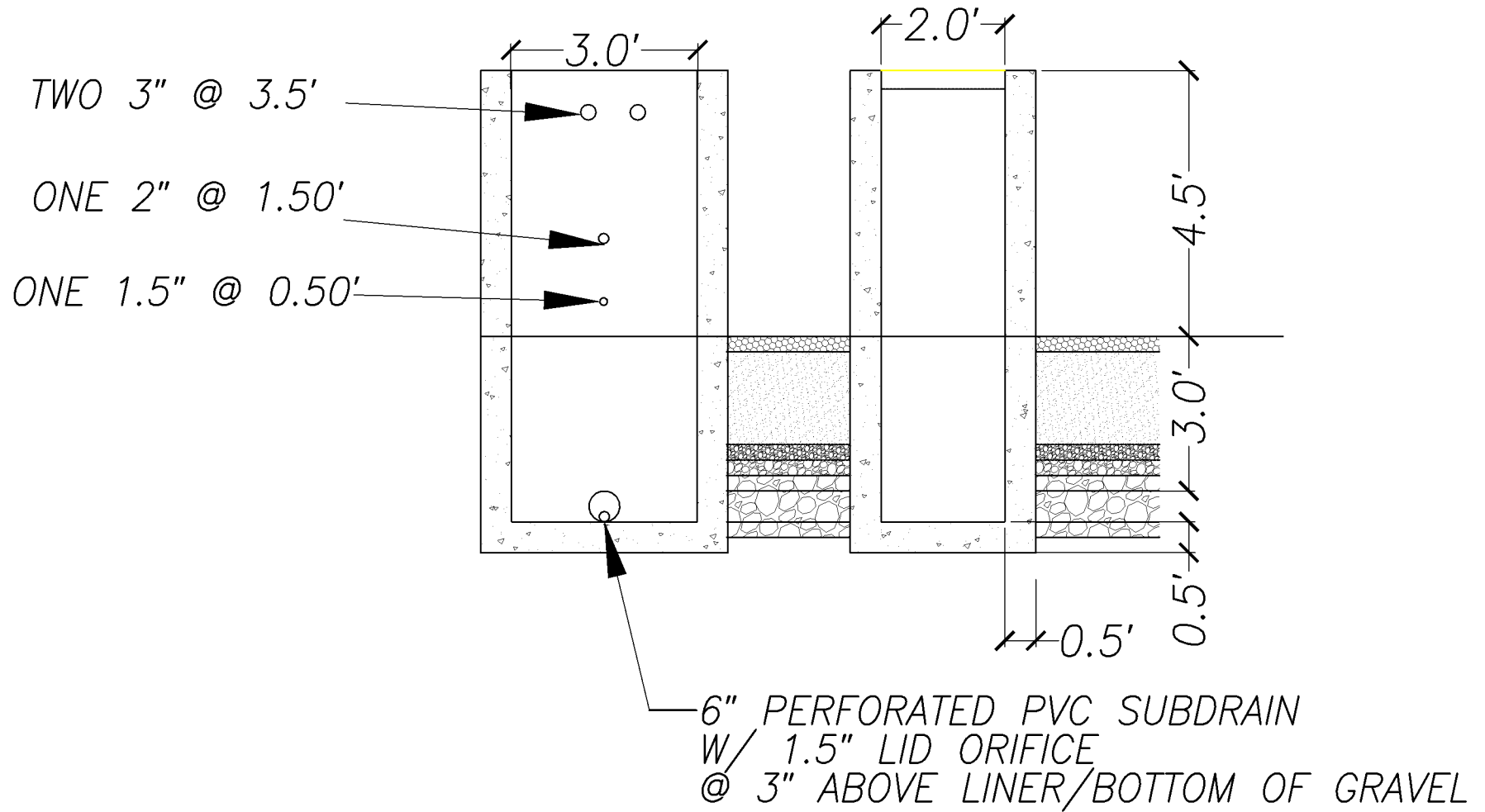
PREPARED BY:  HUNSAKER & ASSOCIATES SAN DIEGO, INC. PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(858)558-4500 - FX(858)558-1414	HMP PROPOSED PACIFIC SITE CITY OF OCEANSIDE, CALIFORNIA	MAP 1 OF 1 <small>W.C.# 2007-2010</small>
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BIOFILTRATION BASIN CROSS SECTION



SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN

NOT TO SCALE



PRIVATE BIOFILTRATION BASIN BF-1-1

RISER DETAIL

Placeholder – **WMAA Exhibit**



Replace placeholder with required exhibit.



PACIFICA SITE

CCSYA WMAA MAP

Legend

-  4991 Macario Dr
-  CCSYA



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

Replace placeholder with required calculations/documentation.

Leave placeholder intact if not applicable.

Not Applicable

NOT APPLICABLE



Downstream Systems Sensitivity to Coarse Sediment		Form I-10	
When it has been determined that potential critical coarse sediment yield areas exist within the project site, the next step is to determine whether downstream systems would be sensitive to reduction of coarse sediment yield from the project site. Use this form to document the evaluation of downstream systems requirements for preservation of coarse sediment supply.			
Project Name:			
Project Tracking Number / Permit Application Number:			
1	Will the project discharge runoff to a hardened MS4 system (pipe or lined channel) or an un-lined channel?	<input type="checkbox"/> Hardened MS4 system	Go to 2
		<input type="checkbox"/> Un-lined channel	Go to 4
2	Will the hardened MS4 system convey sediment (e.g., a concrete-lined channel with steep slope and cleansing velocity) or sink sediment (e.g., flat slopes, constrictions, treatment BMPs, or ponds with restricted outlets within the system will trap sediment and not allow conveyance of coarse sediment from the project site to an un-lined system).	<input type="checkbox"/> Convey	Go to 3
		<input type="checkbox"/> Sink	Go to 7
3	What kind of receiving water will the hardened MS4 system convey the sediment to?	<input type="checkbox"/> Un-lined channel	Go to 4
		<input type="checkbox"/> Lake	Go to 7
		<input type="checkbox"/> Reservoir	
		<input type="checkbox"/> Bay	
4	Is the un-lined channel impacted by deposition of sediment? This condition must be documented by the local agency.	<input type="checkbox"/> Lagoon	Go to 6
		<input type="checkbox"/> Ocean	
		<input type="checkbox"/> Yes	Go to 7
		<input type="checkbox"/> No	Go to 5

NOT APPLICABLE



5	End – Preserve coarse sediment supply to protect un-lined channels from accelerated erosion due to reduction of coarse sediment yield from the project site unless further investigation determines the sediment is not critical to the receiving stream. Sediment that is critical to receiving streams is the sediment that is a significant source of bed material to the receiving stream (bed sediment supply) (see Section 6.2.3 and Appendix H.2 of the manual).
6	End – Provide management measures for preservation of coarse sediment supply (protect beach sand supply).
7	End – Downstream system does not warrant preservation of coarse sediment supply, no measures for protection of critical coarse sediment yield areas onsite are necessary. Use the space below to describe the basis for this finding for the project.

NOT APPLICABLE



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

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

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



INTRODUCTION

This report provides results for hydromodification management for Pacifica Site “the project” in the City of Oceanside, CA. Most of the developed area of the project drains to one biofiltration basin southwest of the site, while a small portion (0.8 ac) east of the site drains northerly away from the biofiltration basin towards Macario Dr. The flow will be captured via proposed proprietary biofiltration flow-based BMP “BF-3-2” (Filterra Unit or equivalent), to address water quality requirements before entering the bypassed storm drain system that will convey the flow to POC1 southwest of the project, where it commingles with the biofiltration basin discharge.

Environmental Protection Agency (EPA) Storm Water Management Model 5.1 (SWMM) has been used for hydromodification analysis. SWMM models were prepared for the pre and post developed conditions at the POC in order to determine if the proposed biofiltration facility has sufficient footprint to meet the current Hydromodification Management Plan (HMP) requirements from the Regional Water Quality Control Board (RWQCB).

The table below provides reports tributary area in both pre and post development conditions, demonstrating that all areas are analyzed in the various section discussed above.

	To POC 1 (AC)
Pre developed Area	15.67
Proposed Area	15.67

See the pre-developed and Proposed Hydromodification Exhibits depicting these areas.

POC1 Watershed Parameters

Pre developed Conditions

DMA1-EX-SoilB			DMA1-EX-Soil D			DMA2-EX-Soil D-offsite		
L=	737	ft	L=	1179	ft	L=	246	ft
A=	4.464	ac	A=	10.55	ac	A=	0.66	ac
% Impervious	52.6%	0% used	% Impervious	22.0%	0% used	% Impervious	55.2%	
W=	264	ft	W=	390	ft	W=	117	ft
US Elev=	109	ft	US Elev=	133	ft	US Elev=	131	ft
DS Elev=	97	ft	DS Elev=	68	ft	DS Elev=	125	ft
S=	1.67%		S=	5.52%		S=	2.52%	

Proposed Conditions

DMA1-SoilB (via Basin)-PR			DMA1-SoilD (via Basin)-PR			DMA1-EX-Soil D-offsite-(via Basin)		
L=	100	ft	L=	100	ft	L=	100	ft
A=	3.945	ac	A=	5.600	ac	A=	0.66	ac
% Impervious	70.52%		% Impervious	66.97%		% Impervious	55.2%	
W=	1718	ft	W=	2439	ft	W=	287	ft
US Elev=	103	ft	US Elev=	104	ft	US Elev=	131	ft
DS Elev=	95	ft	DS Elev=	97	ft	DS Elev=	125	ft
S=	1.00%		S=	1.00%		S=	6.20%	

BF-1-1

L=	193	ft
A=	0.209	ac
W=	47	
US Elev=	88.01	ft
DS Elev=	88.00	ft
S=	0.005%	

DMA 2(Non-Basin)-SOILB

DMA 2(Non-Basin)-SOILD

L=	100	ft	L=	100	ft
A=	0.310	ac	A=	0.490	ac
% Impervious	79.78%		% Impervious	79.78%	
W=	135	ft	W=	213	ft
US Elev=	103	ft	US Elev=	102.95	ft
DS Elev=	102.20	ft	DS Elev=	101.95	ft
S=	1.00%		S=	1.00%	

BYPASS (NON-BASIN)-D				
L=	1614	ft		
A=	4.46	ac		
% Impervious	0.000%			
W=	120	ft		
US Elev=	133	ft		
DS Elev=	68	ft		
S=	4.03%			

SWMM MODEL DEVELOPMENT

Two (2) SWMM models were prepared for this study, one for the point of compliance (POC) in pre-developed condition and one for the POC in the proposed condition. For all SWMM models, flow duration curves were prepared to determine if the proposed biofiltration footprint was sufficient to meet the current HMP requirements.

The inputs required to develop SWMM models include rainfall, watershed characteristics, and BMP configurations. The Oceanside Gage from the Project Clean Water website was used for this study, since it is the closest rain gage.

Evaporation for the site was modeled using average monthly values from the County hourly dataset. The site was modeled with hydrologic soil groups B and D soils as determined from the USGS Survey web-based Soil Survey Map. Other SWMM inputs for the subareas are discussed in the appendix to this document where the selection of the parameters is explained in detail.

BIORETENTION MODELING

Developed storm water runoff from the project site is routed through one (1) biofiltration basin located within the main project boundary. Flows from the proposed residences drain to the aforementioned biofiltration area via storm drain and overland flow, ultimately leaving the site through a southerly draining natural channel.

Basin Discussion:

Flow control in the basin is achieved by using a subdrain with an orifice for flow control, in addition to a spillway near the top of the basin. The design information is presented in the Basin Table below. Sizing and further peak flow discussion will be in the “Drainage Report for Pacifica Site”.

Basin Table

		BF-1-1
Riser/Spillway Height (ft)*		4.50
Spillway Width (ft)		10
Basin Depth (ft)		6
Amended Soil Depth (in)+3in Mulch+ sand filter layer		24
Class 2 Perm. Depth (in)+stone filter layer		12
Biofiltration bottom Area (sf)		9,100
Sub-Drain Orifice		
	No. of Orifices	1
	Diameter (in)	1.5

*From finish grade.

FLOW DURATION CURVE COMPARISON

The Flow Duration Curves (FDC) for the site were compared at the POC by exporting the hourly runoff time series results from SWMM to a spreadsheet. FDC was compared between 10% of the pre-developed condition Q_2 up to the pre-developed condition Q_{10} . The Q_2 and Q_{10} were determined using a partial duration statistical analysis of the runoff time series in an Excel spreadsheet using the Cunnane plotting position method (which is the preferred plotting methodology in the HMP Permit). As the SWMM Model is a statistical analysis based on the Weibull Plotting Position Method, the Weibull Method was also used within the spreadsheet to ensure that the results were similar to those obtained by the SWMM Model.

The range between 10% of Q_2 and Q_{10} was divided into 100 equal time intervals; the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally, the intermediate peaks with a return period “i” were obtained (Q_i with $i=3$ to 9). For the purpose of the plot, the values were presented as percentage of time exceeded for each flow rate.

FDC comparisons at the POC are illustrated in Figure 1 in logarithmic scale. Attachment 7 provides a detailed drainage exhibit for the post-developed condition.

As can be seen in Figure 1, the FDC’s for the proposed condition with the biofiltration basin is within 110% of the curve for the pre-developed condition. The additional runoff volume generated from developing the site will be released downstream at a flow rate below the 10% Q_2 lower threshold. Additionally, the project will also not increase peak flow rates between the 10% Q_2 and the Q_{10} , as shown in the graphic and also in the attached table.

SUMMARY

This study has demonstrated that the proposed biofiltration footprint at the Pacifica Site project is sufficient to meet the current HMP criteria if the biofiltration cross-section area and volume recommended within this memo are incorporated within the proposed project site.

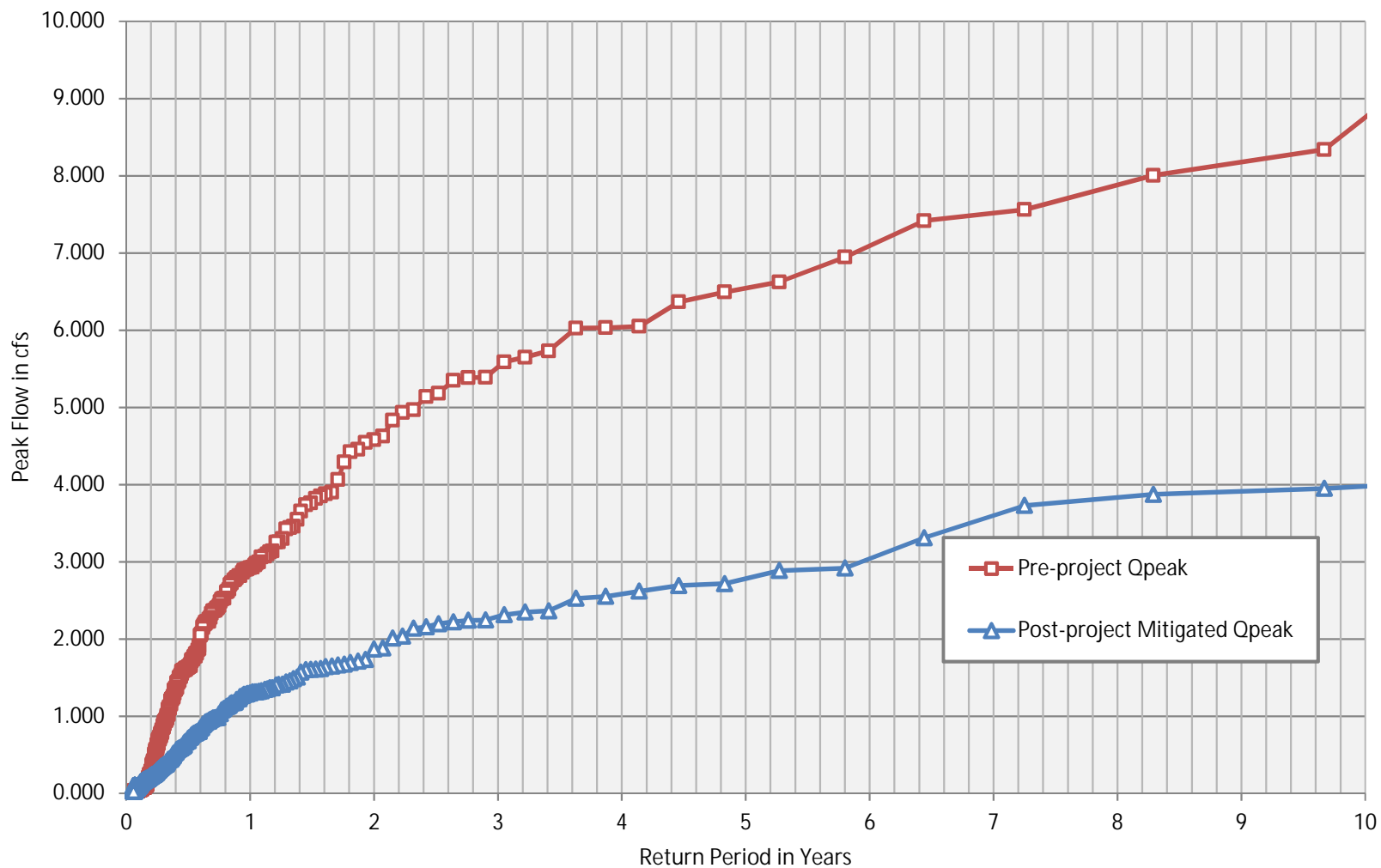
ATTACHMENTS

1. Q₂ to Q₁₀ Comparison Table
2. FDC Plot (log “x” scale) and Flow Duration Table.
3. List of Peak Events and Determination of Q₂ & Q₁₀
4. Elevation vs. Area Curves and Elevations vs. Discharge Curves to be used in SWMM
5. Biofiltration Detail
6. SWMM Input Data in Input Format (Pre-developed and Proposed Models)
7. SWMM Screens and Explanation of Significant Variables
8. Drying time of the Surface Layer of Bio-retention cell
9. Hydromodification Watershed Maps
10. USGS Soil Map for justification of Soil Type Conditions

Peak Flow Frequency Summary

Return Period	Pre-project Q _{peak} (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.458	0.187
2-year	4.581	1.869
5-year	6.545	2.783
10-year	8.757	3.979

POC 1 Peak Flow Frequency Curves



ATTACHMENT 2 - Flow Duration Curve Analysis, Plot & Table

Flow duration curve shall not exceed the pre-develop conditions by more than 10% neither in peak flow nor duration.

The figure on the following page illustrates that the flow duration curve in post-development conditions after the proposed BMPs is below the pre-developed flow duration curve. The flow duration curve table following the curve shows that if the interval $0.10Q_2 - Q_{10}$ is divided in 100 sub-intervals, then a) the post development divided by pre-development durations are never larger than 110% (the permit allows up to 110%); and b) there are no more than 10 intervals in the range 101%-110% which would imply an excess over 10% of the length of the curve (the permit allows less than 10% of excesses measured as 101-110%).

Consequently, the design passes the hydromodification test.

It is important to note that the flow duration curve can be expressed in the "x" axis as percentage of time, hours per year, total number of hours, or any other similar time variable. As those variables only differ by a multiplying constant, their plot in logarithmic scale is going to look exactly the same and compliance can be observed regardless of the variable selected. The selection of a logarithmic scale in lieu of the normal scale is preferred, as differences between the pre-development and post-development curves can be seen more clearly in the entire range of analysis. Log graphics is presented for reference.

In terms of the "y" axis, the peak flow value is the variable of choice. As an additional analysis performed by H&A, not only the range of analysis is clearly depicted (10% of Q_2 to Q_{10}) but also all intermediate flows are shown (30% of Q_2 , 50% of Q_2 , Q_2 , Q_3 , Q_4 , Q_5 , Q_6 , Q_7 , Q_8 and Q_9) in order to demonstrate compliance at any range $Q_x - Q_{x+1}$. It must be pointed out that one of the limitations of both the SWMM and SDHM models is that the intermediate analysis is not performed (to obtain Q_i from $i = 2$ to 10). H&A performed the analysis using the Cunnane Plotting position Method (the preferred method in the HMP permit) from the "n" largest independent peak flows obtained from the continuous time series.

The largest "n" peak flows are attached in this appendix, as well as the values of Q_i with a return period "i", from $i=2$ to 10. The Q_i values are also added into the flow-duration plot.

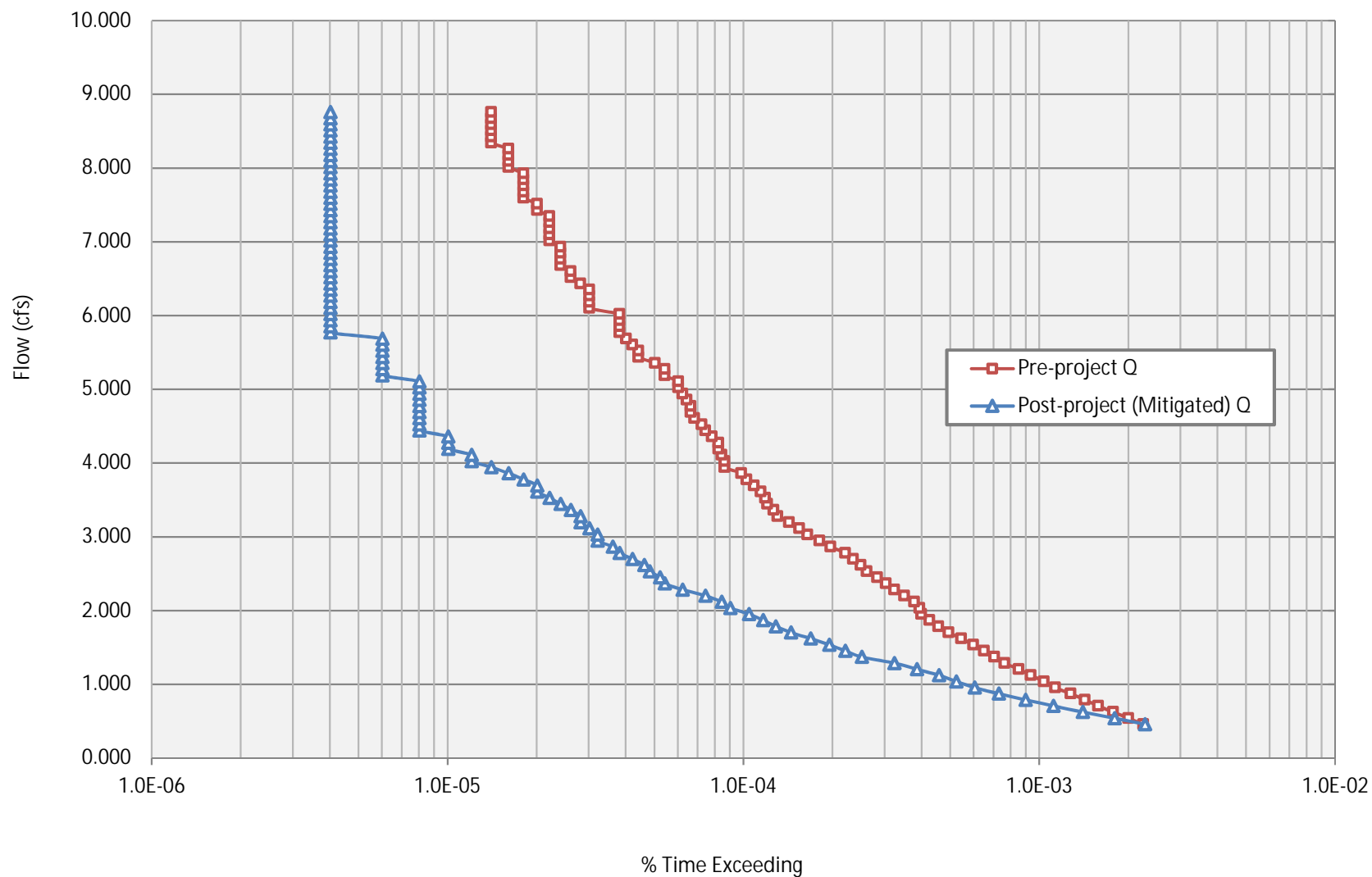
Low-flow Threshold: 10%
 0.1xQ2 (Pre): 0.458 cfs
 Q10 (Pre): 8.757 cfs
 Ordinate #: 100
 Incremental Q (Pre): 0.08299 cfs
 Total Hourly Data: 497375 hours

The proposed BMP: POC1 PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.458	1120	2.25E-03	1132	2.28E-03	101%	Pass
1	0.541	997	2.00E-03	894	1.80E-03	90%	Pass
2	0.624	885	1.78E-03	698	1.40E-03	79%	Pass
3	0.707	787	1.58E-03	556	1.12E-03	71%	Pass
4	0.790	710	1.43E-03	447	8.99E-04	63%	Pass
5	0.873	635	1.28E-03	363	7.30E-04	57%	Pass
6	0.956	563	1.13E-03	301	6.05E-04	53%	Pass
7	1.039	516	1.04E-03	261	5.25E-04	51%	Pass
8	1.122	466	9.37E-04	228	4.58E-04	49%	Pass
9	1.205	424	8.52E-04	192	3.86E-04	45%	Pass
10	1.288	380	7.64E-04	161	3.24E-04	42%	Pass
11	1.371	351	7.06E-04	125	2.51E-04	36%	Pass
12	1.454	324	6.51E-04	110	2.21E-04	34%	Pass
13	1.537	298	5.99E-04	97	1.95E-04	33%	Pass
14	1.620	271	5.45E-04	84	1.69E-04	31%	Pass
15	1.703	246	4.95E-04	72	1.45E-04	29%	Pass
16	1.786	227	4.56E-04	64	1.29E-04	28%	Pass
17	1.869	212	4.26E-04	58	1.17E-04	27%	Pass
18	1.952	199	4.00E-04	52	1.05E-04	26%	Pass
19	2.035	196	3.94E-04	45	9.05E-05	23%	Pass
20	2.118	188	3.78E-04	42	8.44E-05	22%	Pass
21	2.201	174	3.50E-04	37	7.44E-05	21%	Pass
22	2.284	161	3.24E-04	31	6.23E-05	19%	Pass
23	2.367	151	3.04E-04	27	5.43E-05	18%	Pass
24	2.450	141	2.83E-04	26	5.23E-05	18%	Pass
25	2.533	130	2.61E-04	24	4.83E-05	18%	Pass
26	2.616	124	2.49E-04	23	4.62E-05	19%	Pass
27	2.699	117	2.35E-04	21	4.22E-05	18%	Pass
28	2.782	110	2.21E-04	19	3.82E-05	17%	Pass
29	2.865	98	1.97E-04	18	3.62E-05	18%	Pass
30	2.948	90	1.81E-04	16	3.22E-05	18%	Pass
31	3.031	82	1.65E-04	16	3.22E-05	20%	Pass
32	3.114	77	1.55E-04	15	3.02E-05	19%	Pass
33	3.197	71	1.43E-04	14	2.81E-05	20%	Pass
34	3.280	65	1.31E-04	14	2.81E-05	22%	Pass
35	3.363	63	1.27E-04	13	2.61E-05	21%	Pass
36	3.446	60	1.21E-04	12	2.41E-05	20%	Pass
37	3.529	59	1.19E-04	11	2.21E-05	19%	Pass
38	3.612	57	1.15E-04	10	2.01E-05	18%	Pass
39	3.695	54	1.09E-04	10	2.01E-05	19%	Pass
40	3.778	51	1.03E-04	9	1.81E-05	18%	Pass
41	3.861	49	9.85E-05	8	1.61E-05	16%	Pass
42	3.944	43	8.65E-05	7	1.41E-05	16%	Pass
43	4.027	43	8.65E-05	6	1.21E-05	14%	Pass
44	4.109	42	8.44E-05	6	1.21E-05	14%	Pass
45	4.192	41	8.24E-05	5	1.01E-05	12%	Pass
46	4.275	41	8.24E-05	5	1.01E-05	12%	Pass
47	4.358	39	7.84E-05	5	1.01E-05	13%	Pass
48	4.441	37	7.44E-05	4	8.04E-06	11%	Pass
49	4.524	36	7.24E-05	4	8.04E-06	11%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
50	4.607	34	6.84E-05	4	8.04E-06	12%	Pass
51	4.690	33	6.63E-05	4	8.04E-06	12%	Pass
52	4.773	33	6.63E-05	4	8.04E-06	12%	Pass
53	4.856	32	6.43E-05	4	8.04E-06	13%	Pass
54	4.939	31	6.23E-05	4	8.04E-06	13%	Pass
55	5.022	30	6.03E-05	4	8.04E-06	13%	Pass
56	5.105	30	6.03E-05	4	8.04E-06	13%	Pass
57	5.188	27	5.43E-05	3	6.03E-06	11%	Pass
58	5.271	27	5.43E-05	3	6.03E-06	11%	Pass
59	5.354	25	5.03E-05	3	6.03E-06	12%	Pass
60	5.437	22	4.42E-05	3	6.03E-06	14%	Pass
61	5.520	22	4.42E-05	3	6.03E-06	14%	Pass
62	5.603	21	4.22E-05	3	6.03E-06	14%	Pass
63	5.686	20	4.02E-05	3	6.03E-06	15%	Pass
64	5.769	19	3.82E-05	2	4.02E-06	11%	Pass
65	5.852	19	3.82E-05	2	4.02E-06	11%	Pass
66	5.935	19	3.82E-05	2	4.02E-06	11%	Pass
67	6.018	19	3.82E-05	2	4.02E-06	11%	Pass
68	6.101	15	3.02E-05	2	4.02E-06	13%	Pass
69	6.184	15	3.02E-05	2	4.02E-06	13%	Pass
70	6.267	15	3.02E-05	2	4.02E-06	13%	Pass
71	6.350	15	3.02E-05	2	4.02E-06	13%	Pass
72	6.433	14	2.81E-05	2	4.02E-06	14%	Pass
73	6.516	13	2.61E-05	2	4.02E-06	15%	Pass
74	6.599	13	2.61E-05	2	4.02E-06	15%	Pass
75	6.682	12	2.41E-05	2	4.02E-06	17%	Pass
76	6.765	12	2.41E-05	2	4.02E-06	17%	Pass
77	6.848	12	2.41E-05	2	4.02E-06	17%	Pass
78	6.931	12	2.41E-05	2	4.02E-06	17%	Pass
79	7.014	11	2.21E-05	2	4.02E-06	18%	Pass
80	7.097	11	2.21E-05	2	4.02E-06	18%	Pass
81	7.180	11	2.21E-05	2	4.02E-06	18%	Pass
82	7.263	11	2.21E-05	2	4.02E-06	18%	Pass
83	7.346	11	2.21E-05	2	4.02E-06	18%	Pass
84	7.429	10	2.01E-05	2	4.02E-06	20%	Pass
85	7.512	10	2.01E-05	2	4.02E-06	20%	Pass
86	7.595	9	1.81E-05	2	4.02E-06	22%	Pass
87	7.678	9	1.81E-05	2	4.02E-06	22%	Pass
88	7.761	9	1.81E-05	2	4.02E-06	22%	Pass
89	7.844	9	1.81E-05	2	4.02E-06	22%	Pass
90	7.927	9	1.81E-05	2	4.02E-06	22%	Pass
91	8.010	8	1.61E-05	2	4.02E-06	25%	Pass
92	8.093	8	1.61E-05	2	4.02E-06	25%	Pass
93	8.176	8	1.61E-05	2	4.02E-06	25%	Pass
94	8.259	8	1.61E-05	2	4.02E-06	25%	Pass
95	8.342	7	1.41E-05	2	4.02E-06	29%	Pass
96	8.425	7	1.41E-05	2	4.02E-06	29%	Pass
97	8.508	7	1.41E-05	2	4.02E-06	29%	Pass
98	8.591	7	1.41E-05	2	4.02E-06	29%	Pass
99	8.674	7	1.41E-05	2	4.02E-06	29%	Pass
100	8.757	7	1.41E-05	2	4.02E-06	29%	Pass

Flow Duration Curve POC 1 [Pre vs. Post (Mitigated)]



ATTACHMENT 3 - List of Peak Events and Determination of Q2 & Q10

Pre-project Flow Frequency - Long-term Simulation

PRE-DEVELOPED

Statistics - Node POCT1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	4/14/2003	15	14.066	0.12	58
2	1/4/1995	13	13.128	0.25	29
3	1/14/1979	33	12.595	0.37	19.33
4	9/29/1983	51	12.561	0.49	14.5
5	1/3/1978	73	10.782	0.61	11.6
6	2/25/2003	53	8.339	0.74	9.67
7	2/23/1969	48	8.006	0.86	8.29
8	2/3/1958	37	7.563	0.98	7.25
9	2/27/1978	142	7.419	1.11	6.44
10	2/13/1980	190	6.947	1.23	5.8
11	10/27/2004	33	6.625	1.35	5.27
12	1/16/1952	12	6.495	1.47	4.83
13	2/18/2005	29	6.366	1.6	4.46
14	2/5/1978	122	6.049	1.72	4.14
15	1/27/1980	67	6.032	1.84	3.87
16	9/23/1986	32	6.027	1.97	3.63
17	1/13/1993	13	5.732	2.09	3.41
18	1/16/1978	14	5.65	2.21	3.22
19	10/29/2000	27	5.589	2.33	3.05
20	11/22/1965	28	5.388	2.46	2.9
21	2/3/1998	11	5.387	2.58	2.76
22	3/17/1982	44	5.349	2.7	2.64
23	12/29/1991	15	5.184	2.83	2.52
24	2/22/1998	51	5.139	2.95	2.42
25	12/19/1970	21	4.969	3.07	2.32
26	4/1/1958	15	4.935	3.19	2.23
27	2/22/2008	12	4.834	3.32	2.15
28	2/14/1986	13	4.627	3.44	2.07
29	3/2/1980	22	4.581	3.56	2
30	2/16/1998	33	4.547	3.69	1.93
31	8/16/1977	34	4.457	3.81	1.87
32	1/5/1979	32	4.426	3.93	1.81
33	1/28/1983	14	4.294	4.05	1.76
34	3/7/1968	18	4.066	4.18	1.71
35	4/27/1960	10	3.901	4.3	1.66
36	11/14/1952	37	3.879	4.42	1.61
37	2/26/1983	164	3.852	4.55	1.57
38	1/14/1978	19	3.821	4.67	1.53
39	11/11/1985	29	3.762	4.79	1.49
40	1/16/1972	15	3.738	4.91	1.45
41	1/9/2005	55	3.656	5.04	1.41
42	1/27/2008	24	3.548	5.16	1.38
43	10/18/2004	58	3.461	5.28	1.35
44	1/5/2008	52	3.442	5.41	1.32
45	12/24/1988	8	3.425	5.53	1.29
46	1/20/1962	11	3.299	5.65	1.26
47	2/21/2005	54	3.256	5.77	1.23
48	12/1/1961	21	3.253	5.9	1.21
49	2/14/1998	9	3.139	6.02	1.18
50	9/18/1963	6	3.128	6.14	1.16
51	12/24/1971	20	3.099	6.27	1.14
52	1/9/1980	86	3.072	6.39	1.12
53	1/13/1957	9	3.063	6.51	1.09
54	1/15/1993	80	2.999	6.63	1.07
55	12/5/1966	14	2.981	6.76	1.05
56	2/27/1991	43	2.957	6.88	1.04
57	2/12/1992	23	2.931	7	1.02
58	2/26/2004	9	2.921	7.13	1
59	2/3/1994	17	2.907	7.25	0.98
60	3/15/1986	30	2.901	7.37	0.97
61	2/1/1960	9	2.892	7.49	0.95
62	3/16/1963	15	2.864	7.62	0.94
63	3/11/1995	26	2.821	7.74	0.92
64	1/3/2005	32	2.818	7.86	0.91
65	2/18/1993	42	2.796	7.99	0.89
66	1/12/1997	37	2.772	8.11	0.88
67	12/24/1983	73	2.761	8.23	0.87
68	2/7/1993	16	2.727	8.35	0.85
69	2/19/1958	10	2.707	8.48	0.84
70	1/12/1960	8	2.645	8.6	0.83
71	3/5/1995	23	2.622	8.72	0.82
72	3/19/1981	9	2.609	8.85	0.81
73	12/18/1967	23	2.529	8.97	0.79
74	1/18/1954	36	2.525	9.09	0.78
75	2/6/1969	11	2.515	9.21	0.77
76	1/24/1969	63	2.485	9.34	0.76
77	3/24/1994	7	2.431	9.46	0.75
78	11/17/1986	16	2.407	9.58	0.74
79	12/31/2004	5	2.399	9.71	0.73
80	4/8/1975	18	2.392	9.83	0.73
81	1/27/1983	9	2.37	9.95	0.72
82	11/21/1996	14	2.366	10.07	0.71
83	11/25/1988	7	2.365	10.2	0.7
84	2/11/2003	50	2.333	10.32	0.69
85	11/20/1963	32	2.277	10.44	0.68
86	11/30/2007	17	2.258	10.57	0.67

10-year Q: 8.757 cfs
 5-year Q: 6.545 cfs
 2-year Q: 4.581 cfs

(Adjust Column "I" to interpolate from Table)

Lower Flow Threshold: 10%
 0.1xQ2 (Pre): 0.458 cfs

87	11/24/1983	8	2.228	10.69	0.67
88	1/28/1957	41	2.226	10.81	0.66
89	12/16/1987	24	2.226	10.93	0.65
90	2/13/2001	30	2.219	11.06	0.64
91	11/29/1985	11	2.199	11.18	0.64
92	12/22/1982	25	2.185	11.3	0.63
93	11/16/1965	11	2.161	11.43	0.62
94	3/25/1991	54	2.147	11.55	0.62
95	12/9/1965	24	2.07	11.67	0.61
96	12/20/1988	12	2.052	11.79	0.6
97	12/28/2004	28	2.046	11.92	0.6
98	2/17/1990	39	1.912	12.04	0.59
99	2/15/1992	24	1.873	12.16	0.59
100	12/25/1968	5	1.858	12.29	0.58
101	1/17/1952	14	1.82	12.41	0.57
102	1/26/2001	14	1.814	12.53	0.57
103	4/28/2005	2	1.809	12.65	0.56
104	1/15/1997	10	1.778	12.78	0.56
105	1/22/1967	12	1.773	12.9	0.55
106	2/11/1959	19	1.772	13.02	0.55
107	4/6/1958	25	1.742	13.14	0.54
108	10/11/1987	35	1.741	13.27	0.54
109	2/13/1954	12	1.73	13.39	0.53
110	2/22/2004	27	1.716	13.51	0.53
111	1/17/1988	19	1.673	13.64	0.52
112	3/20/1958	37	1.651	13.76	0.52
113	11/30/1952	6	1.647	13.88	0.51
114	1/7/2005	12	1.642	14	0.51
115	1/10/1995	52	1.634	14.13	0.5
116	1/7/1992	28	1.634	14.25	0.5
117	4/20/1983	32	1.633	14.37	0.5
118	12/28/1977	51	1.623	14.5	0.49
119	4/8/1965	34	1.621	14.62	0.49
120	4/19/1988	34	1.62	14.74	0.48
121	2/11/1978	62	1.615	14.86	0.48
122	1/11/2001	34	1.604	14.99	0.48
123	5/10/1957	6	1.599	15.11	0.47
124	11/22/1973	4	1.598	15.23	0.47
125	1/30/2007	2	1.597	15.36	0.46
126	3/15/1952	23	1.591	15.48	0.46
127	12/7/1992	11	1.587	15.6	0.46
128	3/20/1992	70	1.584	15.72	0.45
129	3/7/1952	27	1.564	15.85	0.45
130	2/7/1966	4	1.549	15.97	0.45
131	12/20/2002	26	1.528	16.09	0.44
132	1/6/1993	48	1.517	16.22	0.44
133	1/26/1956	16	1.511	16.34	0.44
134	2/25/2001	51	1.503	16.46	0.43
135	1/5/1977	43	1.492	16.58	0.43
136	9/5/1978	21	1.46	16.71	0.43
137	3/15/1958	20	1.452	16.83	0.42
138	3/13/1967	13	1.443	16.95	0.42
139	11/8/2002	5	1.438	17.08	0.42
140	1/2/1977	10	1.437	17.2	0.41
141	1/14/1960	17	1.422	17.32	0.41
142	12/24/1959	8	1.373	17.44	0.41
143	1/26/1999	4	1.369	17.57	0.41
144	11/16/1972	28	1.366	17.69	0.4
145	1/25/1997	14	1.358	17.81	0.4
146	3/15/2003	26	1.344	17.94	0.4
147	12/7/1982	6	1.343	18.06	0.39
148	1/5/1992	22	1.335	18.18	0.39
149	3/20/1991	28	1.332	18.3	0.39
150	12/2/1952	4	1.295	18.43	0.39
151	1/18/1955	6	1.26	18.55	0.38
152	2/13/1973	6	1.254	18.67	0.38
153	1/1/1982	29	1.247	18.8	0.38
154	11/7/1979	11	1.244	18.92	0.38
155	7/22/1976	5	1.225	19.04	0.37
156	3/24/1983	31	1.225	19.16	0.37
157	11/26/1981	54	1.225	19.29	0.37
158	2/6/1998	55	1.22	19.41	0.37
159	12/29/1951	17	1.204	19.53	0.36
160	2/28/1981	63	1.189	19.66	0.36
161	4/12/1956	23	1.157	19.78	0.36
162	1/9/1978	35	1.157	19.9	0.36
163	3/10/1986	23	1.154	20.02	0.36
164	11/24/1985	26	1.122	20.15	0.35
165	3/19/1991	6	1.114	20.27	0.35
166	1/16/1990	8	1.108	20.39	0.35
167	1/7/1957	9	1.1	20.52	0.35
168	4/2/1958	16	1.096	20.64	0.35
169	12/11/1985	8	1.093	20.76	0.34
170	11/19/1967	21	1.086	20.88	0.34
171	12/26/1984	34	1.071	21.01	0.34
172	9/9/1976	31	1.03	21.13	0.34
173	10/13/2006	3	1.018	21.25	0.34
174	2/17/1994	5	1.011	21.38	0.33
175	2/8/1962	11	0.993	21.5	0.33
176	1/7/1995	22	0.981	21.62	0.33
177	12/9/2001	6	0.974	21.74	0.33
178	1/21/1964	28	0.97	21.87	0.33
179	11/30/1970	21	0.954	21.99	0.32
180	11/17/1964	5	0.951	22.11	0.32
181	1/25/1995	28	0.95	22.24	0.32

182	2/22/1969	10	0.947	22.36	0.32
183	11/30/1967	3	0.943	22.48	0.32
184	11/14/1972	4	0.936	22.6	0.32
185	3/7/1974	14	0.932	22.73	0.31
186	3/20/1973	5	0.923	22.85	0.31
187	3/5/2000	6	0.922	22.97	0.31
188	7/15/1976	7	0.915	23.1	0.31
189	1/29/1981	20	0.904	23.22	0.31
190	3/4/1970	7	0.898	23.34	0.31
191	2/11/2005	34	0.886	23.46	0.3
192	1/10/1955	10	0.875	23.59	0.3
193	4/1/1967	5	0.869	23.71	0.3
194	11/21/1967	3	0.862	23.83	0.3
195	1/29/1998	5	0.859	23.96	0.3
196	3/30/1978	39	0.851	24.08	0.3
197	3/10/2006	18	0.825	24.2	0.29
198	12/3/1966	15	0.808	24.32	0.29
199	1/25/1958	33	0.805	24.45	0.29
200	11/14/1988	4	0.792	24.57	0.29
201	3/5/1980	16	0.791	24.69	0.29
202	11/30/1993	2	0.79	24.82	0.29
203	2/28/1970	40	0.784	24.94	0.29
204	1/13/1952	12	0.782	25.06	0.28
205	4/4/2006	12	0.776	25.18	0.28
206	12/16/1965	9	0.77	25.31	0.28
207	2/29/1960	27	0.762	25.43	0.28
208	12/6/1966	6	0.761	25.55	0.28
209	1/5/1982	13	0.758	25.68	0.28
210	7/8/1976	7	0.742	25.8	0.28
211	3/8/1975	7	0.729	25.92	0.27
212	3/8/1973	5	0.724	26.04	0.27
213	4/20/1957	6	0.724	26.17	0.27
214	4/1/1982	9	0.72	26.29	0.27
215	2/28/1957	17	0.71	26.41	0.27
216	3/11/1978	20	0.709	26.54	0.27
217	3/24/1977	18	0.704	26.66	0.27
218	3/25/1980	6	0.698	26.78	0.27
219	11/24/1984	8	0.697	26.9	0.26
220	3/22/1954	29	0.693	27.03	0.26
221	1/18/1972	9	0.688	27.15	0.26
222	3/17/1979	7	0.678	27.27	0.26
223	10/14/1957	4	0.675	27.4	0.26
224	12/4/1974	5	0.673	27.52	0.26
225	2/6/1966	8	0.653	27.64	0.26
226	2/21/1959	9	0.651	27.76	0.26
227	11/26/1960	7	0.64	27.89	0.26
228	3/28/1993	3	0.634	28.01	0.25
229	2/5/1976	38	0.623	28.13	0.25
230	12/21/1970	2	0.613	28.26	0.25
231	1/30/1993	2	0.611	28.38	0.25
232	1/7/1974	17	0.611	28.5	0.25
233	4/3/1965	29	0.608	28.62	0.25
234	3/18/1979	58	0.596	28.75	0.25
235	2/9/1985	10	0.583	28.87	0.25
236	4/18/1995	3	0.577	28.99	0.25
237	11/23/1951	3	0.573	29.12	0.24
238	11/10/1954	14	0.564	29.24	0.24
239	5/12/1998	5	0.56	29.36	0.24
240	3/10/1975	15	0.557	29.48	0.24
241	12/11/1996	12	0.556	29.61	0.24
242	11/11/1983	32	0.555	29.73	0.24
243	3/11/1973	21	0.55	29.85	0.24
244	12/18/1984	46	0.54	29.98	0.24
245	3/7/1994	7	0.539	30.1	0.24
246	12/25/2003	20	0.524	30.22	0.24
247	3/5/1981	20	0.512	30.34	0.23
248	3/27/1979	32	0.489	30.47	0.23
249	2/18/1969	10	0.487	30.59	0.23
250	2/20/1969	3	0.474	30.71	0.23
251	2/20/2000	29	0.472	30.84	0.23
252	2/25/1987	3	0.465	30.96	0.23
253	2/25/1958	4	0.454	31.08	0.23
254	11/5/1960	16	0.451	31.2	0.23
255	2/7/1994	3	0.449	31.33	0.23
256	12/29/1965	2	0.427	31.45	0.23
257	2/9/1963	33	0.426	31.57	0.23
258	1/24/1967	6	0.423	31.7	0.22
259	2/27/1955	20	0.423	31.82	0.22
260	3/18/1962	12	0.418	31.94	0.22
261	2/8/1981	16	0.411	32.06	0.22
262	4/20/2007	3	0.411	32.19	0.22
263	1/9/1991	4	0.404	32.31	0.22
264	3/14/1982	12	0.4	32.43	0.22
265	11/7/1966	9	0.397	32.56	0.22
266	11/24/2001	4	0.397	32.68	0.22
267	1/9/1998	25	0.396	32.8	0.22
268	1/30/1966	14	0.393	32.92	0.22
269	1/20/1982	35	0.385	33.05	0.22
270	2/27/1996	3	0.377	33.17	0.21
271	12/4/1987	6	0.364	33.29	0.21
272	3/19/1994	30	0.362	33.42	0.21
273	11/12/1960	2	0.354	33.54	0.21
274	1/31/1956	4	0.353	33.66	0.21
275	5/7/1977	36	0.333	33.78	0.21
276	12/20/1952	5	0.332	33.91	0.21

277	4/12/1999	4	0.318	34.03	0.21
278	3/16/1954	1	0.313	34.15	0.21
279	3/16/1957	2	0.312	34.28	0.21
280	11/8/1998	2	0.31	34.4	0.21
281	2/16/1959	18	0.303	34.52	0.21
282	2/14/1995	7	0.295	34.64	0.21
283	12/16/1978	67	0.292	34.77	0.2
284	2/9/1982	26	0.285	34.89	0.2
285	1/30/1979	74	0.281	35.01	0.2
287	3/25/1998	26	0.28	35.26	0.2
287	3/31/1998	4	0.28	35.26	0.2
288	1/17/1980	32	0.278	35.38	0.2
289	12/7/1984	3	0.276	35.5	0.2
290	4/14/1971	2	0.273	35.63	0.2
291	2/15/1973	2	0.272	35.75	0.2
292	2/6/1965	22	0.267	35.87	0.2
293	3/1/1953	1	0.263	36	0.2
294	12/7/1980	4	0.262	36.12	0.2
295	3/1/1976	7	0.26	36.24	0.2
296	2/8/1976	13	0.257	36.36	0.2
297	9/17/1963	12	0.252	36.49	0.2
298	2/11/1973	9	0.251	36.61	0.19
299	2/28/2006	7	0.242	36.73	0.19
300	3/21/1969	9	0.238	36.86	0.19
301	4/10/1952	4	0.238	36.98	0.19
302	4/27/1953	4	0.237	37.1	0.19
303	2/20/1962	14	0.236	37.22	0.19
304	3/6/1983	16	0.235	37.35	0.19
305	12/25/1977	30	0.234	37.47	0.19
306	1/16/1970	5	0.231	37.59	0.19
307	12/15/1988	31	0.229	37.71	0.19
308	6/5/1993	1	0.228	37.84	0.19
309	2/10/1976	3	0.227	37.96	0.19
310	3/30/1954	1	0.225	38.08	0.19
311	3/6/1958	16	0.224	38.21	0.19
312	2/8/1983	1	0.22	38.33	0.19
313	1/23/1995	3	0.21	38.45	0.19
314	4/7/2001	1	0.209	38.57	0.18
315	2/26/1996	6	0.208	38.7	0.18
316	11/6/1969	15	0.201	38.82	0.18
317	12/14/1965	3	0.201	38.94	0.18
318	4/17/1963	4	0.192	39.07	0.18
319	3/31/1965	31	0.192	39.19	0.18
320	3/9/1978	2	0.192	39.31	0.18
321	4/4/1987	12	0.191	39.43	0.18
322	12/11/1951	6	0.19	39.56	0.18
323	12/9/1954	1	0.189	39.68	0.18
324	3/1/1979	11	0.186	39.8	0.18
325	3/24/1954	10	0.182	39.93	0.18
326	4/17/2000	15	0.18	40.05	0.18
327	4/30/1955	8	0.176	40.17	0.18
328	4/1/2004	2	0.172	40.29	0.18
329	4/5/1969	1	0.171	40.42	0.18
330	1/19/1978	7	0.166	40.54	0.18
331	3/10/1980	3	0.166	40.66	0.18
332	3/17/1983	48	0.165	40.79	0.17
333	1/24/1965	3	0.16	40.91	0.17
334	3/21/1983	42	0.16	41.03	0.17
335	12/30/1952	5	0.157	41.15	0.17
336	12/16/2002	1	0.148	41.28	0.17
337	4/18/1983	8	0.145	41.4	0.17
338	2/7/1973	1	0.145	41.52	0.17
339	4/15/1976	21	0.135	41.65	0.17
340	4/1/1968	1	0.134	41.77	0.17
341	1/24/1954	4	0.134	41.89	0.17
342	2/4/1999	3	0.13	42.01	0.17
343	4/29/1983	21	0.129	42.14	0.17
344	2/2/1988	17	0.127	42.26	0.17
345	1/31/1996	30	0.127	42.38	0.17
346	12/10/2006	1	0.122	42.51	0.17
347	12/6/1998	2	0.119	42.63	0.17
348	4/26/1963	1	0.116	42.75	0.17
349	12/6/1997	1	0.115	42.87	0.17
350	12/27/1971	23	0.114	43	0.17
351	2/9/1975	17	0.112	43.12	0.17
352	2/16/1971	14	0.111	43.24	0.16
353	4/1/1998	2	0.111	43.37	0.16
354	12/16/1957	17	0.111	43.49	0.16
355	1/28/1981	10	0.109	43.61	0.16
356	2/24/2008	1	0.109	43.73	0.16
357	10/17/1984	3	0.109	43.86	0.16
358	10/16/1980	3	0.108	43.98	0.16
359	4/14/1988	8	0.108	44.1	0.16
360	4/4/1990	6	0.108	44.23	0.16
361	8/24/1988	12	0.107	44.35	0.16
362	12/22/1988	2	0.107	44.47	0.16
363	9/24/1958	1	0.104	44.59	0.16
364	1/25/1960	1	0.102	44.72	0.16
365	2/2/2004	1	0.102	44.84	0.16
366	3/25/1993	2	0.101	44.96	0.16
367	12/16/1984	2	0.1	45.09	0.16
368	8/26/2007	2	0.1	45.21	0.16
369	12/9/1959	5	0.099	45.33	0.16
370	3/6/1962	15	0.097	45.45	0.16
371	2/19/1998	1	0.096	45.58	0.16

372	1/6/1959	1	0.095	45.7	0.16
373	3/6/2001	25	0.094	45.82	0.16
374	2/21/1996	15	0.093	45.95	0.16
375	2/21/1979	7	0.092	46.07	0.15
376	1/27/1994	1	0.091	46.19	0.15
377	11/23/1952	1	0.091	46.31	0.15
378	3/28/2006	2	0.086	46.44	0.15
379	10/30/1996	3	0.086	46.56	0.15
380	1/26/1961	5	0.086	46.68	0.15
381	4/16/1995	3	0.086	46.81	0.15
382	9/11/1960	4	0.086	46.93	0.15
383	4/26/1959	3	0.086	47.05	0.15
384	3/5/1973	1	0.084	47.17	0.15
385	1/6/1987	12	0.084	47.3	0.15
386	12/20/1959	10	0.084	47.42	0.15
387	1/25/1952	8	0.084	47.54	0.15
388	1/5/1957	3	0.084	47.67	0.15
389	3/27/1974	1	0.083	47.79	0.15
390	2/28/1973	7	0.08	47.91	0.15
391	1/28/1982	9	0.079	48.03	0.15
392	3/13/1986	9	0.079	48.16	0.15
393	1/26/1957	1	0.077	48.28	0.15
394	12/5/1957	2	0.076	48.4	0.15
395	2/29/1952	11	0.076	48.53	0.15
396	2/19/1962	2	0.076	48.65	0.15
397	2/13/2000	1	0.075	48.77	0.15
398	4/17/1975	1	0.075	48.89	0.15
399	8/28/1951	4	0.074	49.02	0.15
400	1/31/1986	5	0.074	49.14	0.14
401	1/21/1996	13	0.074	49.26	0.14
402	2/6/1992	30	0.073	49.39	0.14
403	4/19/1967	1	0.073	49.51	0.14
404	12/30/1981	22	0.073	49.63	0.14
405	12/17/1977	8	0.073	49.75	0.14
408	12/3/1983	7	0.073	50.12	0.14
408	12/30/1976	21	0.073	50.12	0.14
408	1/30/1986	11	0.073	50.12	0.14
412	12/9/1983	1	0.073	50.61	0.14
412	1/10/1982	10	0.073	50.61	0.14
412	1/24/1994	5	0.073	50.61	0.14
412	1/31/1990	2	0.073	50.61	0.14
413	11/9/1982	33	0.072	50.74	0.14
414	11/11/1972	2	0.072	50.86	0.14
415	11/21/1978	9	0.072	50.98	0.14
420	2/14/1979	3	0.072	51.6	0.14
420	2/25/1981	5	0.072	51.6	0.14
420	11/13/1984	1	0.072	51.6	0.14
420	2/23/1953	5	0.072	51.6	0.14
420	2/19/2006	1	0.072	51.6	0.14
421	3/22/1964	24	0.072	51.72	0.14
422	3/25/1989	21	0.072	51.84	0.14
423	3/2/1992	15	0.072	51.97	0.14
429	3/27/1992	1	0.072	52.7	0.14
429	10/21/1985	1	0.072	52.7	0.14
429	3/8/1986	9	0.072	52.7	0.14
429	10/9/1986	6	0.072	52.7	0.14
429	3/8/1992	10	0.072	52.7	0.14
429	10/26/1991	13	0.072	52.7	0.14
430	9/26/1982	15	0.071	52.83	0.13
431	4/22/1980	19	0.071	52.95	0.13
432	4/27/1984	2	0.071	53.07	0.13
433	5/24/1977	5	0.071	53.19	0.13
434	8/30/1976	4	0.071	53.32	0.13
435	2/23/1971	1	0.069	53.44	0.13
436	11/15/1963	3	0.069	53.56	0.13
437	10/31/1957	1	0.068	53.69	0.13
438	1/16/1995	1	0.068	53.81	0.13
439	12/9/1996	1	0.066	53.93	0.13
440	1/13/1962	1	0.065	54.05	0.13
441	2/17/1955	2	0.065	54.18	0.13
442	3/27/1958	2	0.064	54.3	0.13
443	10/15/1964	1	0.064	54.42	0.13
444	1/28/1969	19	0.064	54.55	0.13
445	4/21/1967	4	0.061	54.67	0.13
446	11/14/1965	8	0.061	54.79	0.13
447	10/10/1966	2	0.061	54.91	0.13
448	10/22/1953	1	0.061	55.04	0.13
449	4/22/1955	2	0.06	55.16	0.13
450	2/15/1962	18	0.06	55.28	0.13
451	12/2/1985	14	0.059	55.41	0.13
452	12/27/1992	5	0.058	55.53	0.13
453	1/12/1954	1	0.058	55.65	0.13
454	1/1/2006	16	0.058	55.77	0.13
455	12/1/1998	1	0.058	55.9	0.13
458	12/31/1964	1	0.058	56.27	0.13
458	12/27/2006	1	0.058	56.27	0.13
458	12/18/1992	1	0.058	56.27	0.13
459	11/20/1961	3	0.058	56.39	0.13
460	2/28/2007	1	0.058	56.51	0.13
461	2/11/2007	1	0.058	56.63	0.13
463	11/21/2004	1	0.057	56.88	0.13
463	11/30/2000	1	0.057	56.88	0.13
464	1/10/1993	3	0.057	57	0.13
465	3/25/1999	2	0.057	57.13	0.12
466	3/11/1955	2	0.057	57.25	0.12

467	3/2/2004	1	0.057	57.37	0.12
468	3/28/1963	1	0.057	57.49	0.12
469	3/3/1995	1	0.057	57.62	0.12
470	10/26/2000	26	0.057	57.74	0.12
473	3/21/2006	1	0.057	58.11	0.12
473	10/16/2005	35	0.057	58.11	0.12
473	10/17/2004	1	0.057	58.11	0.12
476	4/7/1965	1	0.056	58.48	0.12
476	9/20/2005	1	0.056	58.48	0.12
476	9/18/1999	1	0.056	58.48	0.12
477	5/22/2006	3	0.056	58.6	0.12
478	6/15/1995	1	0.056	58.72	0.12
479	12/27/1964	3	0.054	58.85	0.12
480	1/16/1955	8	0.054	58.97	0.12
481	11/27/1975	23	0.054	59.09	0.12
482	11/14/1955	3	0.054	59.21	0.12
483	11/26/1967	1	0.054	59.34	0.12
484	10/16/1971	6	0.053	59.46	0.12
485	3/12/1952	12	0.053	59.58	0.12
486	4/20/1953	1	0.053	59.71	0.12
487	5/11/1958	1	0.052	59.83	0.12
488	5/19/1974	1	0.052	59.95	0.12
489	6/10/1957	2	0.052	60.07	0.12
490	4/6/1986	11	0.051	60.2	0.12
491	12/28/1952	1	0.051	60.32	0.12
492	2/13/1968	3	0.05	60.44	0.12
493	11/14/1968	1	0.05	60.57	0.12
494	2/10/1970	24	0.05	60.69	0.12
495	3/2/1974	3	0.05	60.81	0.12
496	3/6/1973	1	0.05	60.93	0.12
497	4/18/1957	1	0.049	61.06	0.12
498	9/4/1963	4	0.049	61.18	0.12
499	4/22/1988	25	0.049	61.3	0.12
500	12/20/1975	1	0.047	61.43	0.12
501	1/12/1971	2	0.047	61.55	0.12
502	11/25/1961	4	0.047	61.67	0.12
503	2/24/1956	1	0.047	61.79	0.12
504	10/29/1974	7	0.046	61.92	0.12
505	3/13/1971	1	0.046	62.04	0.11
506	3/13/1960	1	0.046	62.16	0.11
507	4/4/1976	1	0.045	62.29	0.11
508	3/10/2001	1	0.044	62.41	0.11
509	12/4/1972	4	0.043	62.53	0.11
512	1/25/1999	1	0.043	62.9	0.11
512	12/5/2004	5	0.043	62.9	0.11
512	1/21/1995	1	0.043	62.9	0.11
513	12/27/1996	1	0.043	63.02	0.11
514	1/23/1997	15	0.043	63.14	0.11
515	12/22/1971	4	0.043	63.27	0.11
516	12/19/2007	1	0.043	63.39	0.11
517	12/7/2007	1	0.043	63.51	0.11
518	1/3/1995	1	0.043	63.64	0.11
519	1/12/1993	1	0.043	63.76	0.11
521	1/16/1996	1	0.043	64	0.11
521	12/11/1993	1	0.043	64	0.11
525	12/29/1992	1	0.043	64.5	0.11
525	1/20/1957	1	0.043	64.5	0.11
525	12/23/1995	1	0.043	64.5	0.11
525	1/31/1999	1	0.043	64.5	0.11
526	11/9/1964	2	0.043	64.62	0.11
527	2/23/1993	1	0.043	64.74	0.11
528	11/10/1994	1	0.043	64.86	0.11
529	11/3/1960	1	0.043	64.99	0.11
530	2/4/1976	1	0.043	65.11	0.11
531	2/22/2007	1	0.043	65.23	0.11
532	11/28/1998	1	0.043	65.36	0.11
533	3/22/2005	1	0.042	65.48	0.11
534	3/21/1995	1	0.042	65.6	0.11
535	3/13/1996	1	0.042	65.72	0.11
538	3/3/1976	1	0.042	66.09	0.11
538	10/8/1951	1	0.042	66.09	0.11
538	10/1/1996	1	0.042	66.09	0.11
539	4/17/2004	1	0.041	66.22	0.11
540	5/1/1995	1	0.041	66.34	0.11
542	6/3/1999	1	0.041	66.58	0.11
542	6/2/1999	1	0.041	66.58	0.11
544	1/25/1956	1	0.039	66.83	0.11
544	1/10/1960	4	0.039	66.83	0.11
545	1/14/1969	7	0.039	66.95	0.11
546	1/22/1962	12	0.039	67.08	0.11
547	1/10/1973	1	0.039	67.2	0.11
548	12/18/1997	1	0.039	67.32	0.11
549	1/1/1955	1	0.039	67.44	0.11
550	12/16/1970	1	0.039	67.57	0.11
551	12/28/1974	23	0.039	67.69	0.11
552	12/8/1969	1	0.039	67.81	0.11
553	2/8/1959	4	0.039	67.94	0.1
554	2/8/1960	2	0.039	68.06	0.1
555	2/14/1963	1	0.039	68.18	0.1
556	2/3/1975	7	0.039	68.3	0.1
557	2/11/2000	1	0.039	68.43	0.1
558	11/11/1958	1	0.039	68.55	0.1
559	3/13/1998	25	0.039	68.67	0.1
560	3/6/1965	1	0.038	68.8	0.1
561	2/10/1960	2	0.038	68.92	0.1

562	10/10/1951	1	0.038	69.04	0.1
563	1/3/1997	6	0.038	69.16	0.1
564	4/7/1952	1	0.038	69.29	0.1
565	2/6/1983	19	0.037	69.41	0.1
571	12/6/1986	23	0.036	70.15	0.1
571	12/29/1982	3	0.036	70.15	0.1
571	1/7/1985	17	0.036	70.15	0.1
571	12/28/1991	3	0.036	70.15	0.1
571	12/4/1980	23	0.036	70.15	0.1
571	1/5/1988	5	0.036	70.15	0.1
573	1/9/1979	4	0.036	70.39	0.1
573	1/28/1985	12	0.036	70.39	0.1
574	1/30/1978	13	0.036	70.52	0.1
575	1/13/1990	25	0.036	70.64	0.1
580	1/29/1977	2	0.036	71.25	0.1
580	12/21/1979	7	0.036	71.25	0.1
580	1/23/1989	2	0.036	71.25	0.1
580	1/7/1989	2	0.036	71.25	0.1
580	12/4/1971	2	0.036	71.25	0.1
581	12/19/1951	1	0.036	71.38	0.1
583	12/10/1984	11	0.036	71.62	0.1
583	12/18/1988	8	0.036	71.62	0.1
585	1/1/1974	3	0.036	71.87	0.1
585	12/3/1984	3	0.036	71.87	0.1
586	1/30/1955	9	0.036	71.99	0.1
587	1/17/1979	42	0.036	72.11	0.1
588	1/2/1990	4	0.036	72.24	0.1
589	12/4/1953	1	0.036	72.36	0.1
590	1/22/1983	23	0.036	72.48	0.1
591	12/27/1988	13	0.036	72.6	0.1
592	12/31/1965	1	0.036	72.73	0.1
593	12/3/1954	1	0.036	72.85	0.1
594	1/15/1984	16	0.036	72.97	0.1
595	12/12/1965	17	0.036	73.1	0.1
596	12/29/1987	18	0.036	73.22	0.1
597	2/2/1983	27	0.036	73.34	0.1
601	11/20/1983	13	0.036	73.83	0.1
601	11/29/1982	28	0.036	73.83	0.1
601	11/18/1982	9	0.036	73.83	0.1
601	2/7/1986	17	0.036	73.83	0.1
602	2/23/1983	24	0.036	73.96	0.1
603	2/4/1990	4	0.036	74.08	0.1
604	11/10/1964	1	0.036	74.2	0.1
605	11/14/1953	1	0.036	74.32	0.1
606	11/18/1973	13	0.036	74.45	0.1
607	2/20/2001	1	0.036	74.57	0.1
608	11/10/1969	1	0.036	74.69	0.1
616	11/12/1976	6	0.036	75.68	0.09
616	2/2/1989	3	0.036	75.68	0.09
616	11/24/1978	5	0.036	75.68	0.09
616	11/4/1987	17	0.036	75.68	0.09
616	2/3/1989	20	0.036	75.68	0.09
616	2/2/1985	10	0.036	75.68	0.09
616	2/13/1986	6	0.036	75.68	0.09
616	2/9/1989	15	0.036	75.68	0.09
617	2/23/1957	1	0.036	75.8	0.09
620	2/23/1979	4	0.036	76.17	0.09
620	2/22/1977	4	0.036	76.17	0.09
620	11/17/1973	4	0.036	76.17	0.09
621	11/10/1978	43	0.035	76.29	0.09
623	2/10/1992	6	0.035	76.54	0.09
623	11/23/1988	6	0.035	76.54	0.09
624	2/24/1977	9	0.035	76.66	0.09
625	1/3/1992	20	0.035	76.78	0.09
626	2/3/1973	1	0.035	76.9	0.09
660	12/12/1984	1	0.035	81.08	0.09
660	1/19/1966	1	0.035	81.08	0.09
660	1/28/1987	1	0.035	81.08	0.09
660	12/1/1973	1	0.035	81.08	0.09
660	1/2/1997	1	0.035	81.08	0.09
660	1/12/1981	1	0.035	81.08	0.09
660	1/3/1991	1	0.035	81.08	0.09
660	1/11/1981	1	0.035	81.08	0.09
660	1/4/1984	1	0.035	81.08	0.09
660	1/24/1983	23	0.035	81.08	0.09
660	1/18/1983	24	0.035	81.08	0.09
660	1/17/1983	1	0.035	81.08	0.09
660	1/5/1983	1	0.035	81.08	0.09
660	12/21/1981	1	0.035	81.08	0.09
660	12/19/1983	1	0.035	81.08	0.09
660	12/15/1983	1	0.035	81.08	0.09
660	12/23/1977	1	0.035	81.08	0.09
660	1/26/1977	1	0.035	81.08	0.09
660	1/5/1989	1	0.035	81.08	0.09
660	1/25/1979	1	0.035	81.08	0.09
660	12/25/1979	1	0.035	81.08	0.09
660	1/7/1980	1	0.035	81.08	0.09
660	1/14/1980	1	0.035	81.08	0.09
660	12/1/1989	1	0.035	81.08	0.09
660	1/22/1990	1	0.035	81.08	0.09
660	1/18/1990	1	0.035	81.08	0.09
660	12/9/1991	1	0.035	81.08	0.09
660	12/18/1991	1	0.035	81.08	0.09
660	12/19/1991	1	0.035	81.08	0.09
660	12/19/1987	1	0.035	81.08	0.09

660	12/20/1990	1	0.035	81.08	0.09
660	12/11/1987	1	0.035	81.08	0.09
660	1/9/1972	1	0.035	81.08	0.09
660	12/1/1978	1	0.035	81.08	0.09
663	10/20/1979	15	0.035	81.45	0.09
663	3/22/1987	3	0.035	81.45	0.09
663	3/31/1967	3	0.035	81.45	0.09
664	3/25/1982	9	0.035	81.57	0.09
665	10/21/1957	2	0.035	81.7	0.09
670	3/22/1975	2	0.035	82.31	0.09
670	3/15/1991	2	0.035	82.31	0.09
670	10/31/1987	19	0.035	82.31	0.09
670	3/16/1977	119	0.035	82.31	0.09
670	3/15/1987	2	0.035	82.31	0.09
671	3/11/1958	6	0.035	82.43	0.09
672	3/21/1980	14	0.035	82.56	0.09
673	3/27/1985	30	0.035	82.68	0.09
674	3/2/1989	10	0.035	82.8	0.09
675	3/12/1986	4	0.035	82.92	0.09
676	3/2/1964	1	0.035	83.05	0.09
677	3/5/1987	19	0.035	83.17	0.09
678	3/28/1982	7	0.035	83.29	0.09
680	3/24/1987	24	0.035	83.54	0.09
680	3/22/1978	24	0.035	83.54	0.09
707	2/5/1987	1	0.035	86.86	0.08
707	2/29/1988	1	0.035	86.86	0.08
707	11/17/1987	1	0.035	86.86	0.08
707	11/2/1987	1	0.035	86.86	0.08
707	11/14/1987	1	0.035	86.86	0.08
707	2/3/1987	1	0.035	86.86	0.08
707	11/20/1982	1	0.035	86.86	0.08
707	2/23/1986	1	0.035	86.86	0.08
707	2/17/1986	1	0.035	86.86	0.08
707	2/17/1982	1	0.035	86.86	0.08
707	11/16/1981	1	0.035	86.86	0.08
707	2/8/1982	1	0.035	86.86	0.08
707	11/5/1986	1	0.035	86.86	0.08
707	11/15/1978	1	0.035	86.86	0.08
707	2/10/1984	1	0.035	86.86	0.08
707	11/4/1979	1	0.035	86.86	0.08
707	11/12/1979	1	0.035	86.86	0.08
707	11/13/1978	1	0.035	86.86	0.08
707	11/8/1984	1	0.035	86.86	0.08
707	11/27/1976	1	0.035	86.86	0.08
707	11/16/1984	1	0.035	86.86	0.08
707	11/23/1984	1	0.035	86.86	0.08
707	11/26/1989	1	0.035	86.86	0.08
707	11/17/1983	1	0.035	86.86	0.08
707	11/10/1988	22	0.035	86.86	0.08
707	2/3/1985	1	0.035	86.86	0.08
707	2/20/1985	1	0.035	86.86	0.08
708	3/12/1965	5	0.035	86.98	0.08
710	4/12/1983	27	0.034	87.22	0.08
710	4/16/1990	18	0.034	87.22	0.08
713	9/16/1982	27	0.034	87.59	0.08
713	4/15/1978	2	0.034	87.59	0.08
713	9/18/1985	2	0.034	87.59	0.08
714	4/18/1981	10	0.034	87.71	0.08
716	4/2/1981	6	0.034	87.96	0.08
716	4/8/1978	6	0.034	87.96	0.08
740	3/28/1983	1	0.034	90.91	0.08
740	10/7/1983	19	0.034	90.91	0.08
740	3/13/1969	1	0.034	90.91	0.08
740	10/4/1979	1	0.034	90.91	0.08
740	3/29/1967	1	0.034	90.91	0.08
740	10/15/1951	1	0.034	90.91	0.08
740	3/22/1977	1	0.034	90.91	0.08
740	10/5/1977	1	0.034	90.91	0.08
740	3/18/1981	1	0.034	90.91	0.08
740	10/11/1981	1	0.034	90.91	0.08
740	10/26/1982	1	0.034	90.91	0.08
740	3/18/1980	1	0.034	90.91	0.08
740	3/10/1981	1	0.034	90.91	0.08
740	3/14/1981	1	0.034	90.91	0.08
740	10/7/1985	1	0.034	90.91	0.08
740	10/6/1985	1	0.034	90.91	0.08
740	3/13/1991	1	0.034	90.91	0.08
740	3/11/1991	1	0.034	90.91	0.08
740	10/11/1986	1	0.034	90.91	0.08
740	3/1/1986	1	0.034	90.91	0.08
740	3/29/1992	1	0.034	90.91	0.08
740	3/31/1992	1	0.034	90.91	0.08
740	10/23/1987	1	0.034	90.91	0.08
740	10/28/1987	1	0.034	90.91	0.08
741	5/28/1990	9	0.034	91.03	0.08
742	5/14/1989	25	0.034	91.15	0.08
743	5/19/1957	1	0.034	91.28	0.08
744	5/21/1957	1	0.034	91.4	0.08
745	8/18/1983	4	0.034	91.52	0.08
747	6/9/1990	25	0.034	91.77	0.08
747	7/26/1976	2	0.034	91.77	0.08
748	7/17/1987	4	0.034	91.89	0.08
749	5/27/1962	1	0.034	92.01	0.08
766	4/28/1980	18	0.034	94.1	0.08
766	4/18/1988	1	0.034	94.1	0.08

766	9/9/1977	1	0.034	94.1	0.08
766	4/27/1970	1	0.034	94.1	0.08
766	9/5/1977	1	0.034	94.1	0.08
766	4/21/1980	1	0.034	94.1	0.08
766	9/16/1978	1	0.034	94.1	0.08
766	4/25/1978	1	0.034	94.1	0.08
766	4/7/1978	1	0.034	94.1	0.08
766	4/2/1978	1	0.034	94.1	0.08
766	4/1/1980	1	0.034	94.1	0.08
766	4/26/1981	1	0.034	94.1	0.08
766	4/4/1982	1	0.034	94.1	0.08
766	4/1/1982	1	0.034	94.1	0.08
766	9/15/1982	1	0.034	94.1	0.08
766	4/1/1986	1	0.034	94.1	0.08
766	4/21/1985	1	0.034	94.1	0.08
780	5/5/1992	1	0.033	95.82	0.07
780	5/7/1979	1	0.033	95.82	0.07
780	5/17/1992	1	0.033	95.82	0.07
780	5/29/1988	1	0.033	95.82	0.07
780	5/6/1982	1	0.033	95.82	0.07
780	5/6/1983	1	0.033	95.82	0.07
780	5/1/1983	24	0.033	95.82	0.07
780	5/1/1981	1	0.033	95.82	0.07
780	5/12/1977	1	0.033	95.82	0.07
780	5/7/1976	1	0.033	95.82	0.07
780	5/2/1980	1	0.033	95.82	0.07
780	5/8/1980	1	0.033	95.82	0.07
780	5/9/1980	25	0.033	95.82	0.07
780	5/13/1990	1	0.033	95.82	0.07
784	8/14/1987	1	0.033	96.31	0.07
784	8/6/1983	1	0.033	96.31	0.07
784	8/19/1979	1	0.033	96.31	0.07
784	8/15/1990	1	0.033	96.31	0.07
785	1/20/1969	1	0.033	96.44	0.07
797	7/31/1991	1	0.033	97.91	0.07
797	7/20/1977	1	0.033	97.91	0.07
797	7/27/1977	1	0.033	97.91	0.07
797	7/22/1977	1	0.033	97.91	0.07
797	7/15/1977	1	0.033	97.91	0.07
797	6/17/1982	1	0.033	97.91	0.07
797	6/1/1976	1	0.033	97.91	0.07
797	6/10/1976	1	0.033	97.91	0.07
797	7/15/1984	1	0.033	97.91	0.07
797	7/14/1977	1	0.033	97.91	0.07
797	6/4/1989	1	0.033	97.91	0.07
797	6/30/1976	1	0.033	97.91	0.07
798	12/6/1956	1	0.032	98.03	0.07
799	1/18/1969	1	0.032	98.16	0.07
800	1/10/1957	1	0.032	98.28	0.07
801	1/10/1970	1	0.032	98.4	0.07
802	1/3/1998	1	0.032	98.53	0.07
803	12/12/1975	1	0.032	98.65	0.07
804	12/9/1963	1	0.032	98.77	0.07
805	11/28/1970	1	0.032	98.89	0.07
806	2/29/1964	1	0.032	99.02	0.07
808	11/29/2001	1	0.032	99.26	0.07
808	2/23/2001	1	0.032	99.26	0.07
810	2/23/2000	1	0.032	99.51	0.07
810	2/17/2002	1	0.032	99.51	0.07
811	11/18/1965	1	0.032	99.63	0.07
812	1/27/1968	1	0.032	99.75	0.07
813	3/22/1962	1	0.031	99.88	0.07

Post-project (Mitigated) Flow Frequency - Long-term Simulation

PACIFICASITE DEVELOPED
 Statistics - Node POCT1 Total Inflow

Rank	Start Date	Event Duration (hours)	Event Peak (CFS)	Exceedance Frequency (percent)	Return Period (years)
1	1/3/1995	342	14.128	0.12	58
2	1/27/1980	149	5.754	0.24	29
3	4/14/2003	121	5.147	0.36	19.33
4	1/14/1979	128	4.37	0.47	14.5
5	9/29/1983	143	4.117	0.59	11.6
6	1/3/1978	431	3.95	0.71	9.67
7	1/12/1993	243	3.873	0.83	8.29
8	2/18/1969	282	3.73	0.95	7.25
9	2/27/1978	193	3.311	1.07	6.44
10	2/25/2003	121	2.919	1.19	5.8
11	2/3/1958	130	2.887	1.3	5.27
12	3/14/1982	189	2.718	1.42	4.83
13	2/13/1980	283	2.692	1.54	4.46
14	1/13/1952	223	2.62	1.66	4.14
15	10/27/2004	112	2.552	1.78	3.87
16	11/22/1965	127	2.526	1.9	3.63
17	2/5/1978	273	2.365	2.02	3.41
18	1/5/1979	134	2.349	2.14	3.22
19	2/18/2005	223	2.314	2.25	3.05
20	2/22/2008	116	2.246	2.37	2.9
21	2/14/1998	335	2.242	2.49	2.76
22	9/23/1986	112	2.222	2.61	2.64
23	12/28/1991	336	2.198	2.73	2.52
24	2/13/1986	149	2.156	2.85	2.42
25	3/7/1968	116	2.139	2.97	2.32
26	2/3/1998	200	2.036	3.08	2.23
27	12/28/2004	436	2.01	3.2	2.15
28	4/1/1958	235	1.882	3.32	2.07
29	10/29/2000	80	1.869	3.44	2
30	8/16/1977	114	1.734	3.56	1.93
31	3/2/1980	156	1.714	3.68	1.87
32	1/9/1980	177	1.694	3.8	1.81
33	2/27/1991	141	1.673	3.91	1.76
34	1/20/1962	113	1.662	4.03	1.71
35	11/21/1996	113	1.648	4.15	1.66
36	1/27/1983	185	1.64	4.27	1.61
37	12/16/1970	159	1.618	4.39	1.57
38	3/16/1963	83	1.608	4.51	1.53
39	12/1/1961	96	1.606	4.63	1.49
40	1/24/1969	166	1.601	4.74	1.45
41	2/23/1983	287	1.572	4.86	1.41
42	3/11/1995	120	1.508	4.98	1.38
43	1/16/1972	127	1.484	5.1	1.35
44	4/27/1960	86	1.457	5.22	1.32
45	12/3/1966	169	1.441	5.34	1.29
46	12/24/1983	124	1.414	5.46	1.26
47	1/26/2008	98	1.411	5.58	1.23
48	1/10/1960	179	1.403	5.69	1.21
49	12/20/1988	190	1.368	5.81	1.18
50	1/5/2008	136	1.366	5.93	1.16
51	2/22/2004	233	1.353	6.05	1.14
52	12/22/1971	172	1.347	6.17	1.12
53	11/14/1952	111	1.329	6.29	1.09
54	10/17/2004	174	1.323	6.41	1.07
55	4/28/2005	55	1.316	6.52	1.05
56	9/17/1963	122	1.315	6.64	1.04
57	2/12/1992	148	1.313	6.76	1.02
58	11/11/1985	104	1.299	6.88	1
59	1/12/1997	159	1.294	7	0.98
60	1/13/1957	92	1.286	7.12	0.97
61	3/3/1995	158	1.284	7.24	0.95
62	11/14/1965	136	1.267	7.35	0.94
63	2/11/2003	121	1.252	7.47	0.92
64	2/3/1994	122	1.225	7.59	0.91
65	2/18/1993	150	1.213	7.71	0.89
66	1/26/1957	165	1.182	7.83	0.88
67	11/30/2007	115	1.175	7.95	0.87
68	2/1/1960	88	1.173	8.07	0.85
69	3/15/1986	75	1.163	8.19	0.84
70	2/6/1969	88	1.14	8.3	0.83
71	11/29/1985	115	1.13	8.42	0.82
72	12/18/1967	112	1.124	8.54	0.81
73	1/18/1954	181	1.102	8.66	0.79
74	2/7/1993	94	1.088	8.78	0.78
75	3/18/1981	94	1.078	8.9	0.77
76	3/24/1994	80	1.032	9.02	0.76
77	1/22/1967	124	1.028	9.13	0.75
78	11/20/1963	113	0.984	9.25	0.74
79	3/15/1958	241	0.983	9.37	0.73
80	2/19/1958	82	0.982	9.49	0.73
81	11/17/1986	93	0.98	9.61	0.72
82	12/22/1982	72	0.977	9.73	0.71
83	12/16/1987	110	0.975	9.85	0.7
84	3/15/2003	89	0.961	9.96	0.69
85	4/12/1956	106	0.958	10.08	0.68
86	1/2/1977	196	0.946	10.2	0.67

10-year Q: 3.979 cfs
 5-year Q: 2.783 cfs
 2-year Q: 1.869 cfs
 (Adjust Column "I" to interpolate from Table)

Lower Flow Threshold: 10%
 0.1xQ2 (Post Mit): 0.187 cfs

87	3/25/1991	130	0.938	10.32	0.67
88	2/11/1959	71	0.935	10.44	0.66
89	1/25/1956	157	0.929	10.56	0.65
90	11/24/1983	69	0.923	10.68	0.64
91	11/23/1988	103	0.917	10.79	0.64
92	2/13/1954	96	0.899	10.91	0.63
93	2/13/2001	112	0.893	11.03	0.62
94	4/7/1965	147	0.885	11.15	0.62
95	3/15/1952	98	0.853	11.27	0.61
96	4/8/1975	106	0.848	11.39	0.6
97	7/22/1976	66	0.842	11.51	0.6
98	1/30/2007	63	0.82	11.63	0.59
99	12/9/1965	208	0.801	11.74	0.59
100	11/8/2002	77	0.799	11.86	0.58
101	12/25/1977	143	0.796	11.98	0.57
102	11/30/1952	106	0.794	12.1	0.57
103	1/26/2001	71	0.788	12.22	0.56
104	1/25/1997	88	0.779	12.34	0.56
105	1/6/1993	128	0.778	12.46	0.55
106	3/7/1952	105	0.777	12.57	0.55
107	2/17/1990	84	0.771	12.69	0.54
108	10/11/1987	118	0.768	12.81	0.54
109	3/13/1967	88	0.757	12.93	0.53
110	9/5/1978	80	0.749	13.05	0.53
111	2/6/1966	105	0.734	13.17	0.52
112	5/10/1957	76	0.726	13.29	0.52
113	4/20/1983	57	0.721	13.4	0.51
114	11/22/1973	63	0.72	13.52	0.51
115	1/17/1988	86	0.71	13.64	0.5
116	4/19/1988	96	0.692	13.76	0.5
117	3/19/1991	120	0.68	13.88	0.5
118	3/20/1992	84	0.68	14	0.49
119	1/25/1999	94	0.675	14.12	0.49
120	2/7/1962	113	0.67	14.23	0.48
121	12/20/2002	63	0.669	14.35	0.48
122	12/28/1951	124	0.663	14.47	0.48
123	2/25/2001	110	0.655	14.59	0.47
124	3/7/1974	86	0.625	14.71	0.47
125	12/25/1968	58	0.623	14.83	0.46
126	12/7/1982	70	0.614	14.95	0.46
127	10/13/2006	37	0.611	15.07	0.46
128	11/14/1972	130	0.608	15.18	0.45
129	1/29/1998	46	0.607	15.3	0.45
130	12/7/1992	78	0.598	15.42	0.45
131	11/7/1979	46	0.593	15.54	0.44
132	11/26/1981	124	0.592	15.66	0.44
133	1/10/2001	101	0.59	15.78	0.44
134	2/28/1981	160	0.59	15.9	0.43
135	2/11/1973	120	0.585	16.01	0.43
136	12/24/1959	60	0.579	16.13	0.43
137	3/17/1983	208	0.576	16.25	0.42
138	1/18/1955	67	0.574	16.37	0.42
139	11/30/1967	24	0.572	16.49	0.42
140	11/19/1967	112	0.569	16.61	0.41
141	1/7/1957	89	0.56	16.73	0.41
142	11/17/1964	52	0.557	16.84	0.41
143	9/9/1976	93	0.556	16.96	0.41
144	11/28/1970	124	0.539	17.08	0.4
145	12/26/1984	104	0.534	17.2	0.4
146	3/8/1986	146	0.532	17.32	0.4
147	2/28/1970	146	0.525	17.44	0.39
148	1/16/1990	59	0.524	17.56	0.39
149	2/11/2005	113	0.517	17.67	0.39
150	1/23/1995	82	0.516	17.79	0.39
151	1/25/1958	95	0.513	17.91	0.38
152	12/11/1985	71	0.5	18.03	0.38
153	11/24/1985	85	0.49	18.15	0.38
154	3/10/2006	41	0.488	18.27	0.38
155	3/30/1978	88	0.478	18.39	0.37
156	12/9/2001	36	0.476	18.51	0.37
157	12/30/1981	207	0.467	18.62	0.37
158	2/28/1960	88	0.464	18.74	0.37
159	3/4/2000	104	0.459	18.86	0.36
160	2/17/1994	95	0.458	18.98	0.36
161	3/20/1973	53	0.454	19.1	0.36
162	2/9/1963	128	0.449	19.22	0.36
163	3/17/1979	112	0.444	19.34	0.36
164	11/10/1954	89	0.442	19.45	0.35
165	2/28/1957	67	0.442	19.57	0.35
166	3/31/1965	120	0.442	19.69	0.35
167	12/29/1965	64	0.44	19.81	0.35
168	3/11/1973	50	0.438	19.93	0.35
169	4/11/1967	67	0.438	20.05	0.34
170	1/28/1981	91	0.435	20.17	0.34
171	1/10/1955	35	0.433	20.28	0.34
172	11/30/1993	24	0.429	20.4	0.34
173	12/4/1974	64	0.429	20.52	0.34
174	3/20/1954	132	0.413	20.64	0.33
175	3/2/1992	60	0.413	20.76	0.33
176	7/15/1976	64	0.404	20.88	0.33
177	3/11/1978	54	0.398	21	0.33
178	11/24/2001	30	0.392	21.12	0.33
179	2/9/1982	74	0.39	21.23	0.32
180	3/30/1954	20	0.383	21.35	0.32
181	12/9/1996	116	0.383	21.47	0.32

182	12/24/2003	44	0.38	21.59	0.32
183	11/24/1984	32	0.378	21.71	0.32
184	1/21/1964	73	0.378	21.83	0.32
185	4/20/2007	25	0.377	21.95	0.31
186	4/4/2006	61	0.375	22.06	0.31
187	3/8/1975	149	0.374	22.18	0.31
188	1/9/1991	30	0.373	22.3	0.31
189	3/24/1977	59	0.369	22.42	0.31
190	3/27/1979	72	0.368	22.54	0.31
191	1/30/1966	43	0.367	22.66	0.3
192	4/1/1982	39	0.364	22.78	0.3
193	4/7/2001	27	0.363	22.89	0.3
194	11/22/1951	27	0.363	23.01	0.3
195	3/25/1993	77	0.361	23.13	0.3
196	2/4/1976	199	0.358	23.25	0.3
197	7/8/1976	61	0.355	23.37	0.29
198	5/7/1977	116	0.355	23.49	0.29
199	5/12/1998	30	0.352	23.61	0.29
200	1/30/1993	34	0.35	23.72	0.29
201	12/4/1987	25	0.348	23.84	0.29
202	11/8/1998	32	0.344	23.96	0.29
203	1/20/1982	87	0.344	24.08	0.29
204	4/20/1957	55	0.343	24.2	0.28
205	3/18/1962	45	0.341	24.32	0.28
206	2/20/2000	90	0.341	24.44	0.28
207	11/11/1983	82	0.339	24.56	0.28
208	3/5/1973	100	0.335	24.67	0.28
209	10/13/1957	30	0.334	24.79	0.28
210	2/21/1959	60	0.33	24.91	0.28
211	11/14/1988	38	0.33	25.03	0.27
212	12/18/1984	85	0.326	25.15	0.27
213	2/23/1987	65	0.325	25.27	0.27
214	4/16/1995	97	0.324	25.39	0.27
215	1/7/1974	83	0.32	25.5	0.27
216	4/14/1971	28	0.32	25.62	0.27
217	2/8/1981	75	0.317	25.74	0.27
218	12/16/2002	35	0.316	25.86	0.27
219	2/5/1965	66	0.315	25.98	0.26
220	2/9/1985	52	0.311	26.1	0.26
221	11/6/1969	37	0.304	26.22	0.26
222	3/16/1954	31	0.303	26.33	0.26
223	3/1/1976	60	0.301	26.45	0.26
224	2/25/1958	29	0.3	26.57	0.26
225	1/9/1998	48	0.3	26.69	0.26
226	12/15/1988	100	0.3	26.81	0.26
227	11/7/1966	69	0.299	26.93	0.26
228	2/16/1959	54	0.297	27.05	0.25
229	11/5/1960	31	0.297	27.16	0.25
230	12/6/1997	39	0.295	27.28	0.25
231	3/19/1994	80	0.293	27.4	0.25
232	3/6/1994	82	0.292	27.52	0.25
233	2/27/2006	61	0.292	27.64	0.25
234	6/5/1993	24	0.288	27.76	0.25
235	2/26/1955	55	0.282	27.88	0.25
236	1/6/1987	55	0.278	28	0.25
237	3/21/1969	31	0.278	28.11	0.24
238	12/9/1959	24	0.277	28.23	0.24
239	2/16/1971	36	0.276	28.35	0.24
240	2/25/1996	77	0.276	28.47	0.24
241	4/14/1988	90	0.274	28.59	0.24
242	12/16/1978	91	0.271	28.71	0.24
243	2/6/1992	106	0.267	28.83	0.24
244	1/30/1979	85	0.266	28.94	0.24
245	3/31/1998	34	0.265	29.06	0.24
246	3/10/1980	21	0.264	29.18	0.24
247	3/25/1998	105	0.264	29.3	0.23
248	10/30/1996	34	0.262	29.42	0.23
249	4/26/1959	25	0.261	29.54	0.23
250	12/9/1954	24	0.26	29.66	0.23
251	11/9/1982	43	0.256	29.77	0.23
252	12/11/1951	40	0.256	29.89	0.23
253	3/25/1980	25	0.254	30.01	0.23
254	12/7/1984	24	0.254	30.13	0.23
255	1/17/1980	46	0.254	30.25	0.23
256	3/9/1978	21	0.252	30.37	0.23
257	4/1/2004	23	0.251	30.49	0.23
258	4/4/1987	31	0.25	30.6	0.22
259	1/26/1961	57	0.25	30.72	0.22
260	4/18/1983	25	0.25	30.84	0.22
261	1/31/1996	48	0.249	30.96	0.22
262	3/1/1953	39	0.249	31.08	0.22
263	4/4/1990	35	0.248	31.2	0.22
264	12/5/1957	31	0.244	31.32	0.22
265	8/30/1976	24	0.244	31.44	0.22
266	3/25/1989	40	0.244	31.55	0.22
267	8/28/1951	28	0.243	31.67	0.22
268	4/1/1968	19	0.242	31.79	0.22
269	12/20/1959	31	0.242	31.91	0.22
270	4/29/1983	81	0.241	32.03	0.21
271	12/30/1976	42	0.24	32.15	0.21
272	9/11/1960	27	0.24	32.27	0.21
273	2/21/1979	25	0.239	32.38	0.21
274	3/6/1958	37	0.238	32.5	0.21
275	1/28/1982	25	0.238	32.62	0.21
276	2/2/1988	80	0.238	32.74	0.21

277	1/30/1986	59	0.238	32.86	0.21
278	12/3/1983	30	0.238	32.98	0.21
279	3/16/1957	23	0.236	33.1	0.21
280	12/7/1980	22	0.236	33.21	0.21
281	3/22/1964	38	0.236	33.33	0.21
282	12/10/2006	31	0.235	33.45	0.21
283	4/22/1980	36	0.235	33.57	0.2
284	2/20/1996	52	0.234	33.69	0.2
285	2/2/2004	32	0.23	33.81	0.2
286	1/25/1960	23	0.229	33.93	0.2
287	3/1/1979	41	0.228	34.05	0.2
288	2/19/1962	62	0.228	34.16	0.2
289	1/6/1959	17	0.228	34.28	0.2
290	1/16/1955	27	0.227	34.4	0.2
291	11/15/1963	24	0.226	34.52	0.2
292	4/26/1963	17	0.225	34.64	0.2
293	12/16/1984	17	0.222	34.76	0.2
294	8/26/2007	19	0.221	34.88	0.2
295	2/13/1995	35	0.22	34.99	0.2
296	1/24/1965	22	0.22	35.11	0.2
297	3/11/1955	17	0.22	35.23	0.2
298	4/5/1969	16	0.219	35.35	0.19
299	12/30/1952	25	0.218	35.47	0.19
300	6/10/1957	16	0.218	35.59	0.19
301	2/29/1952	33	0.216	35.71	0.19
302	2/11/2000	84	0.215	35.82	0.19
303	2/10/1970	56	0.214	35.94	0.19
304	12/20/1952	27	0.213	36.06	0.19
305	4/11/1999	33	0.213	36.18	0.19
306	12/27/1992	56	0.212	36.3	0.19
307	11/21/1978	21	0.212	36.42	0.19
308	11/23/1952	22	0.211	36.54	0.19
309	1/25/1952	49	0.21	36.65	0.19
310	4/15/1976	27	0.21	36.77	0.19
311	4/17/1975	19	0.209	36.89	0.19
312	2/7/1986	39	0.209	37.01	0.19
313	12/27/1964	44	0.207	37.13	0.19
314	3/6/1962	30	0.205	37.25	0.18
315	2/6/1983	56	0.204	37.37	0.18
316	11/14/1955	17	0.204	37.49	0.18
317	2/16/1955	37	0.203	37.6	0.18
318	4/30/1955	45	0.203	37.72	0.18
319	3/28/2006	25	0.202	37.84	0.18
320	12/6/1986	39	0.202	37.96	0.18
321	1/13/1969	44	0.201	38.08	0.18
322	12/4/1980	37	0.199	38.2	0.18
323	1/12/1954	31	0.199	38.32	0.18
324	12/28/1974	43	0.199	38.43	0.18
325	11/26/1960	23	0.198	38.55	0.18
326	1/24/1994	77	0.198	38.67	0.18
327	2/15/1962	35	0.197	38.79	0.18
328	4/1/1998	19	0.197	38.91	0.18
329	12/4/2004	46	0.197	39.03	0.18
330	4/27/1953	20	0.197	39.15	0.18
331	3/6/2001	39	0.197	39.26	0.18
332	9/4/1963	19	0.196	39.38	0.17
333	4/6/1986	31	0.196	39.5	0.17
334	10/20/1979	34	0.195	39.62	0.17
335	10/28/1974	46	0.195	39.74	0.17
336	11/17/1973	56	0.195	39.86	0.17
337	4/10/1952	29	0.195	39.98	0.17
338	4/22/1955	19	0.195	40.09	0.17
339	11/11/1972	20	0.195	40.21	0.17
340	9/26/1982	28	0.194	40.33	0.17
341	12/31/2005	70	0.193	40.45	0.17
342	2/4/1999	33	0.193	40.57	0.17
343	1/16/1970	32	0.193	40.69	0.17
344	1/5/1957	21	0.193	40.81	0.17
345	12/6/1998	16	0.193	40.93	0.17
346	10/26/2000	42	0.192	41.04	0.17
347	11/29/1982	45	0.191	41.16	0.17
348	1/10/1982	22	0.191	41.28	0.17
349	2/3/1975	43	0.191	41.4	0.17
350	11/25/1961	36	0.19	41.52	0.17
351	10/9/1986	44	0.19	41.64	0.17
352	10/17/1984	21	0.19	41.76	0.16
353	10/16/1980	21	0.19	41.87	0.16
354	2/28/1973	21	0.19	41.99	0.16
355	11/12/1960	15	0.189	42.11	0.16
356	8/24/1988	19	0.188	42.23	0.16
357	12/4/1972	26	0.188	42.35	0.16
358	12/18/2007	28	0.187	42.47	0.16
359	10/31/1957	19	0.187	42.59	0.16
360	3/21/1995	22	0.187	42.7	0.16
361	1/21/1995	16	0.186	42.82	0.16
362	2/23/1971	14	0.186	42.94	0.16
363	2/13/1968	22	0.186	43.06	0.16
364	2/25/1981	26	0.186	43.18	0.16
365	5/28/1990	25	0.186	43.3	0.16
366	11/20/1961	20	0.185	43.42	0.16
367	1/18/1969	89	0.185	43.53	0.16
368	3/25/1999	24	0.185	43.65	0.16
369	1/22/1997	55	0.185	43.77	0.16
370	4/21/1967	19	0.183	43.89	0.16
371	9/23/1958	24	0.183	44.01	0.16

372	5/22/2006	21	0.182	44.13	0.16
373	11/18/1982	41	0.181	44.25	0.16
374	4/16/1990	31	0.181	44.37	0.16
375	3/12/1952	24	0.18	44.48	0.15
376	12/15/1957	58	0.179	44.6	0.15
377	3/12/1996	33	0.179	44.72	0.15
378	2/8/1959	32	0.179	44.84	0.15
379	2/8/1960	46	0.179	44.96	0.15
380	1/21/1996	27	0.178	45.08	0.15
381	3/2/1974	33	0.178	45.2	0.15
382	6/9/1990	37	0.178	45.31	0.15
383	2/28/2007	25	0.178	45.43	0.15
384	4/17/2000	27	0.177	45.55	0.15
385	1/30/1978	26	0.177	45.67	0.15
386	12/10/1984	23	0.175	45.79	0.15
387	3/23/1995	21	0.175	45.91	0.15
388	1/5/1988	21	0.175	46.03	0.15
389	11/24/1978	18	0.175	46.14	0.15
390	1/2/1997	43	0.175	46.26	0.15
391	12/29/1982	17	0.174	46.38	0.15
392	2/4/1990	17	0.174	46.5	0.15
393	2/14/1979	20	0.174	46.62	0.15
394	2/9/1975	33	0.174	46.74	0.15
395	12/7/2007	55	0.174	46.86	0.15
396	1/7/1985	32	0.174	46.98	0.15
397	3/25/1982	23	0.173	47.09	0.15
398	4/17/1963	22	0.173	47.21	0.15
399	1/28/1985	23	0.173	47.33	0.15
400	12/19/1951	17	0.173	47.45	0.14
401	11/20/1983	23	0.173	47.57	0.14
402	1/31/1990	16	0.173	47.69	0.14
403	2/2/1985	50	0.173	47.81	0.14
404	11/4/1987	26	0.173	47.92	0.14
405	2/18/2006	41	0.173	48.04	0.14
406	11/14/1953	28	0.172	48.16	0.14
407	10/31/1987	54	0.172	48.28	0.14
408	11/10/1978	50	0.172	48.4	0.14
409	3/31/1967	17	0.172	48.52	0.14
410	3/22/1987	16	0.171	48.64	0.14
411	12/27/1996	29	0.171	48.75	0.14
412	4/12/1983	36	0.171	48.87	0.14
413	3/27/1958	17	0.169	48.99	0.14
414	1/13/1990	36	0.169	49.11	0.14
415	10/16/2005	52	0.169	49.23	0.14
416	12/17/1977	23	0.168	49.35	0.14
417	11/27/1975	40	0.168	49.47	0.14
418	12/11/1993	21	0.168	49.58	0.14
419	2/23/1953	21	0.167	49.7	0.14
420	1/12/1971	19	0.166	49.82	0.14
421	3/10/2001	19	0.166	49.94	0.14
422	1/6/1953	49	0.166	50.06	0.14
423	10/16/1971	21	0.165	50.18	0.14
424	12/28/1952	17	0.165	50.3	0.14
425	2/6/1973	37	0.164	50.42	0.14
426	2/3/2008	28	0.164	50.53	0.14
427	10/21/1957	14	0.162	50.65	0.14
428	4/18/1967	40	0.161	50.77	0.14
429	12/5/1996	21	0.16	50.89	0.14
430	1/23/2008	28	0.16	51.01	0.13
431	3/22/2005	18	0.16	51.13	0.13
432	1/9/1970	60	0.16	51.25	0.13
433	2/13/1987	17	0.16	51.36	0.13
434	2/11/2007	17	0.159	51.48	0.13
435	12/18/1997	20	0.159	51.6	0.13
436	3/12/1965	39	0.159	51.72	0.13
437	2/9/1989	25	0.158	51.84	0.13
438	5/24/1977	15	0.158	51.96	0.13
439	10/26/1991	20	0.158	52.08	0.13
440	3/2/1989	20	0.158	52.19	0.13
441	5/21/1957	14	0.158	52.31	0.13
442	3/21/1980	24	0.157	52.43	0.13
443	1/30/1955	20	0.157	52.55	0.13
444	11/10/1969	15	0.156	52.67	0.13
445	12/1/1998	16	0.156	52.79	0.13
446	2/3/1989	30	0.156	52.91	0.13
447	4/13/1976	20	0.155	53.02	0.13
448	11/17/1955	17	0.155	53.14	0.13
449	2/23/1957	19	0.155	53.26	0.13
450	11/14/1968	20	0.154	53.38	0.13
451	12/9/1983	12	0.154	53.5	0.13
452	12/20/1975	18	0.153	53.62	0.13
453	1/7/1989	13	0.153	53.74	0.13
454	1/29/1977	13	0.151	53.86	0.13
455	2/20/2001	17	0.151	53.97	0.13
456	2/23/1979	14	0.151	54.09	0.13
457	3/11/1958	36	0.151	54.21	0.13
458	11/9/1964	41	0.151	54.33	0.13
459	3/15/1991	13	0.15	54.45	0.13
460	3/27/1992	12	0.149	54.57	0.13
461	5/14/1989	35	0.148	54.69	0.13
462	1/16/1996	15	0.147	54.8	0.13
463	12/3/1984	13	0.147	54.92	0.13
464	2/2/1989	13	0.146	55.04	0.13
465	3/28/1963	15	0.146	55.16	0.12
466	4/18/1981	19	0.145	55.28	0.12

467	3/27/1974	16	0.145	55.4	0.12
468	11/21/2004	13	0.145	55.52	0.12
469	12/25/1994	15	0.144	55.63	0.12
470	11/12/1976	16	0.144	55.75	0.12
471	12/5/1951	17	0.143	55.87	0.12
472	1/3/1998	33	0.142	55.99	0.12
473	7/26/1976	12	0.142	56.11	0.12
474	2/23/2001	15	0.142	56.23	0.12
475	3/8/1992	18	0.142	56.35	0.12
476	12/21/1979	16	0.141	56.47	0.12
477	12/7/1972	40	0.14	56.58	0.12
478	11/29/2001	15	0.14	56.7	0.12
479	3/13/1998	36	0.14	56.82	0.12
480	1/2/1993	18	0.139	56.94	0.12
481	2/23/1956	28	0.139	57.06	0.12
482	11/13/1984	12	0.139	57.18	0.12
483	3/5/1987	27	0.138	57.3	0.12
484	1/23/1989	12	0.137	57.41	0.12
485	3/22/1975	12	0.137	57.53	0.12
486	10/19/1972	33	0.135	57.65	0.12
487	3/15/1987	12	0.135	57.77	0.12
488	12/31/1964	13	0.135	57.89	0.12
489	3/21/2006	14	0.134	58.01	0.12
490	2/20/2008	14	0.134	58.13	0.12
491	2/19/2007	15	0.134	58.24	0.12
492	11/10/1994	13	0.134	58.36	0.12
493	3/4/1996	15	0.133	58.48	0.12
494	10/10/1966	16	0.133	58.6	0.12
495	1/13/1962	13	0.132	58.72	0.12
496	2/13/1958	12	0.131	58.84	0.12
497	12/12/1975	11	0.131	58.96	0.12
498	4/15/1978	11	0.131	59.07	0.12
499	12/6/1956	12	0.13	59.19	0.12
500	2/10/1997	11	0.129	59.31	0.12
501	12/3/2001	35	0.129	59.43	0.12
502	1/1/1955	16	0.129	59.55	0.12
503	1/10/1973	10	0.128	59.67	0.12
504	10/22/1953	13	0.126	59.79	0.12
505	11/12/2003	26	0.126	59.91	0.11
506	1/25/1996	10	0.126	60.02	0.11
507	10/21/1985	11	0.126	60.14	0.11
508	12/4/1971	11	0.126	60.26	0.11
509	5/19/1957	11	0.125	60.38	0.11
510	4/22/2007	10	0.125	60.5	0.11
511	2/22/2007	10	0.125	60.62	0.11
512	4/27/1984	13	0.125	60.74	0.11
513	11/3/1960	12	0.124	60.85	0.11
514	3/17/2002	15	0.123	60.97	0.11
515	12/22/1965	14	0.122	61.09	0.11
516	12/27/2006	11	0.121	61.21	0.11
517	12/14/1993	17	0.121	61.33	0.11
518	2/24/1962	11	0.121	61.45	0.11
519	12/8/1969	10	0.119	61.57	0.11
520	3/28/1961	15	0.119	61.68	0.11
521	1/20/1957	11	0.118	61.8	0.11
522	2/3/1973	11	0.118	61.92	0.11
523	12/16/2006	15	0.117	62.04	0.11
524	1/1/1974	11	0.117	62.16	0.11
525	1/20/1999	23	0.117	62.28	0.11
526	12/23/1995	10	0.116	62.4	0.11
527	12/3/1954	10	0.116	62.51	0.11
528	12/17/1952	15	0.116	62.63	0.11
529	3/28/1960	11	0.115	62.75	0.11
530	6/3/1999	10	0.114	62.87	0.11
531	9/16/1982	35	0.114	62.99	0.11
532	12/13/1995	12	0.113	63.11	0.11
533	4/8/1978	14	0.113	63.23	0.11
534	10/15/1964	10	0.113	63.35	0.11
535	11/26/1967	10	0.112	63.46	0.11
536	3/22/1962	9	0.112	63.58	0.11
537	4/25/1975	9	0.112	63.7	0.11
538	12/18/1992	11	0.111	63.82	0.11
539	1/30/1975	9	0.111	63.94	0.11
540	11/28/1998	26	0.111	64.06	0.11
541	11/5/1953	9	0.111	64.18	0.11
542	1/2/1990	12	0.111	64.29	0.11
543	12/6/1952	9	0.111	64.41	0.11
544	2/22/1977	12	0.11	64.53	0.11
545	3/4/2005	24	0.11	64.65	0.11
546	3/16/1977	151	0.11	64.77	0.11
547	3/28/1982	15	0.109	64.89	0.11
548	2/17/2002	11	0.109	65.01	0.11
549	1/27/1966	12	0.108	65.12	0.11
550	4/10/2001	9	0.108	65.24	0.11
551	2/3/1996	9	0.107	65.36	0.11
552	4/26/1955	9	0.107	65.48	0.11
553	3/2/1964	9	0.107	65.6	0.1
554	12/4/1953	9	0.106	65.72	0.1
555	3/3/2006	8	0.105	65.84	0.1
556	1/22/1983	81	0.105	65.95	0.1
557	11/20/1951	27	0.105	66.07	0.1
558	4/3/1969	10	0.103	66.19	0.1
559	2/29/1964	8	0.102	66.31	0.1
560	3/13/1971	9	0.102	66.43	0.1
561	11/14/1957	9	0.101	66.55	0.1

562	11/30/2000	9	0.101	66.67	0.1
563	9/16/1965	22	0.1	66.79	0.1
564	2/24/1977	16	0.1	66.9	0.1
565	6/15/1995	30	0.099	67.02	0.1
567	9/18/1999	4	0.099	67.26	0.1
567	9/20/2005	7	0.099	67.26	0.1
568	3/24/1987	30	0.099	67.38	0.1
569	4/2/1981	13	0.098	67.5	0.1
570	1/31/1999	8	0.098	67.62	0.1
571	3/27/1985	36	0.098	67.73	0.1
572	3/22/1978	30	0.097	67.85	0.1
573	1/15/1984	23	0.097	67.97	0.1
574	4/18/1957	11	0.097	68.09	0.1
575	12/29/1987	25	0.096	68.21	0.1
576	4/14/2006	24	0.096	68.33	0.1
577	1/28/1996	8	0.096	68.45	0.1
578	11/10/2000	24	0.095	68.56	0.1
579	12/7/1967	15	0.094	68.68	0.1
580	4/20/1953	4	0.092	68.8	0.1
581	1/7/1965	7	0.092	68.92	0.1
582	5/11/1958	10	0.092	69.04	0.1
583	5/19/1974	1	0.092	69.16	0.1
584	1/31/1967	9	0.092	69.28	0.1
585	3/11/1999	7	0.092	69.4	0.1
586	3/13/1969	10	0.091	69.51	0.1
587	12/12/1984	7	0.09	69.63	0.1
588	10/10/1951	7	0.09	69.75	0.1
589	10/7/1983	25	0.09	69.87	0.1
590	4/1/1999	7	0.09	69.99	0.1
591	1/17/1983	59	0.089	70.11	0.1
592	4/4/1982	7	0.089	70.23	0.1
593	1/12/1981	7	0.089	70.34	0.1
594	12/19/1991	7	0.089	70.46	0.1
595	11/13/1978	7	0.089	70.58	0.1
596	11/15/1978	7	0.088	70.7	0.1
597	12/4/1955	7	0.088	70.82	0.1
598	1/22/1990	7	0.088	70.94	0.1
599	2/12/1996	7	0.087	71.06	0.1
600	10/15/1951	7	0.087	71.17	0.1
601	3/7/2006	7	0.087	71.29	0.1
602	2/5/1987	7	0.087	71.41	0.1
603	3/10/1969	15	0.087	71.53	0.1
604	4/28/1980	24	0.087	71.65	0.1
605	12/19/1998	7	0.086	71.77	0.1
606	3/29/1992	7	0.086	71.89	0.1
607	1/2/2004	6	0.086	72	0.1
608	12/25/1979	7	0.086	72.12	0.1
609	11/12/1979	7	0.086	72.24	0.1
610	12/19/1983	7	0.086	72.36	0.1
611	11/16/1984	7	0.085	72.48	0.09
612	3/31/1992	7	0.085	72.6	0.09
613	4/5/1975	23	0.085	72.72	0.09
614	12/23/1977	7	0.085	72.84	0.09
615	3/28/1983	6	0.085	72.95	0.09
616	11/17/1983	6	0.085	73.07	0.09
617	5/8/1980	56	0.085	73.19	0.09
618	12/8/2004	8	0.084	73.31	0.09
619	11/17/1987	6	0.084	73.43	0.09
620	12/11/1987	6	0.084	73.55	0.09
621	3/13/1991	6	0.084	73.67	0.09
622	1/22/2008	7	0.084	73.78	0.09
623	12/15/1983	6	0.083	73.9	0.09
624	1/25/1979	6	0.083	74.02	0.09
625	1/5/1983	6	0.083	74.14	0.09
626	3/13/1960	7	0.083	74.26	0.09
627	2/23/1986	6	0.082	74.38	0.09
628	2/17/1982	6	0.082	74.5	0.09
629	2/15/1964	6	0.082	74.61	0.09
630	2/3/1987	6	0.082	74.73	0.09
631	3/14/1981	6	0.081	74.85	0.09
632	1/4/1984	6	0.081	74.97	0.09
633	1/5/1989	6	0.081	75.09	0.09
634	2/26/1993	9	0.081	75.21	0.09
635	12/9/1963	7	0.081	75.33	0.09
636	3/10/1981	6	0.08	75.44	0.09
637	5/7/1971	7	0.08	75.56	0.09
638	3/1/1986	6	0.08	75.68	0.09
639	4/4/1976	25	0.08	75.8	0.09
640	1/30/1958	6	0.08	75.92	0.09
641	12/1/1978	6	0.08	76.04	0.09
642	12/7/1971	6	0.079	76.16	0.09
643	11/23/1984	6	0.079	76.28	0.09
644	7/22/1977	6	0.079	76.39	0.09
645	2/14/2008	6	0.079	76.51	0.09
646	10/7/1985	6	0.079	76.63	0.09
647	12/13/1971	6	0.079	76.75	0.09
648	10/28/1987	6	0.079	76.87	0.09
649	12/3/1960	6	0.079	76.99	0.09
650	1/13/1953	7	0.079	77.11	0.09
651	5/2/1980	6	0.078	77.22	0.09
652	12/1/1973	6	0.077	77.34	0.09
653	3/23/1960	6	0.077	77.46	0.09
654	11/6/1963	7	0.077	77.58	0.09
655	4/7/1999	6	0.077	77.7	0.09
656	12/20/2001	30	0.076	77.82	0.09

657	6/2/1999	9	0.076	77.94	0.09
658	1/9/1972	6	0.076	78.05	0.09
659	4/7/1978	6	0.075	78.17	0.09
660	9/18/1985	7	0.075	78.29	0.09
661	11/14/1987	6	0.075	78.41	0.09
662	4/26/1971	6	0.075	78.53	0.09
664	10/8/1951	4	0.074	78.77	0.09
664	10/1/1996	1	0.074	78.77	0.09
665	2/13/2007	5	0.074	78.88	0.09
666	1/7/1980	5	0.073	79	0.09
667	2/18/2004	6	0.073	79.12	0.09
668	5/6/1983	5	0.073	79.24	0.09
669	2/8/1982	5	0.073	79.36	0.09
670	4/1/1980	5	0.073	79.48	0.09
671	3/26/1973	5	0.073	79.6	0.09
672	4/17/2004	3	0.073	79.72	0.09
673	1/8/2001	6	0.072	79.83	0.09
674	5/1/1995	4	0.072	79.95	0.09
675	11/3/1957	35	0.072	80.07	0.09
676	10/1/1959	6	0.072	80.19	0.09
677	5/1/1981	5	0.071	80.31	0.09
678	5/3/2003	7	0.071	80.43	0.09
679	4/7/1952	11	0.07	80.55	0.09
680	2/20/1985	5	0.07	80.66	0.09
681	1/27/1968	6	0.07	80.78	0.09
682	3/18/1980	5	0.07	80.9	0.09
683	3/9/1969	5	0.069	81.02	0.08
684	10/13/2007	6	0.069	81.14	0.08
685	8/18/1983	8	0.068	81.26	0.08
686	11/11/1958	1	0.068	81.38	0.08
687	5/27/1962	6	0.068	81.49	0.08
688	7/17/1987	8	0.068	81.61	0.08
689	3/6/1965	4	0.067	81.73	0.08
690	12/29/2002	5	0.067	81.85	0.08
691	12/22/2006	5	0.067	81.97	0.08
692	1/24/1957	5	0.066	82.09	0.08
693	7/20/1977	5	0.065	82.21	0.08
694	3/11/1991	5	0.065	82.33	0.08
695	11/21/1955	5	0.065	82.44	0.08
696	3/12/1964	5	0.064	82.56	0.08
697	1/26/1977	5	0.064	82.68	0.08
698	7/27/1977	4	0.064	82.8	0.08
699	1/19/1966	5	0.063	82.92	0.08
700	4/21/2001	6	0.063	83.04	0.08
701	3/26/2004	7	0.062	83.16	0.08
702	10/23/1987	4	0.062	83.27	0.08
703	1/18/1964	6	0.062	83.39	0.08
704	3/15/1999	4	0.062	83.51	0.08
712	12/21/1981	4	0.062	84.46	0.08
712	12/9/1991	1	0.062	84.46	0.08
712	12/18/1991	2	0.062	84.46	0.08
712	1/1/1981	1	0.062	84.46	0.08
712	1/28/1987	4	0.062	84.46	0.08
712	12/1/1989	1	0.062	84.46	0.08
712	12/20/1990	1	0.062	84.46	0.08
712	1/3/1991	1	0.062	84.46	0.08
713	12/7/1955	5	0.062	84.58	0.08
714	2/14/1975	6	0.061	84.7	0.08
715	2/9/1999	4	0.061	84.82	0.08
716	5/9/1956	4	0.061	84.93	0.08
717	11/4/1979	3	0.061	85.05	0.08
725	11/27/1976	4	0.061	86	0.08
725	2/10/1984	2	0.061	86	0.08
725	11/26/1989	1	0.061	86	0.08
725	2/29/1988	1	0.061	86	0.08
725	11/16/1981	1	0.061	86	0.08
725	11/5/1986	1	0.061	86	0.08
725	11/8/1984	1	0.061	86	0.08
725	11/10/1988	24	0.061	86	0.08
726	4/11/1982	4	0.061	86.12	0.08
727	4/18/1996	6	0.06	86.24	0.08
728	12/1/1955	5	0.06	86.36	0.08
729	3/29/1967	3	0.06	86.48	0.08
734	10/4/1979	1	0.06	87.07	0.08
734	10/5/1977	1	0.06	87.07	0.08
734	10/11/1981	1	0.06	87.07	0.08
734	10/6/1985	1	0.06	87.07	0.08
734	10/26/1982	1	0.06	87.07	0.08
735	1/20/1965	3	0.06	87.19	0.08
736	4/26/1981	4	0.06	87.31	0.08
737	11/16/2003	10	0.06	87.43	0.08
738	9/16/1978	3	0.059	87.54	0.08
739	4/1/1986	2	0.059	87.66	0.08
740	9/5/1977	1	0.059	87.78	0.08
746	4/21/1985	1	0.059	88.49	0.08
746	9/15/1982	1	0.059	88.49	0.08
746	4/25/1978	3	0.059	88.49	0.08
746	4/27/1970	4	0.059	88.49	0.08
746	4/21/1980	1	0.059	88.49	0.08
746	9/9/1977	1	0.059	88.49	0.08
747	3/19/2005	17	0.059	88.61	0.08
754	5/7/1976	1	0.059	89.44	0.08
754	5/6/1982	1	0.059	89.44	0.08
754	5/13/1990	1	0.059	89.44	0.08
754	5/17/1992	1	0.059	89.44	0.08

754	5/7/1979	1	0.059	89.44	0.08
754	5/5/1992	1	0.059	89.44	0.08
754	5/29/1988	1	0.059	89.44	0.08
758	8/6/1983	1	0.058	89.92	0.08
758	8/14/1987	1	0.058	89.92	0.08
758	8/15/1990	1	0.058	89.92	0.08
758	8/19/1979	1	0.058	89.92	0.08
767	7/15/1984	1	0.058	90.98	0.08
767	7/31/1991	1	0.058	90.98	0.08
767	7/14/1977	1	0.058	90.98	0.08
767	6/17/1982	1	0.058	90.98	0.08
767	6/4/1989	1	0.058	90.98	0.08
767	7/15/1977	1	0.058	90.98	0.08
767	6/30/1976	1	0.058	90.98	0.08
767	6/10/1976	1	0.058	90.98	0.08
767	6/1/1976	1	0.058	90.98	0.08
768	12/20/1968	4	0.058	91.1	0.08
769	11/16/1957	8	0.057	91.22	0.08
770	1/13/1998	4	0.054	91.34	0.08
771	11/16/1994	3	0.054	91.46	0.08
772	4/27/1956	8	0.054	91.58	0.08
773	11/20/1953	4	0.054	91.7	0.08
774	4/16/1970	1	0.054	91.81	0.07
775	10/16/1963	1	0.054	91.93	0.07
776	5/14/1962	11	0.053	92.05	0.07
777	1/2/1971	4	0.053	92.17	0.07
778	12/14/2001	3	0.052	92.29	0.07
779	4/23/1960	25	0.052	92.41	0.07
780	11/15/1969	4	0.051	92.53	0.07
781	10/19/1963	3	0.051	92.65	0.07
782	12/5/1998	3	0.051	92.76	0.07
783	3/22/2003	4	0.051	92.88	0.07
784	12/2/1951	4	0.05	93	0.07
785	1/19/1998	3	0.05	93.12	0.07
786	12/3/2005	1	0.05	93.24	0.07
787	11/12/2001	28	0.049	93.36	0.07
788	4/15/1998	3	0.049	93.48	0.07
789	10/11/1957	1	0.048	93.59	0.07
790	12/11/1968	2	0.047	93.71	0.07
791	3/2/1966	3	0.047	93.83	0.07
792	4/1/1964	2	0.047	93.95	0.07
793	11/23/1993	2	0.047	94.07	0.07
794	1/7/1952	2	0.046	94.19	0.07
795	10/8/1961	1	0.046	94.31	0.07
796	4/8/1963	6	0.046	94.42	0.07
797	1/28/2005	3	0.046	94.54	0.07
798	9/22/2000	1	0.046	94.66	0.07
799	2/26/1962	3	0.046	94.78	0.07
800	11/27/2006	1	0.045	94.9	0.07
801	6/11/1963	1	0.045	95.02	0.07
803	10/2/1996	3	0.044	95.26	0.07
803	10/7/1951	1	0.044	95.26	0.07
804	1/29/2002	2	0.044	95.37	0.07
805	12/30/2001	2	0.044	95.49	0.07
808	9/22/2007	1	0.043	95.85	0.07
808	4/3/1997	1	0.043	95.85	0.07
808	4/24/1994	1	0.043	95.85	0.07
809	3/15/1963	1	0.042	95.97	0.07
810	4/29/1953	3	0.042	96.09	0.07
811	2/25/1966	6	0.042	96.2	0.07
813	8/30/2004	1	0.042	96.44	0.07
813	8/31/1998	1	0.042	96.44	0.07
814	7/18/1999	1	0.041	96.56	0.07
815	4/24/2002	1	0.041	96.68	0.07
816	9/29/2002	1	0.041	96.8	0.07
817	1/20/2003	2	0.04	96.92	0.07
818	5/6/1998	1	0.04	97.03	0.07
819	4/15/2002	1	0.04	97.15	0.07
820	2/17/2000	2	0.04	97.27	0.07
821	3/17/2006	1	0.039	97.39	0.07
822	7/29/1965	1	0.038	97.51	0.07
823	1/25/2000	1	0.037	97.63	0.07
824	5/5/1969	1	0.037	97.75	0.07
825	1/28/2004	1	0.037	97.86	0.07
826	3/31/1958	1	0.037	97.98	0.07
827	2/19/1974	1	0.036	98.1	0.07
828	4/26/2002	1	0.036	98.22	0.07
829	12/16/1967	2	0.036	98.34	0.07
830	10/17/1972	1	0.036	98.46	0.07
831	3/15/1961	1	0.036	98.58	0.07
832	2/7/2005	1	0.035	98.7	0.07
833	1/8/1952	1	0.035	98.81	0.07
834	3/4/1973	1	0.035	98.93	0.07
835	3/20/1953	1	0.034	99.05	0.07
836	2/15/1969	2	0.034	99.17	0.07
837	12/14/1961	2	0.033	99.29	0.07
838	3/29/1962	1	0.033	99.41	0.07
839	11/11/1998	1	0.033	99.53	0.07
840	7/13/1954	1	0.032	99.64	0.07
841	9/19/1952	1	0.031	99.76	0.07
842	12/8/2003	1	0.031	99.88	0.07
843	4/25/1978	1	0.034	99.41	0.07
844	4/26/1994	1	0.032	99.53	0.07
845	3/29/1967	1	0.032	99.65	0.07
846	11/11/1988	1	0.032	99.76	0.07

847	9/16/1978	1	0.032	99.88	0.07
848	4/5/1976	2	0.054	96.15	0.07
849	1/8/1952	1	0.054	96.26	0.07
850	2/17/2000	2	0.052	96.37	0.07
851	4/29/1953	2	0.051	96.49	0.07
852	11/5/1979	1	0.051	96.6	0.07
853	4/24/1960	1	0.05	96.71	0.07
854	3/17/2006	12	0.05	96.83	0.07
855	9/18/1999	1	0.049	96.94	0.07
856	3/21/1973	1	0.047	97.05	0.07
857	3/29/1962	1	0.047	97.17	0.07
858	3/31/1958	1	0.046	97.28	0.07
859	4/21/1953	1	0.045	97.39	0.07
860	12/14/1961	2	0.045	97.51	0.07
861	2/15/1969	2	0.045	97.62	0.07
862	12/16/1967	2	0.044	97.73	0.07
863	3/4/1973	1	0.042	97.85	0.07
864	2/10/1984	1	0.042	97.96	0.07
865	4/13/1998	1	0.042	98.07	0.07
866	10/16/1963	2	0.041	98.19	0.07
867	11/11/1998	1	0.04	98.3	0.07
868	3/20/1953	1	0.038	98.41	0.07
870	12/16/1995	1	0.038	98.64	0.07
870	1/19/1996	1	0.038	98.64	0.07
871	2/25/2005	1	0.036	98.75	0.07
873	2/15/1987	1	0.036	98.98	0.07
873	11/18/1994	1	0.036	98.98	0.07
874	1/31/2000	1	0.035	99.09	0.07
875	1/28/2005	1	0.035	99.21	0.07
876	4/25/1978	1	0.034	99.32	0.07
877	4/26/1994	1	0.032	99.43	0.07
878	11/11/1988	1	0.032	99.55	0.07
879	2/28/1969	1	0.032	99.66	0.07
880	3/29/1967	1	0.032	99.77	0.07
881	2/7/1999	1	0.032	99.89	0.07
882	7/29/1965	2	0.106	78.19	0.07
883	2/26/1993	5	0.105	78.28	0.07
884	12/2/1960	22	0.105	78.37	0.07
885	4/20/2001	14	0.104	78.46	0.07
886	12/7/2003	16	0.103	78.55	0.07
887	1/29/2008	2	0.102	78.63	0.07
888	12/22/2006	2	0.102	78.72	0.07
889	1/28/2005	2	0.102	78.81	0.07
891	12/29/2002	3	0.101	78.99	0.07
891	1/20/2003	3	0.101	78.99	0.07
892	12/4/1955	7	0.099	79.08	0.07
893	2/13/2007	16	0.099	79.17	0.06
894	11/4/1957	8	0.097	79.26	0.06
895	7/13/1954	2	0.096	79.34	0.06
896	12/3/1992	24	0.095	79.43	0.06
897	10/2/1996	21	0.095	79.52	0.06
898	3/15/1999	2	0.094	79.61	0.06
899	1/30/1967	9	0.093	79.7	0.06
900	1/11/1970	17	0.091	79.79	0.06
901	9/6/1972	6	0.09	79.88	0.06
902	11/12/1971	3	0.09	79.96	0.06
903	12/13/1994	3	0.089	80.05	0.06
904	9/22/2007	4	0.089	80.14	0.06
905	3/18/2005	32	0.088	80.23	0.06
906	1/9/1974	4	0.088	80.32	0.06
907	11/21/1955	7	0.085	80.41	0.06
908	1/24/1957	18	0.085	80.5	0.06
910	8/30/2004	1	0.084	80.67	0.06
910	8/31/1998	1	0.084	80.67	0.06
911	2/9/1999	3	0.084	80.76	0.06
912	11/16/2003	9	0.084	80.85	0.06
913	11/16/1994	3	0.084	80.94	0.06
914	7/18/1999	1	0.083	81.03	0.06
915	5/5/1969	25	0.082	81.12	0.06
916	12/1/1955	6	0.078	81.21	0.06
917	1/2/1971	5	0.077	81.29	0.06
918	4/10/1956	23	0.076	81.38	0.06
919	11/13/1951	3	0.073	81.47	0.06
920	11/8/1972	4	0.073	81.56	0.06
921	12/18/1962	2	0.072	81.65	0.06
922	1/20/1956	9	0.071	81.74	0.06
923	10/7/1975	4	0.069	81.83	0.06
924	11/1/1995	16	0.069	81.91	0.06
925	2/20/1994	20	0.069	82	0.06
926	10/23/1956	2	0.068	82.09	0.06
927	1/28/2002	29	0.066	82.18	0.06
928	4/14/1963	1	0.065	82.27	0.06
929	1/13/1953	6	0.062	82.36	0.06
930	12/20/1968	3	0.062	82.45	0.06
931	3/22/2003	3	0.061	82.54	0.06
932	4/1/1964	8	0.061	82.62	0.06
933	4/8/1963	4	0.06	82.71	0.06
934	12/6/1955	4	0.06	82.8	0.06
935	5/23/2008	7	0.06	82.89	0.06
936	1/28/2004	6	0.059	82.98	0.06
937	12/2/1951	2	0.058	83.07	0.06
938	11/20/1953	2	0.056	83.16	0.06
940	3/17/2006	14	0.056	83.33	0.06
940	10/23/1992	3	0.056	83.33	0.06
941	2/14/1975	5	0.054	83.42	0.06

943	7/16/1995	2	0.054	83.6	0.06
943	6/15/1962	3	0.054	83.6	0.06
944	2/25/1966	5	0.054	83.69	0.06
945	9/19/1952	2	0.053	83.78	0.06
946	1/7/1952	32	0.053	83.87	0.06
947	5/20/2002	1	0.049	83.95	0.06
948	11/16/1957	22	0.049	84.04	0.06
949	12/4/1998	27	0.049	84.13	0.06
950	3/2/1966	3	0.049	84.22	0.06
951	11/3/1957	2	0.047	84.31	0.06
952	3/29/1962	2	0.046	84.4	0.06
953	4/15/1957	3	0.044	84.49	0.06
954	4/28/1952	5	0.044	84.57	0.06
955	2/7/2005	5	0.043	84.66	0.06
956	10/18/1963	24	0.043	84.75	0.06
957	3/30/1958	1	0.043	84.84	0.06
958	3/4/1973	1	0.043	84.93	0.06
959	11/1/1959	2	0.042	85.02	0.06
960	11/15/1969	11	0.041	85.11	0.06
961	3/7/1999	4	0.038	85.2	0.06
962	6/9/1964	6	0.036	85.28	0.06
963	4/18/1955	1	0.035	85.37	0.06
964	3/2/1958	1	0.034	85.46	0.06
965	10/30/1975	1	0.034	85.55	0.06
966	4/15/1998	3	0.034	85.64	0.06
967	4/21/1953	1	0.034	85.73	0.06
968	4/21/1970	1	0.033	85.82	0.06
971	9/29/1959	1	0.033	86.08	0.06
971	4/1/1956	1	0.033	86.08	0.06
971	4/25/1952	1	0.033	86.08	0.06
972	4/26/2002	5	0.032	86.17	0.06
973	2/26/1962	3	0.032	86.26	0.06
976	5/7/1961	1	0.032	86.52	0.06
976	5/17/1956	1	0.032	86.52	0.06
976	5/17/1964	1	0.032	86.52	0.06
977	1/13/1998	2	0.032	86.61	0.06
978	6/6/1972	1	0.032	86.7	0.06
979	1/19/1998	2	0.032	86.79	0.06
980	12/14/2001	2	0.032	86.88	0.06
981	12/30/2001	2	0.032	86.97	0.06
982	2/27/1997	6	0.03	87.06	0.06
983	5/13/1995	3	0.03	87.15	0.06
984	4/28/1954	2	0.029	87.23	0.06
985	1/31/2000	2	0.029	87.32	0.06
986	10/30/1968	13	0.029	87.41	0.06
987	12/2/1971	3	0.029	87.5	0.06
988	2/16/2000	26	0.028	87.59	0.06
989	11/29/2002	2	0.028	87.68	0.06
990	3/21/1973	1	0.028	87.77	0.06
991	2/28/1969	1	0.028	87.85	0.06
992	1/24/2001	15	0.027	87.94	0.06
993	1/19/1996	1	0.027	88.03	0.06
994	12/16/1995	1	0.027	88.12	0.06
995	12/31/1996	1	0.027	88.21	0.06
996	12/11/1992	1	0.027	88.3	0.06
997	12/19/1993	1	0.027	88.39	0.06
998	1/25/2004	1	0.027	88.48	0.06
1003	12/17/2003	1	0.027	88.92	0.06
1003	12/22/1994	1	0.027	88.92	0.06
1003	1/19/2004	1	0.027	88.92	0.06
1003	1/30/2006	1	0.027	88.92	0.06
1003	12/10/1999	1	0.027	88.92	0.06
1004	11/11/1998	12	0.027	89.01	0.06
1005	11/3/2003	7	0.027	89.1	0.06
1007	2/15/1987	1	0.027	89.27	0.06
1007	11/18/1994	1	0.027	89.27	0.06
1008	2/25/2005	1	0.027	89.36	0.06
1009	2/1/2006	1	0.027	89.45	0.06
1010	2/7/1999	1	0.027	89.54	0.06
1011	2/18/1987	1	0.027	89.63	0.06
1012	11/2/1974	1	0.027	89.72	0.06
1013	11/12/2004	1	0.027	89.8	0.06
1018	11/29/2004	1	0.026	90.25	0.06
1018	11/22/1992	1	0.026	90.25	0.06
1018	11/12/1993	1	0.026	90.25	0.06
1018	11/1/1993	1	0.026	90.25	0.06
1018	11/8/2004	1	0.026	90.25	0.06
1019	8/13/1992	3	0.026	90.34	0.06
1020	10/23/1960	1	0.026	90.43	0.06
1021	10/6/2000	1	0.026	90.51	0.06
1022	10/11/2000	1	0.026	90.6	0.06
1031	3/4/1999	1	0.026	91.4	0.06
1031	10/16/1993	1	0.026	91.4	0.06
1031	3/27/2007	1	0.026	91.4	0.06
1031	3/21/2007	1	0.026	91.4	0.06
1031	3/24/1961	2	0.026	91.4	0.06
1031	10/4/2000	1	0.026	91.4	0.06
1031	3/6/1975	1	0.026	91.4	0.06
1031	10/4/1994	1	0.026	91.4	0.06
1031	10/25/2005	1	0.026	91.4	0.06
1032	4/13/1998	1	0.025	91.49	0.06
1033	4/7/1998	1	0.025	91.58	0.06
1034	4/2/1974	1	0.025	91.67	0.06
1035	3/9/1957	4	0.025	91.76	0.06
1036	12/14/1961	4	0.025	91.84	0.06

1037	12/16/1967	14	0.025	91.93	0.06
1038	4/25/1994	48	0.025	92.02	0.06
1039	9/3/1998	6	0.025	92.11	0.06
1040	4/8/1999	1	0.025	92.2	0.06
1041	9/21/1999	1	0.024	92.29	0.06
1042	4/1/2006	1	0.024	92.38	0.06
1043	4/21/2000	1	0.024	92.46	0.06
1044	9/28/2007	1	0.024	92.55	0.06
1050	4/14/2000	1	0.024	93.09	0.06
1050	4/24/2005	1	0.024	93.09	0.06
1050	9/7/2000	1	0.024	93.09	0.06
1050	4/2/1996	1	0.024	93.09	0.06
1050	9/26/1998	1	0.024	93.09	0.06
1050	9/3/1972	1	0.024	93.09	0.06
1051	5/3/1960	6	0.024	93.17	0.06
1052	2/15/1969	8	0.024	93.26	0.06
1053	5/15/1994	1	0.024	93.35	0.06
1054	5/11/1994	1	0.024	93.44	0.06
1055	5/27/2006	1	0.024	93.53	0.05
1059	5/23/1999	1	0.024	93.88	0.05
1059	5/29/2001	1	0.024	93.88	0.05
1059	5/8/1994	1	0.024	93.88	0.05
1059	5/12/1968	1	0.024	93.88	0.05
1061	8/20/2003	1	0.023	94.06	0.05
1061	8/4/2006	1	0.023	94.06	0.05
1062	7/5/1999	1	0.023	94.15	0.05
1063	6/19/2004	1	0.023	94.24	0.05
1065	7/30/2003	1	0.023	94.41	0.05
1065	7/21/1959	1	0.023	94.41	0.05
1066	1/20/1974	7	0.022	94.5	0.05
1067	1/1/2000	1	0.021	94.59	0.05
1068	1/14/1964	4	0.021	94.68	0.05
1069	1/31/1969	1	0.021	94.77	0.05
1070	1/6/1955	1	0.021	94.86	0.05
1071	1/30/1973	1	0.021	94.95	0.05
1072	3/4/1961	5	0.02	95.04	0.05
1073	2/27/2000	25	0.02	95.12	0.05
1074	4/29/1953	2	0.02	95.21	0.05
1075	12/8/1960	2	0.019	95.3	0.05
1077	1/25/2002	1	0.019	95.48	0.05
1077	1/4/1973	1	0.019	95.48	0.05
1078	3/10/1970	1	0.019	95.57	0.05
1079	2/10/1966	1	0.018	95.66	0.05
1080	11/4/1968	1	0.018	95.74	0.05
1081	11/30/1968	1	0.018	95.83	0.05
1082	5/6/1971	1	0.018	95.92	0.05
1083	3/23/2002	19	0.018	96.01	0.05
1084	3/7/2002	15	0.017	96.1	0.05
1085	10/5/1951	1	0.017	96.19	0.05
1086	6/1/1963	2	0.017	96.28	0.05
1087	3/1/2002	5	0.017	96.37	0.05
1088	3/2/1962	1	0.017	96.45	0.05
1089	3/13/1968	1	0.017	96.54	0.05
1090	9/20/2002	1	0.017	96.63	0.05
1092	10/27/1959	2	0.017	96.81	0.05
1092	10/14/1962	1	0.017	96.81	0.05
1093	6/13/1967	1	0.017	96.9	0.05
1094	9/28/1951	1	0.017	96.99	0.05
1095	5/7/2003	1	0.016	97.07	0.05
1096	4/28/1967	23	0.016	97.16	0.05
1097	4/24/1967	1	0.016	97.25	0.05
1098	4/21/1963	2	0.016	97.34	0.05
1099	5/19/1972	20	0.016	97.43	0.05
1100	5/20/1975	7	0.016	97.52	0.05
1101	5/29/1971	1	0.016	97.61	0.05
1102	6/16/1998	1	0.015	97.7	0.05
1104	6/23/2003	1	0.015	97.87	0.05
1104	6/12/1998	1	0.015	97.87	0.05
1105	8/31/1967	1	0.015	97.96	0.05
1106	6/17/1975	1	0.015	98.05	0.05
1108	6/23/1960	1	0.015	98.23	0.05
1108	7/28/1968	1	0.015	98.23	0.05
1109	11/5/1957	2	0.014	98.32	0.05
1110	11/30/1961	2	0.014	98.4	0.05
1111	1/31/1963	3	0.013	98.49	0.05
1112	1/14/1970	1	0.013	98.58	0.05
1114	12/23/1964	1	0.013	98.76	0.05
1114	1/16/2000	1	0.013	98.76	0.05
1115	3/17/1962	2	0.013	98.85	0.05
1117	3/4/1967	1	0.013	99.02	0.05
1117	10/4/1956	1	0.013	99.02	0.05
1118	2/10/2001	1	0.012	99.11	0.05
1119	10/3/1951	1	0.011	99.2	0.05
1120	1/23/1956	5	0.011	99.29	0.05
1121	2/12/1962	1	0.01	99.38	0.05
1122	11/12/1964	1	0.01	99.47	0.05
1123	2/18/1952	1	0.01	99.56	0.05
1124	11/15/1958	1	0.01	99.65	0.05
1127	2/19/1960	1	0.01	99.91	0.05
1127	11/26/1964	1	0.01	99.91	0.05
1127	11/21/1966	1	0.01	99.91	0.05

ATTACHMENT 4 - Elevation vs. Area Curves vs. Discharge Curves to be used in SWMM

Elevation vs. Area

For the portion of the flow diverted in the LID Control to the receiving detention basin, a pond is used to route the hydrographs. The elevation vs area curve in the model is calculated in Excel and imported into the model at a 0.05 ft interval range.

Elevation vs Discharge

The total discharge peak flow is imported from an Excel spreadsheet that calculated the elevation vs discharge of the multiple outlet system.

The orifices have been selected to maximize their size while still restricting flows to conform to the required 10% of the Q2 event flow as mandated in the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011. While we acknowledge that these orifices are small, to increase the size of these outlets would impact the basins' ability to restrict flows beneath the HMP thresholds, thus preventing the BMP from conformance with HMP requirements.

In order to prevent blockage of the orifices, a debris screen will be fitted to the base invert of the lower orifices located within the detention basin. Regular maintenance of the riser and orifices will be performed to ensure potential blockages are minimized. A detail of the orifice and riser structure is provided in Attachment 5 of this attachment. The stage-storage and stage-discharge calculations have been provided on the following pages.

Elevation vs. Area Curve

depth	area	area (ac)	volume (cf)
0	9100	0.209	0
0.05	9176	0.211	456.9
0.1	9253	0.212	917.6
0.15	9329	0.214	1382.2
0.2	9405	0.216	1850.5
0.25	9481	0.218	2322.7
0.3	9558	0.219	2798.6
0.35	9634	0.221	3278.4
0.4	9710	0.223	3762.0
0.45	9786	0.225	4249.4
0.5	9863	0.226	4740.6
0.55	9939	0.228	5235.7
0.6	10015	0.230	5734.5
0.65	10091	0.232	6237.2
0.7	10168	0.233	6743.6
0.75	10244	0.235	7253.9
0.8	10320	0.237	7768.0
0.85	10396	0.239	8285.9
0.9	10473	0.240	8807.6
0.95	10549	0.242	9333.2
1	10625	0.244	9862.5
1.05	10704	0.246	10395.7
1.1	10782	0.248	10932.9
1.15	10861	0.249	11474.0
1.2	10940	0.251	12019.0
1.25	11019	0.253	12567.9
1.3	11097	0.255	13120.8
1.35	11176	0.257	13677.7
1.4	11255	0.258	14238.4
1.45	11333	0.260	14803.1
1.5	11412	0.262	15371.8
1.55	11491	0.264	15944.3
1.6	11569	0.266	16520.8
1.65	11648	0.267	17101.3
1.7	11727	0.269	17685.6
1.75	11806	0.271	18273.9
1.8	11884	0.273	18866.2
1.85	11963	0.275	19462.4
1.9	12042	0.276	20062.5
1.95	12120	0.278	20666.5
2	12199	0.280	21274.5
2.05	12281	0.282	21886.5
2.1	12362	0.284	22502.6
2.15	12444	0.286	23122.7
2.2	12525	0.288	23746.9

depth	area	area (ac)	volume (cf)
0	9100	0.209	0
2.25	12607	0.289	24375.2
2.3	12688	0.291	25007.6
2.35	12770	0.293	25644.0
2.4	12851	0.295	26284.6
2.45	12933	0.297	26929.2
2.5	13015	0.299	27577.9
2.55	13096	0.301	28230.6
2.6	13178	0.303	28887.5
2.65	13259	0.304	29548.4
2.7	13341	0.306	30213.4
2.75	13422	0.308	30882.5
2.8	13504	0.310	31555.6
2.85	13585	0.312	32232.8
2.9	13667	0.314	32914.2
2.95	13748	0.316	33599.5
3	13830	0.317	34289.0
3.05	13915	0.319	34982.6
3.1	13999	0.321	35680.5
3.15	14084	0.323	36382.5
3.2	14168	0.325	37088.8
3.25	14253	0.327	37799.3
3.3	14337	0.329	38514.1
3.35	14422	0.331	39233.0
3.4	14506	0.333	39956.2
3.45	14591	0.335	40683.6
3.5	14675	0.337	41415.3
3.55	14760	0.339	42151.1
3.6	14844	0.341	42891.2
3.65	14929	0.343	43635.5
3.7	15013	0.345	44384.1
3.75	15098	0.347	45136.8
3.8	15182	0.349	45893.8
3.85	15267	0.350	46655.0
3.9	15351	0.352	47420.5
3.95	15436	0.354	48190.1
4	15520	0.356	48964.0
4.05	15607	0.358	49742.2
4.1	15695	0.360	50524.7
4.15	15782	0.362	51311.7
4.2	15869	0.364	52102.9
4.25	15957	0.366	52898.6
4.3	16044	0.368	53698.6
4.35	16131	0.370	54503.0
4.4	16219	0.372	55311.8

depth	area	area (ac)	volume (cf)
0	9100	0.209	0
4.45	16306	0.374	56124.9
4.5	16394	0.376	56942.4
4.55	16481	0.378	57764.2
4.6	16568	0.380	58590.5
4.65	16656	0.382	59421.1
4.7	16743	0.384	60256.0
4.75	16830	0.386	61095.3
4.8	16918	0.388	61939.0
4.85	17005	0.390	62787.1
4.9	17092	0.392	63639.5
4.95	17180	0.394	64496.3
5	17267	0.396	65357.5
5.05	17356	0.398	66223.1
5.1	17446	0.400	67093.1
5.15	17535	0.403	67967.6
5.2	17624	0.405	68846.6
5.25	17713	0.407	69730.0
5.3	17803	0.409	70617.9
5.35	17892	0.411	71510.3
5.4	17981	0.413	72407.1
5.45	18070	0.415	73308.4
5.5	18160	0.417	74214.1
5.55	18249	0.419	75124.3
5.6	18338	0.421	76039.0
5.65	18427	0.423	76958.1
5.7	18517	0.425	77881.7
5.75	18606	0.427	78809.8
5.8	18695	0.429	79742.3
5.85	18784	0.431	80679.3
5.9	18874	0.433	81620.7
5.95	18963	0.435	82566.6
6	19052	0.437	83517.0

Basin BF -1-1

Discharge vs Elevation Table

Bottom orifice diameter:	1.5 "	Top orifice diameter:	3 "
Number:	1	Number:	2
Cg-low:	0.61	Cg-low:	0.61
Invert elev:	0.50 ft	Invert elev:	3.50 ft
Middle orifice diameter:	2 "	Emergency weir:	
number of orif:	1	Invert:	4.50 ft
Cg-middle:	0.61	Weir Length (ft)	10.0 ft
Invert elev:	1.50 ft		

h (ft)	H/D-low	H/D-mid	H/D-top	H/D-peak	Olow-orif (cfs)	Olow-weir (cfs)	Otot-low (cfs)	Omid-orif (cfs)	Omid-weir (cfs)	Otot-med (cfs)	Otop-orif (cfs)	Otop-weir (cfs)	Otot-top (cfs)	Opeak-top (cfs)	Otot (cfs)
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
0.55	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0028
0.6	0.80	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.0099
0.65	1.20	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.0178
0.7	1.60	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.0223
0.75	2.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0260
0.8	2.40	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0293
0.85	2.80	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0322
0.9	3.20	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0349
0.95	3.60	0.00	0.00	0.00	0.00	0.04	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0374
1	4.00	0.00	0.00	0.00	0.00	0.04	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0397
1.05	4.40	0.00	0.00	0.00	0.00	0.04	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0419
1.1	4.80	0.00	0.00	0.00	0.00	0.04	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.0440
1.15	5.20	0.00	0.00	0.00	0.00	0.05	0.35	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0460
1.2	5.60	0.00	0.00	0.00	0.00	0.05	0.59	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0480
1.25	6.00	0.00	0.00	0.00	0.00	0.05	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0498
1.3	6.40	0.00	0.00	0.00	0.00	0.05	1.47	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0516
1.35	6.80	0.00	0.00	0.00	0.00	0.05	2.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0533
1.4	7.20	0.00	0.00	0.00	0.00	0.05	3.18	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.0550
1.45	7.60	0.00	0.00	0.00	0.00	0.06	4.49	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.0566
1.5	8.00	0.00	0.00	0.00	0.00	0.06	6.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.0582
1.55	8.40	0.30	0.00	0.00	0.00	0.06	8.34	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.0630
1.6	8.80	0.60	0.00	0.00	0.00	0.06	11.06	0.06	0.01	0.01	0.01	0.00	0.00	0.00	0.0733
1.65	9.20	0.90	0.00	0.00	0.00	0.06	14.44	0.06	0.03	0.02	0.02	0.00	0.00	0.00	0.0874
1.7	9.60	1.20	0.00	0.00	0.00	0.06	18.58	0.06	0.04	0.04	0.04	0.00	0.00	0.00	0.1005
1.75	10.00	1.50	0.00	0.00	0.00	0.07	23.61	0.07	0.04	0.05	0.04	0.00	0.00	0.00	0.1091
1.8	10.40	1.80	0.00	0.00	0.00	0.07	29.65	0.07	0.05	0.06	0.05	0.00	0.00	0.00	0.1165
1.85	10.80	2.10	0.00	0.00	0.00	0.07	36.86	0.07	0.06	0.07	0.06	0.00	0.00	0.00	0.1233
1.9	11.20	2.40	0.00	0.00	0.00	0.07	45.39	0.07	0.06	0.08	0.06	0.00	0.00	0.00	0.1296
1.95	11.60	2.70	0.00	0.00	0.00	0.07	55.41	0.07	0.06	0.08	0.06	0.00	0.00	0.00	0.1354
2	12.00	3.00	0.00	0.00	0.00	0.07	67.11	0.07	0.07	0.08	0.07	0.00	0.00	0.00	0.1410
2.05	12.40	3.30	0.00	0.00	0.00	0.07	80.69	0.07	0.07	0.08	0.07	0.00	0.00	0.00	0.1462
2.1	12.80	3.60	0.00	0.00	0.00	0.07	96.36	0.07	0.08	0.09	0.08	0.00	0.00	0.00	0.1513
2.15	13.20	3.90	0.00	0.00	0.00	0.08	114.36	0.08	0.08	0.12	0.08	0.00	0.00	0.00	0.1561
2.2	13.60	4.20	0.00	0.00	0.00	0.08	134.92	0.08	0.08	0.17	0.08	0.00	0.00	0.00	0.1607
2.25	14.00	4.50	0.00	0.00	0.00	0.08	158.32	0.08	0.09	0.26	0.09	0.00	0.00	0.00	0.1652
2.3	14.40	4.80	0.00	0.00	0.00	0.08	184.84	0.08	0.09	0.41	0.09	0.00	0.00	0.00	0.1696
2.35	14.80	5.10	0.00	0.00	0.00	0.08	214.77	0.08	0.09	0.62	0.09	0.00	0.00	0.00	0.1738
2.4	15.20	5.40	0.00	0.00	0.00	0.08	248.43	0.08	0.10	0.93	0.10	0.00	0.00	0.00	0.1779
2.45	15.60	5.70	0.00	0.00	0.00	0.08	286.15	0.08	0.10	1.36	0.10	0.00	0.00	0.00	0.1820
2.5	16.00	6.00	0.00	0.00	0.00	0.08	328.30	0.08	0.10	1.94	0.10	0.00	0.00	0.00	0.1859
2.55	16.40	6.30	0.00	0.00	0.00	0.08	375.25	0.08	0.11	2.71	0.11	0.00	0.00	0.00	0.1897
2.6	16.80	6.60	0.00	0.00	0.00	0.09	427.39	0.09	0.11	3.70	0.11	0.00	0.00	0.00	0.1934
2.65	17.20	6.90	0.00	0.00	0.00	0.09	485.14	0.09	0.11	4.96	0.11	0.00	0.00	0.00	0.1971
2.7	17.60	7.20	0.00	0.00	0.00	0.09	548.94	0.09	0.11	6.53	0.11	0.00	0.00	0.00	0.2007
2.75	18.00	7.50	0.00	0.00	0.00	0.09	619.25	0.09	0.12	8.47	0.12	0.00	0.00	0.00	0.2042
2.8	18.40	7.80	0.00	0.00	0.00	0.09	696.55	0.09	0.12	10.84	0.12	0.00	0.00	0.00	0.2077
2.85	18.80	8.10	0.00	0.00	0.00	0.09	781.35	0.09	0.12	13.70	0.12	0.00	0.00	0.00	0.2111
2.9	19.20	8.40	0.00	0.00	0.00	0.09	874.19	0.09	0.12	17.13	0.12	0.00	0.00	0.00	0.2144
2.95	19.60	8.70	0.00	0.00	0.00	0.09	975.61	0.09	0.12	21.20	0.12	0.00	0.00	0.00	0.2177
3	20.00	9.00	0.00	0.00	0.00	0.09	1086.19	0.09	0.13	26.00	0.13	0.00	0.00	0.00	0.2209
3.05	20.40	9.30	0.00	0.00	0.00	0.09	1206.55	0.09	0.13	31.61	0.13	0.00	0.00	0.00	0.2241
3.1	20.80	9.60	0.00	0.00	0.00	0.10	1337.31	0.10	0.13	38.14	0.13	0.00	0.00	0.00	0.2272
3.15	21.20	9.90	0.00	0.00	0.00	0.10	1479.13	0.10	0.13	45.70	0.13	0.00	0.00	0.00	0.2303
3.2	21.60	10.20	0.00	0.00	0.00	0.10	1632.69	0.10	0.14	54.39	0.14	0.00	0.00	0.00	0.2334
3.25	22.00	10.50	0.00	0.00	0.00	0.10	1798.71	0.10	0.14	64.34	0.14	0.00	0.00	0.00	0.2364
3.3	22.40	10.80	0.00	0.00	0.00	0.10	1977.93	0.10	0.14	75.67	0.14	0.00	0.00	0.00	0.2393
3.35	22.80	11.10	0.00	0.00	0.00	0.10	2171.11	0.10	0.14	88.53	0.14	0.00	0.00	0.00	0.2422
3.4	23.20	11.40	0.00	0.00	0.00	0.10	2379.06	0.10	0.14	103.06	0.14	0.00	0.00	0.00	0.2451
3.45	23.60	11.70	0.00	0.00	0.00	0.10	2602.61	0.10	0.15	119.42	0.15	0.00	0.00	0.00	0.2480
3.5	24.00	12.00	0.00	0.00	0.00	0.10	2842.60	0.10	0.15	137.77	0.15	0.00	0.00	0.00	0.2508
3.55	24.40	12.30	0.20	0.00	0.00	0.10	3099.94	0.10	0.15	158.29	0.15	0.00	0.01	0.01	0.2619
3.6	24.80	12.60	0.40	0.00	0.00	0.10	3375.54	0.10	0.15	181.17	0.15	0.00	0.03	0.03	0.2879
3.65	25.20	12.90	0.60	0.00	0.00	0.11	3670.36	0.11	0.15	206.59	0.15	0.08	0.07	0.07	0.3261
3.7	25.60	13.20	0.80	0.00	0.00	0.11	3985.37	0.11	0.16	234.76	0.16	0.13	0.11	0.11	0.3735
3.75	26.00	13.50	1.00	0.00	0.00	0.11	4321.61	0.11	0.16	265.90	0.16	0.17	0.16	0.16	0.4268
3.8	26.40	13.80	1.20	0.00	0.00	0.11	4680.11	0.11	0.16	300.23	0.16	0.20			

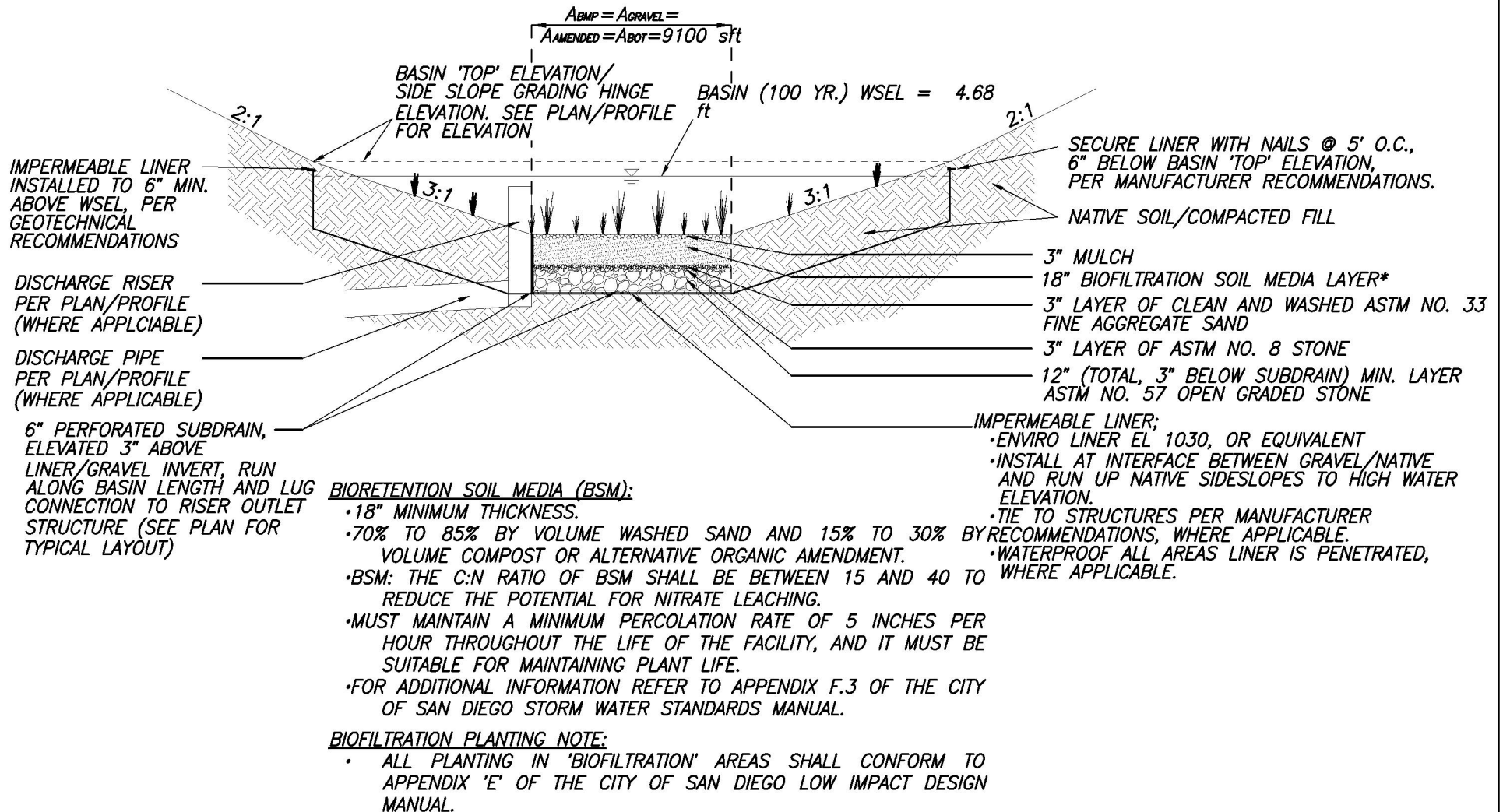
Basin BF-1-1

Discharge vs Elevation Table

Bottom orifice diameter: 1.5 "	Top orifice diameter: 3 "
Number: 1	Number: 2
Cg-low: 0.61	Cg-low: 0.61
Invert elev: 0.50 ft	Invert elev: 3.50 ft
Middle orifice diameter: 2 "	Emergency weir: 4.50 ft
number of orif: 1	Weir Length (ft) 10.0 ft
Cg-middle: 0.61	
Invert elev: 1.50 ft	

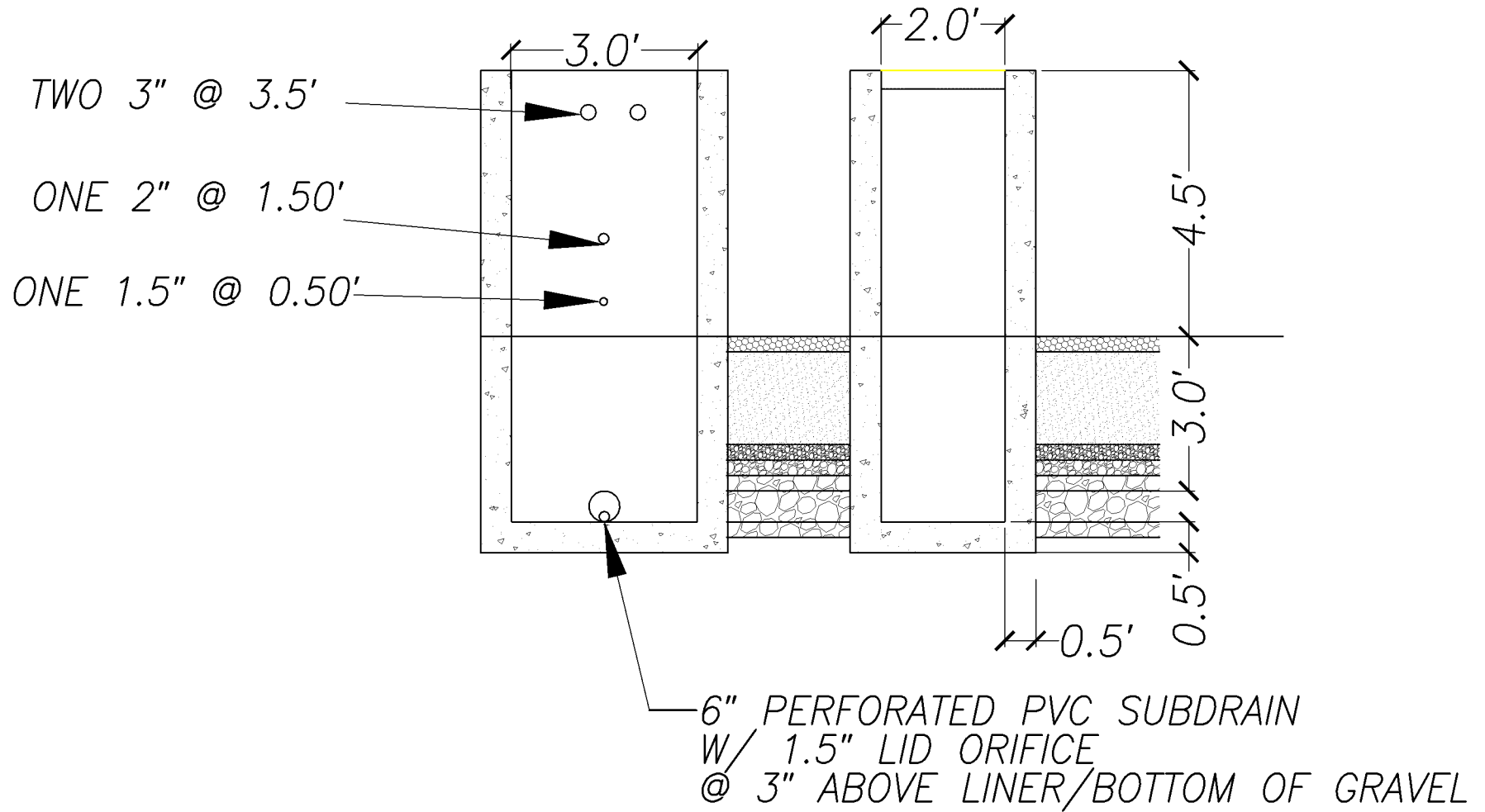
h (ft)	H/D-low	H/D-mid	H/D-top	H/D-peak	Olow-orif (cfs)	Olow-weir (cfs)	Otot-low (cfs)	Omid-orif (cfs)	Omid-weir (cfs)	Otot-med (cfs)	Otop-orif (cfs)	Otop-weir (cfs)	Otot-top (cfs)	Opeak-top (cfs)	Otot (cfs)
3.95	27.60	14.70	1.80	0.00	0.11	5900.28	0.11	0.16	424.82	0.16	0.27	0.36	0.27	0.00	0.5488
4	28.00	15.00	2.00	0.00	0.11	6359.08	0.11	0.17	474.42	0.17	0.29	0.39	0.29	0.00	0.5717
4.05	28.40	15.30	2.20	0.00	0.11	6845.93	0.11	0.17	528.52	0.17	0.31	0.42	0.31	0.00	0.5932
4.1	28.80	15.60	2.40	0.00	0.11	7362.10	0.11	0.17	587.42	0.17	0.33	0.43	0.33	0.00	0.6136
4.15	29.20	15.90	2.60	0.00	0.11	7908.88	0.11	0.17	651.41	0.17	0.35	0.44	0.35	0.00	0.6331
4.2	29.60	16.20	2.80	0.00	0.11	8487.63	0.11	0.17	720.84	0.17	0.36	0.44	0.36	0.00	0.6518
4.25	30.00	16.50	3.00	0.00	0.12	9099.71	0.12	0.17	796.03	0.17	0.38	0.44	0.38	0.00	0.6697
4.3	30.40	16.80	3.20	0.00	0.12	9746.55	0.12	0.18	877.34	0.18	0.39	0.45	0.39	0.00	0.6870
4.35	30.80	17.10	3.40	0.00	0.12	10429.61	0.12	0.18	965.12	0.18	0.41	0.47	0.41	0.00	0.7038
4.4	31.20	17.40	3.60	0.00	0.12	11150.37	0.12	0.18	1059.76	0.18	0.42	0.52	0.42	0.00	0.7200
4.45	31.60	17.70	3.80	0.00	0.12	11910.39	0.12	0.18	1161.65	0.18	0.44	0.60	0.44	0.00	0.7358
4.5	32.00	18.00	4.00	0.00	0.12	12711.23	0.12	0.18	1271.19	0.18	0.45	0.74	0.45	0.00	0.7511
4.55	32.40	18.30	4.20	0.06	0.12	13554.52	0.12	0.18	1388.80	0.18	0.46	0.95	0.46	0.37	1.1384
4.6	32.80	18.60	4.40	0.12	0.12	14441.92	0.12	0.19	1514.93	0.19	0.47	1.25	0.47	1.05	1.8338
4.65	33.20	18.90	4.60	0.18	0.12	15375.13	0.12	0.19	1650.01	0.19	0.49	1.67	0.49	1.93	2.7296
4.7	33.60	19.20	4.80	0.24	0.12	16355.92	0.12	0.19	1794.53	0.19	0.50	2.23	0.50	2.98	3.7875
4.75	34.00	19.50	5.00	0.30	0.12	17386.06	0.12	0.19	1948.96	0.19	0.51	2.98	0.51	4.16	4.9852
4.8	34.40	19.80	5.20	0.36	0.12	18467.40	0.12	0.19	2113.80	0.19	0.52	3.93	0.52	5.47	6.3079
4.85	34.80	20.10	5.40	0.42	0.12	19601.82	0.12	0.19	2289.57	0.19	0.53	5.14	0.53	6.90	7.7445
4.9	35.20	20.40	5.60	0.48	0.13	20791.25	0.13	0.19	2476.80	0.19	0.54	6.64	0.54	8.42	9.2866
4.95	35.60	20.70	5.80	0.54	0.13	22037.66	0.13	0.20	2676.05	0.20	0.55	8.48	0.55	10.05	10.9272
5	36.00	21.00	6.00	0.60	0.13	23343.08	0.13	0.20	2887.86	0.20	0.56	10.72	0.56	11.77	12.6608
5.05	36.40	21.30	6.20	0.66	0.13	24709.57	0.13	0.20	3112.84	0.20	0.57	13.41	0.57	13.58	14.4826
5.1	36.80	21.60	6.40	0.72	0.13	26139.24	0.13	0.20	3351.59	0.20	0.58	16.61	0.58	15.48	16.3884
5.15	37.20	21.90	6.60	0.78	0.13	27634.27	0.13	0.20	3604.71	0.20	0.59	20.39	0.59	17.45	18.3746
5.2	37.60	22.20	6.80	0.84	0.13	29196.86	0.13	0.20	3872.86	0.20	0.60	24.83	0.60	19.50	20.4381
5.25	38.00	22.50	7.00	0.90	0.13	30829.27	0.13	0.20	4156.69	0.20	0.61	30.00	0.61	21.63	22.5762
5.3	38.40	22.80	7.20	0.96	0.13	32533.83	0.13	0.21	4456.87	0.21	0.62	35.98	0.62	23.83	24.7862
5.35	38.80	23.10	7.40	1.02	0.13	34312.88	0.13	0.21	4774.09	0.21	0.63	42.87	0.63	26.10	27.0658
5.4	39.20	23.40	7.60	1.08	0.13	36168.85	0.13	0.21	5109.08	0.21	0.64	50.75	0.64	28.43	29.4131
5.45	39.60	23.70	7.80	1.14	0.13	38104.20	0.13	0.21	5462.57	0.21	0.65	59.73	0.65	30.83	31.8260
5.5	40.00	24.00	8.00	1.20	0.13	40121.45	0.13	0.21	5835.30	0.21	0.66	69.93	0.66	33.30	34.3029
5.55	40.40	24.30	8.20	1.26	0.13	42223.16	0.13	0.21	6228.06	0.21	0.67	81.44	0.67	35.83	36.8421
5.6	40.80	24.60	8.40	1.32	0.13	44411.96	0.13	0.21	6641.63	0.21	0.68	94.40	0.68	38.42	39.4421
5.65	41.20	24.90	8.60	1.38	0.14	46690.52	0.14	0.22	7076.84	0.22	0.68	108.94	0.68	41.07	42.1016
5.7	41.60	25.20	8.80	1.44	0.14	49061.58	0.14	0.22	7534.51	0.22	0.69	125.18	0.69	43.77	44.8191
5.75	42.00	25.50	9.00	1.50	0.14	51527.93	0.14	0.22	8015.51	0.22	0.70	143.28	0.70	46.54	47.5936
5.8	42.40	25.80	9.20	1.56	0.14	54092.39	0.14	0.22	8520.71	0.22	0.71	163.37	0.71	49.36	50.4237
5.85	42.80	26.10	9.40	1.62	0.14	56757.87	0.14	0.22	9051.01	0.22	0.72	185.64	0.72	52.23	53.3086
5.9	43.20	26.40	9.60	1.68	0.14	59527.33	0.14	0.22	9607.34	0.22	0.72	210.22	0.72	55.16	56.2471
5.95	43.60	26.70	9.80	1.74	0.14	62403.77	0.14	0.22	10190.63	0.22	0.73	237.32	0.73	58.14	59.2382
6	44.00	27.00	10.00	1.80	0.14	65390.26	0.14	0.22	10801.86	0.22	0.74	267.10	0.74	61.18	62.2812

BIOFILTRATION BASIN CROSS SECTION



SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN

NOT TO SCALE



PRIVATE BIOFILTRATION BASIN BF-1-1

RISER DETAIL

ATTACHMENT 5 - Bio Retention Cell Details

SWMM Model Flow Coefficient Calculation

Basin BF-1-1			
PARAMETER	ABBREV.	Bio-Retention Cell	
Ponding Depth	PD	6	in
Bioretention Soil Layer	S	24	in
Gravel Layer	G	12	in
TOTAL		3.5	ft
		42	in
Orifice Coefficient	C_g	0.6	--
Low Flow Orifice Diameter	D	1.5	in
Drain (Flow) exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.110	cfs
Ponding Depth Surface Area	A_{PD}	9863	ft ²
Bioretention Surface Area	A_S, A_G	9100	ft ²
	A_S, A_G	0.2089	ac
Porosity of Bioretention Soil	n	1.00	-
Flow Rate (per unit area)	q	0.520	in/hr
Effective Ponding Depth	PD_{eff}	6.25	in
Flow Coefficient	C	0.0810	--

ATTACHMENT 6 - SWMM Input Data (Pre-developed and Proposed Models)

[TITLE]

;; Project Title/Notes
 PRE-DEVELOPED

[OPTIONS]

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

START_DATE 08/28/1951
 START_TIME 00:00:00
 REPORT_START_DATE 08/28/1951
 REPORT_START_TIME 00:00:00
 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 1

[EVAPORATION]

;; Data Source Parameters

 MONTHLY 0.06 0.08 0.11 0.15 0.17 0.19 0.19 0.18 0.15 0.11 0.08 0.06
 DRY_ONLY NO

[RAINGAGES]

;; Name Format Interval SCF Source

 OCEANSIDE INTENSITY 1:00 1.0 TIMESERIES OCEANSIDE-RAIN

[SUBCATCHMENTS]

Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
DMA-1-EX-SoiIB	OCEANSIDE	POC1	4.464	0	264	1.67	0	
DMA1-EX-SoiID	OCEANSIDE	poc1	10.55	0	390	5.52	0	
DMA2-EX-SoiID-offsite	OCEANSIDE	poc1	0.66	55.2	115	2.52	0	

[SUBAREAS]

Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
DMA-1-EX-SoiIB	0.012	0.15	0.05	0.10	25	OUTLET	
DMA1-EX-SoiID	0.012	0.15	0.05	0.1	25	OUTLET	
DMA2-EX-SoiID-offsite	0.012	0.15	0.05	0.1	25	OUTLET	

[INFILTRATION]

Subcatchment	Suction	Ksat	IMD
DMA-1-EX-SoiIB	3	0.15	0.31
DMA1-EX-SoiID	9	0.01875	0.33
DMA2-EX-SoiID-offsite	9	0.01875	0.33

[OUTFALLS]

Name	Elevation	Type	Stage Data	Gated	Route To
POC1	0	FREE		NO	

[TIMESERIES]

Name	Date	Time	Value
OCEANSIDE-RAIN	FILE	"OCEANSIDE.prn"	

[REPORT]

;; Reporting Options
 SUBCATCHMENTS ALL
 NODES ALL
 LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 1196.632 7154.180 2292.457 8209.745
 Units None

[COORDINATES]

Node	X-Coord	Y-Coord
POC1	1081.360	7778.736

[VERTICES]

Link	X-Coord	Y-Coord
------	---------	---------

```
[Polygons]
;; Subcatchment X-Coord Y-Coord
;;-----
DMA-1-EX-Soi I B 1081.360 8095.894
DMA1-EX-Soi I D 742.183 7992.673
DMA2-EX-Soi I D-offsite 1300.769 7996.075
```

```
[SYMBOLS]
;; Gage X-Coord Y-Coord
;;-----
OCEANSIDE 1247.258 8085.322
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.014)

PRE-DEVELOPED

 NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff YES
 RDI NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
 Infiltration Method GREEN_AMPT
 Starting Date 08/28/1951 00:00:00
 Ending Date 05/23/2008 23:00:00
 Antecedent Dry Days 0.0
 Report Time Step 01:00:00
 Wet Time Step 00:15:00
 Dry Time Step 04:00:00

*****	Volume	Depth
Runoff Quantity Continuity	acre-feet	inches
*****	-----	-----
Total Precipitation	881.989	675.250
Evaporation Loss	31.264	23.936
Infiltration Loss	704.154	539.100
Surface Runoff	154.901	118.592
Final Storage	0.001	0.001
Continuity Error (%)	-0.945	

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	154.901	50.477
Groundwater Inflow	0.000	0.000
RDI Inflow	0.000	0.000
External Inflow	0.000	0.000

External Outflow 154.901 50.477
 Flooding Loss 0.000 0.000
 Evaporation Loss 0.000 0.000
 Exfiltration Loss 0.000 0.000
 Initial Stored Volume 0.000 0.000
 Final Stored Volume 0.000 0.000
 Continuity Error (%) 0.000

 Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1-EX-Soil B	675.25	0.00	3.23	652.01	0.00	20.57	20.57	2.49	3.43	0.030
DMA1-EX-Soil D	675.25	0.00	29.89	511.33	0.00	142.64	142.64	40.86	9.98	0.211
DMA2-EX-Soil D-offsite	675.25	0.00	68.78	219.24	321.79	75.36	397.15	7.12	0.77	0.588

Analysis begun on: Wed Mar 22 16:28:20 2023
 Analysis ended on: Wed Mar 22 16:28:42 2023
 Total elapsed time: 00:00:22

[TITLE]

;; Project Title/Notes
 PACIFIC SITE-DEVELOPED

[OPTIONS]

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

START_DATE 08/28/1951
 START_TIME 00:00:00
 REPORT_START_DATE 08/28/1951
 REPORT_START_TIME 00:00:00
 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 1

[EVAPORATION]

;; Data Source Parameters
 ;-----
 MONTHLY 0.060 0.080 0.11 0.15 0.17 0.19 0.19 0.18 0.15 0.11 0.08 0.06
 DRY_ONLY NO

[RAINGAGES]

;; Name Format Interval SCF Source
 ;-----
 OCEANSIDE INTENSITY 1:00 1.0 TIMESERIES OCEANSIDE-RAIN

1714-Proposed.inp

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
DMA-1-SoilB	OCEANSIDE	BF-1-1	3.945	70.52	1718	1	0	
BF-1-1	OCEANSIDE	DIV	0.209	0	47	0.005	0	
BYPASS-soilD	OCEANSIDE	POC1	4.46	0	120	4.03	0	
DMA-1-soilD	OCEANSIDE	bf-1-1	5.60	66.97	2439	1	0	
DMA-1-ex-offsite-soilD	OCEANSIDE	bf-1-1		0.66	55.2	287	2.52	0
DMA-2-soilb	OCEANSIDE	poc1	0.310	79.78	135	1	0	
DMA-2-SoilD	OCEANSIDE	poc1	0.49	79.78	213	1	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
DMA-1-SoilB	0.012	0.15	0.05	0.10	25	OUTLET	
BF-1-1	0.012	0.15	0.05	0.10	25	OUTLET	
BYPASS-soilD	0.012	0.15	0.05	0.10	25	OUTLET	
DMA-1-soilD	0.012	0.15	0.05	0.10	25	OUTLET	
DMA-1-ex-offsite-soilD	0.012	0.15	0.05	0.10	25	OUTLET	
DMA-2-soilb	0.012	0.15	0.05	0.10	25	OUTLET	
DMA-2-SoilD	0.012	0.15	0.05	0.10	25	OUTLET	

[INFILTRATION]

;;Subcatchment	Suction	Ksat	IMD
DMA-1-SoilB	3	0.15	0.31
BF-1-1	1.5	0.3	0.3
BYPASS-soilD	9	0.025	0.33
DMA-1-soilD	9	0.01875	0.33
DMA-1-ex-offsite-soilD	9	0.01875	0.33
DMA-2-soilb	3	0.15	0.31
DMA-2-SoilD	9	0.01875	0.33

[LID_CONTROLS]

;;Name	Type/Layer	Parameters						
BASIN-BF-1-1	BC							
BASIN-BF-1-1	SURFACE	6.25	0.0	0.1	1.0	5		
BASIN-BF-1-1	SOIL	24	0.4	0.2	0.1	5	5	1.5
BASIN-BF-1-1	STORAGE	12	0.67	0.0	0			
BASIN-BF-1-1	DRAIN	0.2024	0.5	3	6	0	0	

[LID_USAGE]

;;Subcatchment	LID Process	Number	Area	Width	InitSat	FromImp	ToPerv	RptFile	DrainTo	FromPerv
BF-1-1	BASIN-BF-1-1	1	9100	0	0	100	0	*	*	100

[OUTFALLS]

;;Name	Elevation	Type	Stage Data	Gated	Route To

POC1 0 FREE NO

[DIVIDERS]

;;Name	Elevation	Diverted Link	Type	Parameters
DIV	0	BYPASS	CUTOFF	0.11 0 0 0 0

[STORAGE]

;;Name	El ev.	MaxDepth	Ini tDepth	Shape	Curve Name/Params	N/A	Fevap	Psi	Ksat	IMD
BF-1-1-Storage	0	5.5	0	TABULAR	BF-1-1-storage	0	0			

[CONDUITS]

;;Name	From Node	To Node	Length	Roughness	InOffset	OutOffset	Ini tFlow	MaxFlow
BYPASS	DIV	BF-1-1-Storage	400	0.013	0	0	0	0
UNDERDRAIN	DIV	POC1	95	0.013	0	0	0	0

[OUTLETS]

;;Name	From Node	To Node	Offset	Type	QTable/Qcoeff	Qexpon	Gated
OUTLET	BF-1-1-Storage	POC1	0	TABULAR/DEPTH	BF-1-1		NO

[XSECTIONS]

;;Li nk	Shape	Geom1	Geom2	Geom3	Geom4	Barrel s	Culvert
BYPASS	DUMMY	0	0	0	0	1	
UNDERDRAIN	DUMMY	0	0	0	0	1	

[CURVES]

;;Name	Type	X-Val ue	Y-Val ue
BF-1-1	Rati ng	0	0.0000
BF-1-1		0.05	0.0028
BF-1-1		0.1	0.0099
BF-1-1		0.15	0.0178
BF-1-1		0.2	0.0223
BF-1-1		0.25	0.0260
BF-1-1		0.3	0.0293
BF-1-1		0.35	0.0322
BF-1-1		0.4	0.0349
BF-1-1		0.45	0.0374
BF-1-1		0.5	0.0397
BF-1-1		0.55	0.0419
BF-1-1		0.6	0.0440
BF-1-1		0.65	0.0460
BF-1-1		0.7	0.0480
BF-1-1		0.75	0.0498
BF-1-1		0.8	0.0516
BF-1-1		0.85	0.0533
BF-1-1		0.9	0.0550
BF-1-1		0.95	0.0566

BF-1-1	1	0.0582
BF-1-1	1.05	0.0630
BF-1-1	1.1	0.0733
BF-1-1	1.15	0.0874
BF-1-1	1.2	0.1005
BF-1-1	1.25	0.1091
BF-1-1	1.3	0.1165
BF-1-1	1.35	0.1233
BF-1-1	1.4	0.1296
BF-1-1	1.45	0.1354
BF-1-1	1.5	0.1410
BF-1-1	1.55	0.1462
BF-1-1	1.6	0.1513
BF-1-1	1.65	0.1561
BF-1-1	1.7	0.1607
BF-1-1	1.75	0.1652
BF-1-1	1.8	0.1696
BF-1-1	1.85	0.1738
BF-1-1	1.9	0.1779
BF-1-1	1.95	0.1820
BF-1-1	2	0.1859
BF-1-1	2.05	0.1897
BF-1-1	2.1	0.1934
BF-1-1	2.15	0.1971
BF-1-1	2.2	0.2007
BF-1-1	2.25	0.2042
BF-1-1	2.3	0.2077
BF-1-1	2.35	0.2111
BF-1-1	2.4	0.2144
BF-1-1	2.45	0.2177
BF-1-1	2.5	0.2209
BF-1-1	2.55	0.2241
BF-1-1	2.6	0.2272
BF-1-1	2.65	0.2303
BF-1-1	2.7	0.2334
BF-1-1	2.75	0.2364
BF-1-1	2.8	0.2393
BF-1-1	2.85	0.2422
BF-1-1	2.9	0.2451
BF-1-1	2.95	0.2480
BF-1-1	3	0.2508
BF-1-1	3.05	0.2619
BF-1-1	3.1	0.2879
BF-1-1	3.15	0.3261
BF-1-1	3.2	0.3735
BF-1-1	3.25	0.4268
BF-1-1	3.3	0.4681
BF-1-1	3.35	0.4977
BF-1-1	3.4	0.5243
BF-1-1	3.45	0.5488
BF-1-1	3.5	0.5717
BF-1-1	3.55	0.5932

BF-1-1		3. 6	0. 6136
BF-1-1		3. 65	0. 6331
BF-1-1		3. 7	0. 6518
BF-1-1		3. 75	0. 6697
BF-1-1		3. 8	0. 6870
BF-1-1		3. 85	0. 7038
BF-1-1		3. 9	0. 7200
BF-1-1		3. 95	0. 7358
BF-1-1		4	0. 7511
BF-1-1		4. 05	1. 1384
BF-1-1		4. 1	1. 8338
BF-1-1		4. 15	2. 7296
BF-1-1		4. 2	3. 7875
BF-1-1		4. 25	4. 9852
BF-1-1		4. 3	6. 3079
BF-1-1		4. 35	7. 7445
BF-1-1		4. 4	9. 2866
BF-1-1		4. 45	10. 9272
BF-1-1		4. 5	12. 6608
BF-1-1		4. 55	14. 4826
BF-1-1		4. 6	16. 3884
BF-1-1		4. 65	18. 3746
BF-1-1		4. 7	20. 4381
BF-1-1		4. 75	22. 5762
BF-1-1		4. 8	24. 7862
BF-1-1		4. 85	27. 0658
BF-1-1		4. 9	29. 4131
BF-1-1		4. 95	31. 8260
BF-1-1		5	34. 3029
BF-1-1		5. 05	36. 8421
BF-1-1		5. 1	39. 4421
BF-1-1		5. 15	42. 1016
BF-1-1		5. 2	44. 8191
BF-1-1		5. 25	47. 5936
BF-1-1		5. 3	50. 4237
BF-1-1		5. 35	53. 3086
BF-1-1		5. 4	56. 2471
BF-1-1		5. 45	59. 2382
BF-1-1		5. 5	62. 2812
;			
BF-1-1-storage	Storage	0	9863
BF-1-1-storage		0. 05	9939
BF-1-1-storage		0. 1	10015
BF-1-1-storage		0. 15	10091
BF-1-1-storage		0. 2	10168
BF-1-1-storage		0. 25	10244
BF-1-1-storage		0. 3	10320
BF-1-1-storage		0. 35	10396
BF-1-1-storage		0. 4	10473
BF-1-1-storage		0. 45	10549
BF-1-1-storage		0. 5	10625
BF-1-1-storage		0. 55	10704

BF-1-1-storage	0. 6	10782
BF-1-1-storage	0. 65	10861
BF-1-1-storage	0. 7	10940
BF-1-1-storage	0. 75	11019
BF-1-1-storage	0. 8	11097
BF-1-1-storage	0. 85	11176
BF-1-1-storage	0. 9	11255
BF-1-1-storage	0. 95	11333
BF-1-1-storage	1	11412
BF-1-1-storage	1. 05	11491
BF-1-1-storage	1. 1	11569
BF-1-1-storage	1. 15	11648
BF-1-1-storage	1. 2	11727
BF-1-1-storage	1. 25	11806
BF-1-1-storage	1. 3	11884
BF-1-1-storage	1. 35	11963
BF-1-1-storage	1. 4	12042
BF-1-1-storage	1. 45	12120
BF-1-1-storage	1. 5	12199
BF-1-1-storage	1. 55	12281
BF-1-1-storage	1. 6	12362
BF-1-1-storage	1. 65	12444
BF-1-1-storage	1. 7	12525
BF-1-1-storage	1. 75	12607
BF-1-1-storage	1. 8	12688
BF-1-1-storage	1. 85	12770
BF-1-1-storage	1. 9	12851
BF-1-1-storage	1. 95	12933
BF-1-1-storage	2	13015
BF-1-1-storage	2. 05	13096
BF-1-1-storage	2. 1	13178
BF-1-1-storage	2. 15	13259
BF-1-1-storage	2. 2	13341
BF-1-1-storage	2. 25	13422
BF-1-1-storage	2. 3	13504
BF-1-1-storage	2. 35	13585
BF-1-1-storage	2. 4	13667
BF-1-1-storage	2. 45	13748
BF-1-1-storage	2. 5	13830
BF-1-1-storage	2. 55	13915
BF-1-1-storage	2. 6	13999
BF-1-1-storage	2. 65	14084
BF-1-1-storage	2. 7	14168
BF-1-1-storage	2. 75	14253
BF-1-1-storage	2. 8	14337
BF-1-1-storage	2. 85	14422
BF-1-1-storage	2. 9	14506
BF-1-1-storage	2. 95	14591
BF-1-1-storage	3	14675
BF-1-1-storage	3. 05	14760
BF-1-1-storage	3. 1	14844
BF-1-1-storage	3. 15	14929

BF-1-1-storage	3. 2	15013
BF-1-1-storage	3. 25	15098
BF-1-1-storage	3. 3	15182
BF-1-1-storage	3. 35	15267
BF-1-1-storage	3. 4	15351
BF-1-1-storage	3. 45	15436
BF-1-1-storage	3. 5	15520
BF-1-1-storage	3. 55	15607
BF-1-1-storage	3. 6	15695
BF-1-1-storage	3. 65	15782
BF-1-1-storage	3. 7	15869
BF-1-1-storage	3. 75	15957
BF-1-1-storage	3. 8	16044
BF-1-1-storage	3. 85	16131
BF-1-1-storage	3. 9	16219
BF-1-1-storage	3. 95	16306
BF-1-1-storage	4	16394
BF-1-1-storage	4. 05	16481
BF-1-1-storage	4. 1	16568
BF-1-1-storage	4. 15	16656
BF-1-1-storage	4. 2	16743
BF-1-1-storage	4. 25	16830
BF-1-1-storage	4. 3	16918
BF-1-1-storage	4. 35	17005
BF-1-1-storage	4. 4	17092
BF-1-1-storage	4. 45	17180
BF-1-1-storage	4. 5	17267
BF-1-1-storage	4. 55	17356
BF-1-1-storage	4. 6	17446
BF-1-1-storage	4. 65	17535
BF-1-1-storage	4. 7	17624
BF-1-1-storage	4. 75	17713
BF-1-1-storage	4. 8	17803
BF-1-1-storage	4. 85	17892
BF-1-1-storage	4. 9	17981
BF-1-1-storage	4. 95	18070
BF-1-1-storage	5	18160
BF-1-1-storage	5. 05	18249
BF-1-1-storage	5. 1	18338
BF-1-1-storage	5. 15	18427
BF-1-1-storage	5. 2	18517
BF-1-1-storage	5. 25	18606
BF-1-1-storage	5. 3	18695
BF-1-1-storage	5. 35	18784
BF-1-1-storage	5. 4	18874
BF-1-1-storage	5. 45	18963
BF-1-1-storage	5. 5	19052

[TIMESERIES]

;; Name	Date	Time	Value
-----	-----	-----	-----
OCEANSIDE-RAIN	FILE	"OCEANSIDE.prn"	

[REPORT]

;; Reporting Options

SUBCATCHMENTS ALL

NODES ALL

LINKS ALL

[TAGS]

[MAP]

DIMENSIONS 664.453 4315.668 1694.096 5505.165

Units None

[COORDINATES]

;; Node	X-Coord	Y-Coord
POC1	1481.291	4369.736
DIV	1391.474	4955.804
BF-1-1-Storage	1367.896	4777.792

[VERTICES]

;; Link	X-Coord	Y-Coord
UNDERDRAIN	1472.817	4866.208
UNDERDRAIN	1473.996	4866.208

[Polygons]

;; Subcatchment	X-Coord	Y-Coord
DMA-1-Soil B	1021.576	5446.591
BF-1-1	1413.569	5162.734
BYPASS-soil D	832.509	4978.329
DMA-1-soil dD	1409.064	5365.489
DMA-1-ex-offsite-soil D	1828.091	5216.802
DMA-2-soil b	1661.865	4598.637
DMA-2-Soil D	1674.212	4551.304

[SYMBOLS]

;; Gage	X-Coord	Y-Coord
OCEANSIDE	711.255	5356.409

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.014)

PACIFICA SITE-DEVELOPED

WARNING 04: minimum elevation drop used for Conduit BYPASS
WARNING 04: minimum elevation drop used for Conduit UNDERDRAIN

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units CFS
Process Models:
Rainfall/Runoff YES
RDI NO
Snowmelt NO
Groundwater NO
Flow Routing YES
Ponding Allowed NO
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method KINWAVE
Starting Date 08/28/1951 00:00:00
Ending Date 05/23/2008 23:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:15:00
Dry Time Step 04:00:00
Routing Time Step 60.00 sec

Table with 3 columns: Description, Volume (acre-feet), and Depth (inches). Rows include Runoff Quantity Continuity, Initial LID Storage, Total Precipitation, Evaporation Loss, Infiltration Loss, Surface Runoff, LID Drainage, Final Storage, and Continuity Error (%).

Volume Volume

Flow Routing Continuity	acre-feet	10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	434.837	141.698
Groundwater Inflow	0.000	0.000
RDI Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	434.816	141.691
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.005	

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step	:	60.00 sec
Average Time Step	:	60.00 sec
Maximum Time Step	:	60.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	1.00
Percent Not Converging	:	0.00

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1-Soil B	675.25	0.00	72.72	188.41	411.80	10.45	422.25	45.23	4.57	0.625
BF-1-1	675.25	21298.77	1171.98	0.00	0.00	0.00	20790.90	117.99	12.21	0.946
BYPASS-soil D	675.25	0.00	21.18	547.75	0.00	107.64	107.64	13.04	3.63	0.159
DMA-1-soil d	675.25	0.00	75.72	158.53	391.25	58.60	449.85	68.40	6.62	0.666
DMA-1-ex-offsite-soil D	675.25	0.00	65.65	214.45	323.69	80.21	403.89	7.24	0.77	0.598
DMA-2-soil b	675.25	0.00	82.18	129.07	465.43	7.41	472.84	3.98	0.36	0.700
DMA-2-Soil D	675.25	0.00	86.21	96.35	465.41	36.81	502.23	6.68	0.58	0.744

LID Performance Summary

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BF-1-1	BASIN-BF-1-1	21974.02	1172.54	0.00	6095.89	14705.00	2.40	3.53	-0.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr: min	Reported Max Depth Feet
POC1	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DIV	DIVIDER	0.00	0.00	0.00	0 00:00	0.00
BF-1-1-Storage	STORAGE	0.05	4.41	4.41	15835 21:04	4.41

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr: min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC1	OUTFALL	4.39	14.14	15835 21:01	23.7	142	0.000
DIV	DIVIDER	12.21	12.21	18857 17:01	118	118	0.000
BF-1-1-Storage	STORAGE	0.00	12.10	18857 17:01	0	63.7	0.011

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
---------	-----	------	-------	---------	-----	-------------	---------

Storage Unit	Volume 1000 ft3	Pcnt Full	Pcnt Loss	Pcnt Loss	Volume 1000 ft3	Pcnt Full	Occurrence days hr:min	Outflow CFS
BF-1-1-Storage	0.595	1	0	0	59.087	75	15835 21:03	9.65

 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC1	15.24	0.07	14.14	141.681
System	15.24	0.07	14.14	141.681

 Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
BYPASS	DUMMY	12.10	18857 17:01			
UNDERDRAIN	DUMMY	0.11	141 11:25			
OUTLET	DUMMY	9.65	15835 21:04			

 Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Mar 23 10:51:47 2023
 Analysis ended on: Thu Mar 23 10:52:26 2023
 Total elapsed time: 00:00:39

ATTACHMENT 7 - SWMM Explanation of Significant Variables

Attached, the reader can see the reports associated with the EPA-SWMM Model in both pre-development and post-development conditions. Each portion, i.e., sub-catchments, outfalls, storage units, LID controls for the bio-retention cells, ponding on top of the bio-retention (modeled as a storage unit), weir as a discharge, and outfalls (point of compliance), are also shown.

Soil characteristics of the existing soils were determined from the USGS sources.

Description of model parameters and assumptions:

N-Imperv – Manning's N for impervious surfaces

0.012 (typical)

N-Perv – Manning's N for pervious surfaces

0.15 (typical)

Dstore-Imperv – Depth of depression storage on impervious area (in)

0.05 (typical)

Dstore-Perv – Depth of depression storage on pervious area (in)

0.1 (typical)

%Zero-Imperv – Percentage of impervious area with no depression storage (%)

25 (typical)

Suction Head – Soil capillary suction head (in)

Conductivity – Soil saturated hydraulic conductivity (in/hr)

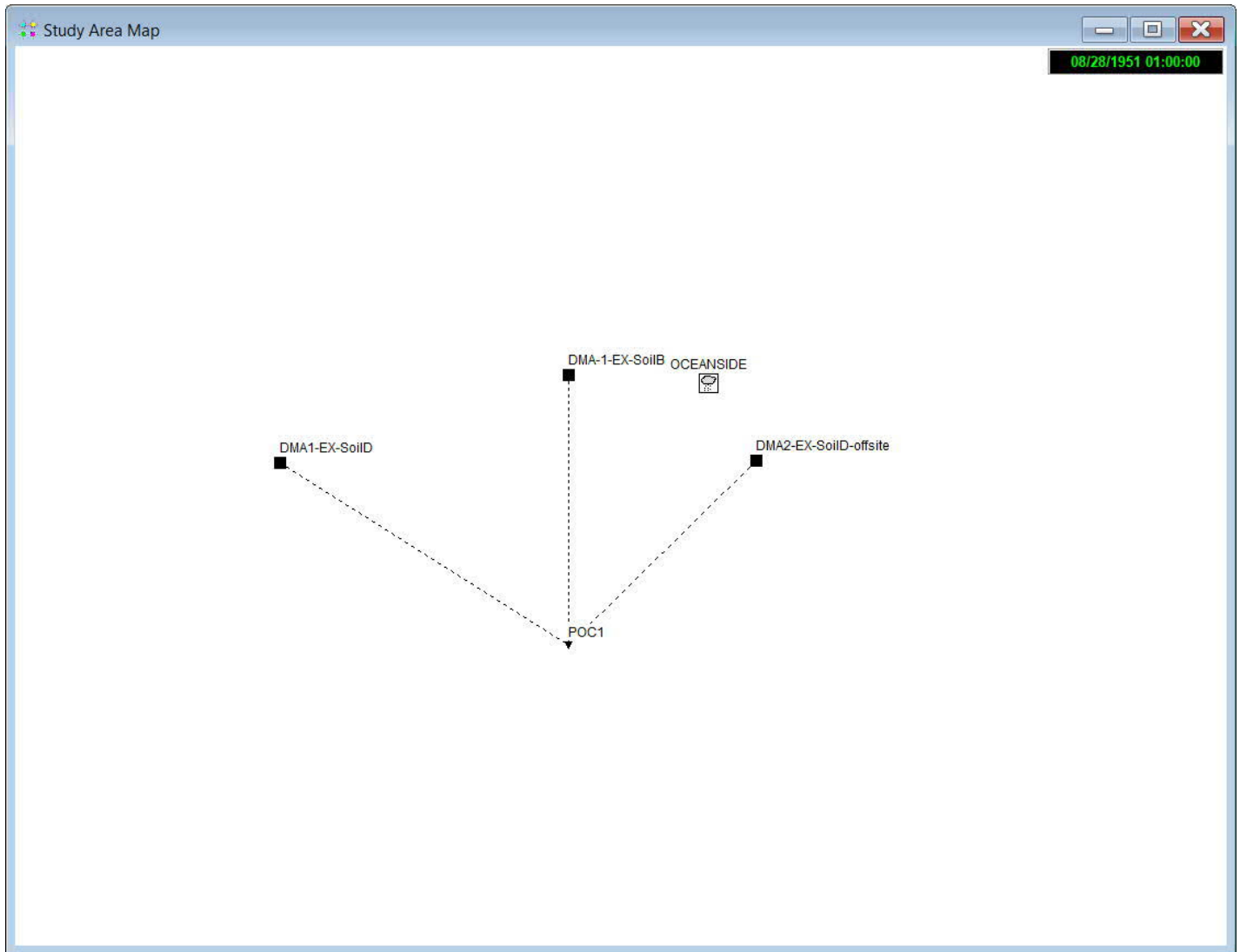
-75% of these values if subcatchment is graded/compacted

Initial Deficit – Initial moisture deficit (fraction)

Soil Type	Suction Head	Conductivity	Initial Deficit
A	1.5	0.3	0.30
B	3	0.2	0.31
C	6	0.1	0.32
D	9	0.025	0.33

NOTE: These values are based on City of Oceanside BMP Design Manual, Appendix G for SWMM and recommended values for the EPA SWMM program.

POC 1 – Pre-Developed Condition



EXPLANATION OF SELECTED VARIABLES

Parameters for the pre- and post-developed models include soil types B and D in accordance with the San Diego County Hydrology Manual and the USGS Soil Survey Map (attached at the end of this appendix). Suction head, conductivity and initial deficit corresponds to average values expected for the soil types, values recommended by the "Model BMP Design Manual San Diego Region for Permanent Site Design, Stormwater Treatment, and Hydromodification Management .

H&A selected infiltration values, such that the percentage of total precipitation that becomes runoff, is realistic for soil types B and D and slightly smaller than measured values for Southern California watersheds.

Selection of a Kinematic Approach: As the continuous model is based on hourly rainfall, and the time of concentration for the pre-development and post-development conditions is significantly smaller than 60 minutes, precise routing of the flows through the impervious surfaces, the underdrain pipe system, and the discharge pipe was considered unnecessary. The truncation error of the precipitation into hourly steps is much more significant than the precise routing in a system where the time of concentration is much smaller than 1 hour.

Sub-catchments labeled BR-X:

The area of Prop-X + BR-X must be equal to the area of the development tributary to that particular bio-retention facility. Five (5) decimal places were given regarding the areas of the bio-retention to insure that the area used by the program for the LID subroutine corresponds exactly with these tributaries.

The area input in the LID Usage Editor is the ponded area at the water quality depth. The depth input in the surface tab of the LID Control Editor equates to a volume on the surface of the bioretention basin. SWMM "sees" vertical side slopes in the LID Editor, so in order to not over estimate the surface storage that is reduced by the actual side slopes of the basin, we have calculated an 'effective' depth by calculating the surface volume and dividing by the ponded area.

LID Control Editor Input Definitions:

Storage Depth - When confining walls or berms are present this is the maximum depth to which water can pond above the surface of the unit before overflow occurs (in inches or mm). For LIDs that experience overland flow it is the height of any surface depression storage. For swales, it is the height of its trapezoidal cross section.

Vegetation Volume Fraction - The fraction of the volume within the storage depth filled with vegetation. This is the volume occupied by stems and leaves, not their surface area coverage. Normally this volume can be ignored, but may be as high as 0.1 to 0.2 for very dense vegetative growth.

Surface Roughness - Manning's n for overland flow over the surface of porous pavement or a vegetative swale (see this table for suggested values). Use 0 for other types of LIDs.

Surface Slope - Slope of porous pavement surface or vegetative swale (percent). Use 0 for other types of LIDs.

Thickness - The thickness of the soil layer (inches or mm). Typical values range from 18 to 36 inches (450 to 900 mm) for rain gardens, street planters and other types of land-based bio-retention units, but only 3 to 6 inches (75 to 150 mm) for green roofs.

Porosity - The volume of pore space relative to total volume of soil (as a fraction).

Field Capacity - Volume of pore water relative to total volume after the soil has been allowed to drain fully (as a fraction). Below this level, vertical drainage of water through the soil layer does not occur.

Wilting Point - Volume of pore water relative to total volume for a well dried soil where only bound water remains (as a fraction). The moisture content of the soil cannot fall below this limit.

Conductivity - Hydraulic conductivity for the fully saturated soil (in/hr or mm/hr).

Conductivity Slope - Slope of the curve of log(conductivity) versus soil moisture content (dimensionless). Typical values range from 5 for sands to 15 for silty clay.

Suction Head - The average value of soil capillary suction along the wetting front (inches or mm). This is the same parameter as used in the Green-Ampt infiltration model.

Height - This is the thickness of a gravel layer (inches or mm).

Void Ratio - The volume of void space relative to the volume of solids in the layer. Typical values range from 0.5 to 0.75 for gravel beds. Note that porosity = void ratio / (1 + void ratio).

Infiltration Rate - The rate at which water infiltrates into the native soil below the layer (in inches/hour or mm/hour). This would typically be the Saturated Hydraulic Conductivity of the surrounding subcatchment if Green-Ampt infiltration is used or the Minimum Infiltration Rate for Horton infiltration. If there is an impermeable floor or liner below the layer then use a value of 0.

Clogging Factor - Total volume of treated runoff it takes to completely clog the bottom of the layer divided by the void volume of the layer. Use a value of 0 to ignore clogging. Clogging progressively reduces the Infiltration Rate in direct proportion to the cumulative volume of runoff treated and may only be of concern for infiltration trenches with permeable bottoms

and no under drains. Refer to the Pavement Layer page for more discussion of the Clogging Factor.

Drain Coefficient and Drain Exponent - Coefficient C and exponent n that determines the rate of flow through the underdrain as a function of height of stored water above the drain height. The following equation is used to compute this flow rate (per unit area of the LID unit):

$$q = C(h-H_d)^n$$

where q is outflow (in/hr or mm/hr), h height of stored water (inches or mm), and H_d is the drain height. If the layer does not have an underdrain then set C to 0. A typical value for n would be 0.5 (making the drain act like an orifice). A rough estimate for C can be based on the time T required to drain a depth D of stored water. For $n = 0.5$, $C = 2D^{1/2}/T$.

Drain Offset Height - Height of any underdrain piping above the bottom of a storage layer or rain barrel (inches or mm).

LID Control Editor: Explanation of Significant Variables

Storage Depth:

The storage depth variable within the SWMM model is representative of the storage volume provided beneath the engineered soil and mulch components of the bioretention facility. This storage volume is comprised of a gravel located bed beneath a layer of engineered soil and a 0.25 foot (3-inch) layer of landscaping mulch.

Porosity:

A porosity value of 0.4 has been selected for the model. The amended soil is to be highly sandy in content in order to have a saturated hydraulic conductivity of approximately 5 in/hr.

H&A considers such a value to be slightly high; however, in order to comply with the HMP Permit, the value recommended by the Copermittees for the porosity of amended soil is 0.4, per Appendix A of the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011.

Void Ratio:

The ratio of the void volume divided by the soil volume is directly related to porosity as $n/(1-n)$. As the underdrain layer is composed of gravel, a porosity value of 0.4 has been selected, which results in a void ratio of $0.4/(1-0.4) = 0.67$ for the gravel detention layer.

Clogging factor:

A clogging factor was not used (0 indicates that there is not clogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMP sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

Drain (Flow) coefficient:

The flow coefficient in the SWMM Model is the coefficient needed to transform the orifice equation into a general power law equation of the form:

$$q = C(H - H_D)^n \quad (1)$$

where q is the peak flow in in/hr, n is the exponent (typically 0.5 for orifice equation), H_D is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and in our design equal to 0) and H is the depth of the water in inches.

The general orifice equation can be expressed as:

$$Q = \frac{\pi}{4} C_g \frac{D^2}{144} \sqrt{2g \frac{(H - H_D)}{12}} \quad (2)$$

where Q is the peak flow in cfs, D is the diameter in inches, c_g is the typical discharge coefficient for orifices (0.61-0.63 for thin walls and around 0.75-0.8 for thick walls), g is the acceleration of gravity in ft/s^2 , and H and H_D are defined above and are also used in inches in Equation (2).

Cutoff Flow:

This is the only significant variable in the diversion, as the type of diversion is defined by this value. Any excess of flow over this value will be diverted into a pond subroutine (the surface stage of the bio-retention basin) and routed there. The determination of this value equates to the value obtained with equation (2) above, plus 1%, when H = depth of gravel layer and $H_D=0$ (orifice situated at the datum). Thus, once flows exceed the maximum discharge the LID orifice experiences a head of the storage depth, ponding occurs within the bioretention basin, routing these additional flows via the pond riser.

Note:

The complete storage and rating curves and the respective explanation is shown at the end of this appendix. A variable area vs. elevation storage curve was used for the final model, and a discharge that is a function of the outlet structure in the surface was used also.

ATTACHMENT 8 - Drying Time of the Surface Layer of Bio-retention cells

The LID subroutine of the SWMM Model does not increase the discharge of the lower LID orifice once the storage layer is full (in other words, it does not consider the influence of the pressure in the amended soil layer). The discharge of the lower LID orifice when the surface layer is full is considered constant by the model and equal to the discharge of the lower orifice when the storage layer is full (equal to the cutoff flows).

The drying time interval between an elevation y_i and another elevation $y_i - \Delta y$ can be obtained by:

$$\Delta t_i (\text{hours}) = \frac{(Q(y_i) + Q(y_i - \Delta y))}{7200 (V(y_i) - V(y_i - \Delta y))} = \frac{Q_{\text{ave}}}{3600 \Delta V}$$

$$t = \sum_{i=1}^n \Delta t_i (\text{hours})$$

Q_{ave} represents the average discharge between elevation y_i and y_{i+1} obtained by $\frac{Q(y_i) + Q(y_i - \Delta y)}{2}$ where ΔV represents the fraction of the volume that must be discharged at a peak flow $Q_{\text{ave}} (V(y_i) - V(y_i - \Delta y))$.




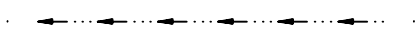





The volume and the discharge change as the elevation changes; the calculation takes into account this change.

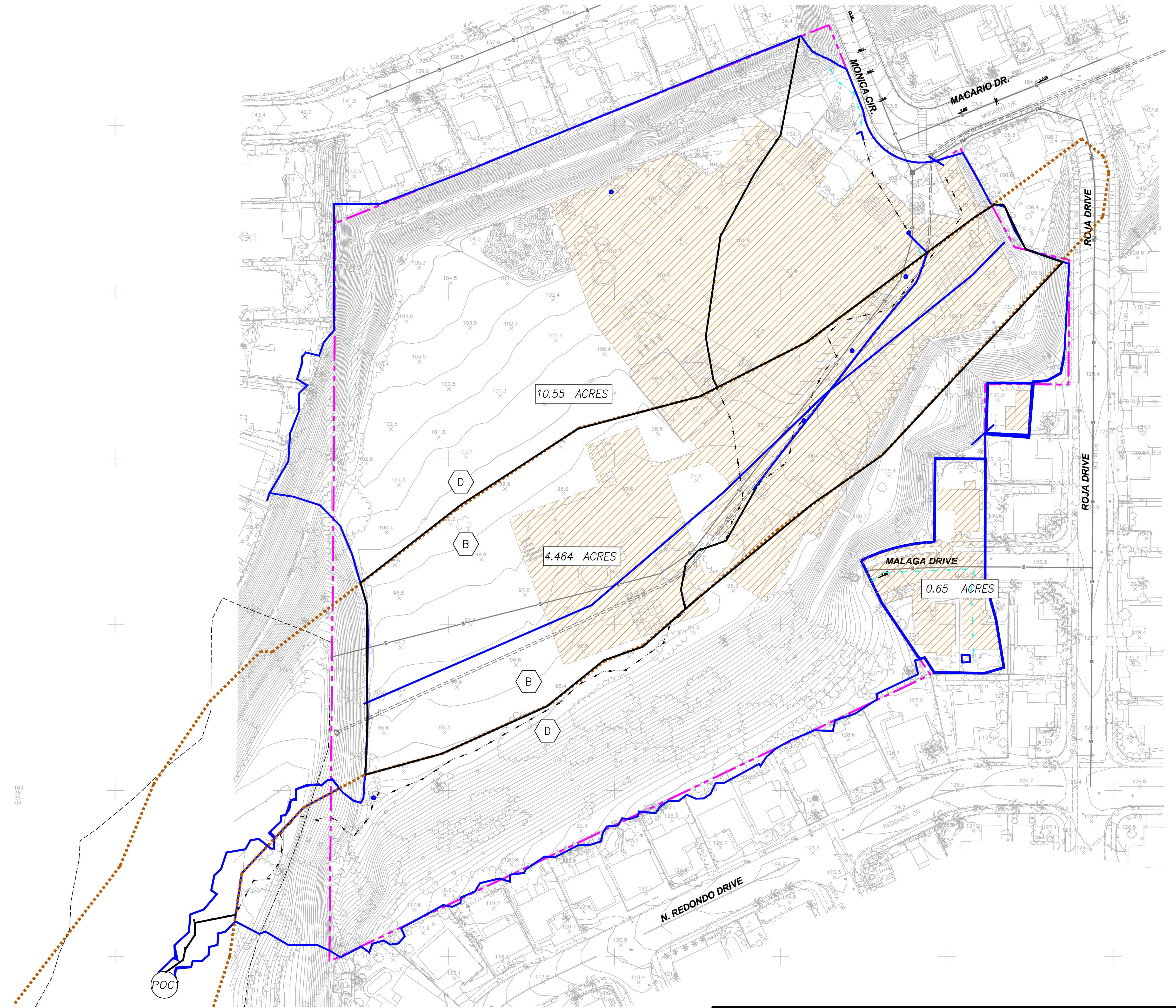
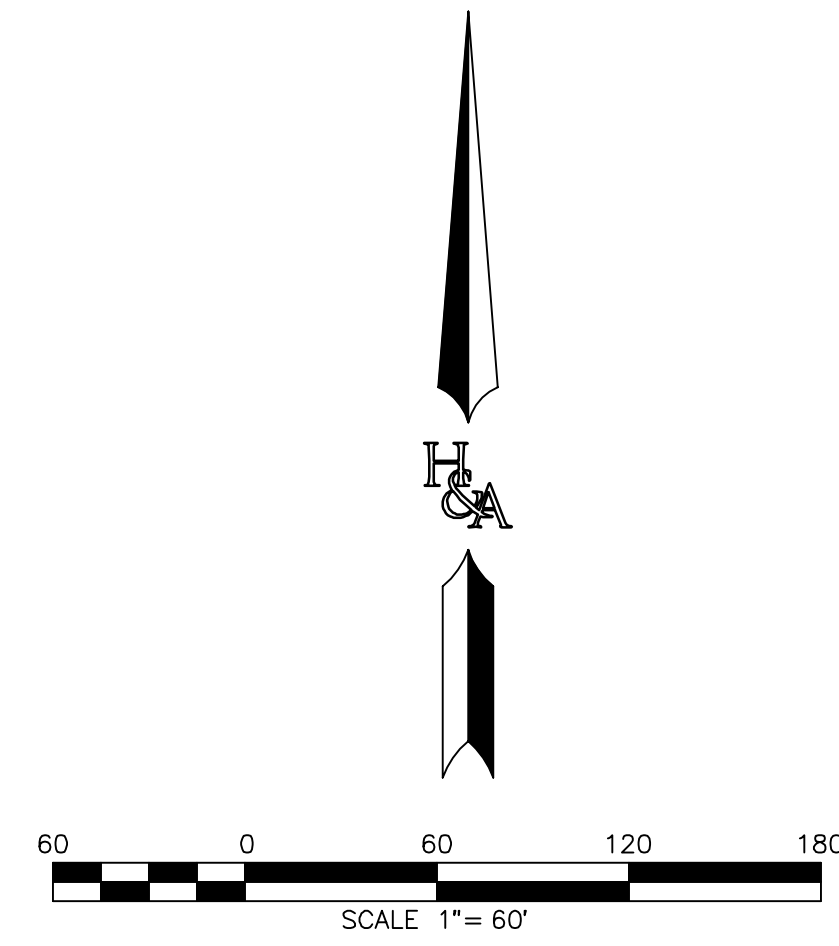
BASIN DRAWDOWN			
Ponding Depth (FT)	Qout Total (CFS)	V in basin (CU FT)	Total Drawdown Time (HR)
6.00	62.391	83517	0.00
5.90	56.357	81621	0.01
5.80	50.533	79742	0.02
5.70	44.929	77882	0.03
5.60	39.552	76039	0.04
5.50	34.412	74214	0.06
5.40	29.523	72407	0.07
5.30	24.896	70618	0.09
5.20	20.548	68847	0.11
5.10	16.498	67093	0.14
5.00	12.770	65358	0.17
4.90	9.396	63640	0.21
4.80	6.417	61939	0.27
4.70	3.897	60256	0.36
4.60	1.943	58590	0.52
4.50	0.861	56942	0.85
4.40	0.830	55312	1.38
4.30	0.797	53699	1.94
4.20	0.761	52103	2.50
4.10	0.723	50525	3.10
4.00	0.681	48964	3.71
3.90	0.634	47420	4.36
3.80	0.578	45894	5.06
3.70	0.483	44384	5.86
3.60	0.397	42891	6.80
3.50	0.360	41415	7.88
3.40	0.355	39956	9.01
3.30	0.349	38514	10.15
3.20	0.343	37089	11.30
3.10	0.337	35680	12.45
3.00	0.330	34289	13.61
2.90	0.324	32914	14.77
2.80	0.317	31556	15.95
2.70	0.310	30213	17.14
2.60	0.303	28887	18.34
2.50	0.295	27578	19.56
2.40	0.287	26285	20.79
2.30	0.279	25008	22.04
2.20	0.270	23747	23.32
2.10	0.261	22503	24.62
2.00	0.251	21275	25.95
1.90	0.239	20062	27.33


1.80	0.226	18866	28.75
1.70	0.210	17686	30.26
1.60	0.183	16521	31.91
1.50	0.168	15372	33.73
1.40	0.165	14238	35.62
1.30	0.161	13121	37.53
1.20	0.158	12019	39.45
1.10	0.154	10933	41.39
1.00	0.149	9863	43.35
0.90	0.144	8808	45.35
0.80	0.139	7768	47.38
0.70	0.132	6744	49.49
0.60	0.119	5735	51.72
0.50	0.110	4741	54.13
0.40	0.110	3762	56.61
0.30	0.110	2799	59.05
0.20	0.110	1851	61.46
0.10	0.110	918	63.82
0.00	0.110	0	66.15

ATTACHMENT 9 – Hydromodification Watershed Maps



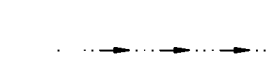



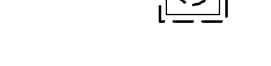
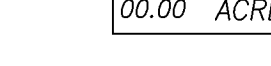










LEGEND

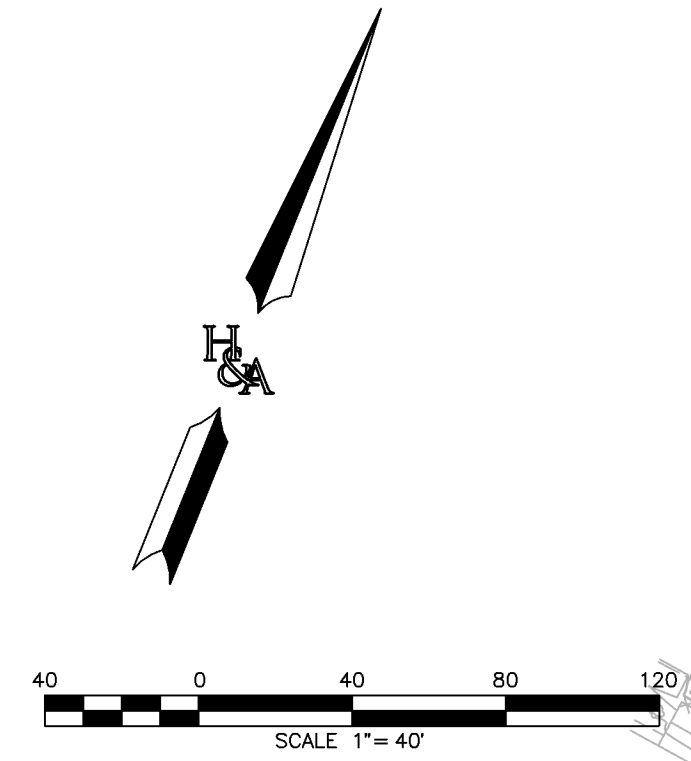
-  PROJECT BOUNDARY
-  DRAINAGE BOUNDARY
-  INITIAL SUBAREA
-  FLOW DIRECTION
-  AREA
-  HYDROLOGIC SOIL TYPE
-  NODE NUMBER
-  SOIL BOUNDARY
-  EXISTING IMPERVIOUS AREA




PREPARED BY:  HUNSAKER & ASSOCIATES SAN DIEGO, INC. PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(619)598-4500 FX(619)598-1414	EXISTING HYDROLOGY PACIFIC SITE CITY OF OCEANSIDE, CALIFORNIA	MAP 1 OF 1
--	---	-----------------------------------

LEGEND

-  PROJECT BOUNDARY
-  DMA BOUNDARY
-  FLOW DIRECTION
-  BYPASS STORM DRAIN
-  STORM DRAIN
-  ON-SITE STORM DRAIN INLETS
-  SUBAREA ACREAGE
- DMA 1** DMA ICON
-  IMPERVIOUS - ROAD/SIDEWALK/ DRIVEWAY
-  IMPERVIOUS - ROOF/BUILDING
-  PERVIOUS - LANDSCAPE
-  BIOFILTRATION BASIN
-  HYDROLOGIC SOIL TYPE
-  POINT OF COMPLIANCE
-  STRUCTURAL BMP
-  SOIL BOUNDARY
-  EXISTING IMPERVIOUS AREA
-  DECOMPOST GRANIELT
-  DISTURBED AREA BOUNDARY



UNDERLYING SOIL GROUP : B & D
 APPROXIMATE DEPTH TO GROUNDWATER > 20'
 NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

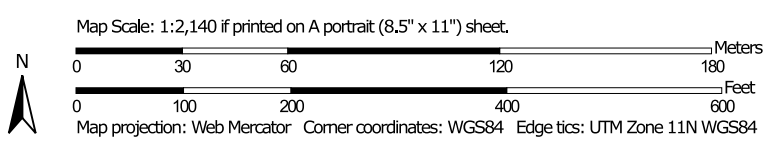
PREPARED BY:  HUNSAKER & ASSOCIATES SAN DIEGO, INC. PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(858)558-4500 · FX(858)558-1414	HMP PROPOSED PACIFIC SITE CITY OF OCEANSIDE, CALIFORNIA	MAP 1 OF 1 <small>W.C.# 2007-2010</small>
--	--	---

ATTACHMENT 10 – USGS Soil Map for justification of Soil Type Conditions

Hydrologic Soil Group—San Diego County Area, California




Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: San Diego County Area, California
 Survey Area Data: Version 16, Sep 13, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GoA	Grangeville fine sandy loam, 0 to 2 percent slopes	B	4.5	30.1%
LeC	Las Flores loamy fine sand, 2 to 9 percent slopes	D	0.7	5.0%
LeC2	Las Flores loamy fine sand, 5 to 9 percent slopes, eroded	D	0.9	5.8%
LeE2	Las Flores loamy fine sand, 15 to 30 percent slopes, eroded	D	8.9	59.2%
Totals for Area of Interest			15.1	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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)	<input checked="" type="checkbox"/> Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Draft Maintenance Agreement (when applicable)	<input checked="" type="checkbox"/> Included <input type="checkbox"/> Not Applicable



Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:
 - Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

- Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- 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

Attachment 3b: For private entity operation and maintenance, Attachment 3b shall include a draft maintenance agreement in the local jurisdiction's standard format (PDP applicant to contact the City Engineer to obtain the current maintenance agreement forms).



CITY OF OCEANSIDE



BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE PLAN FOR PRIORITY PROJECTS

PROJECT NAME: PACIFIC SITE, OCEANSIDE

PARCEL NUMBER: 157-070-42, 122-190-19, & 122-190-22

PROJECT NUMBER: _____

APPLICANT NAME: MERITAGE HOMES

DATE: JUNE 13TH, 2022

Prepared for:

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

This O&M Plan is a placeholder for preliminary Design

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)			
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	
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
<input checked="" type="checkbox"/> On-site storm drain inlets	<ul style="list-style-type: none"> All inlets shall be marked with City of Oceanside storm drain markers 	<ul style="list-style-type: none"> 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. 	See Drainage Management Area Map.
<input type="checkbox"/> Interior floor drains and elevator shaft sump pumps	<ul style="list-style-type: none"> Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer. 	<ul style="list-style-type: none"> Inspect and maintain drains to prevent blockages and overflow. Regularly clear all associated cleanouts and hand holes. 	
<input checked="" type="checkbox"/> Interior parking garages	<ul style="list-style-type: none"> Parking garage floor drains will be plumbed to the sanitary sewer. 	<ul style="list-style-type: none"> Inspect and maintain drains to prevent blockages and overflow. 	See Drainage Management Area Map.

**TABLE 3
 SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
<input checked="" type="checkbox"/> Landscape/ Outdoor Pesticide Use	<ul style="list-style-type: none"> • Final site landscape plans shall be placed in Attachment 7 and shall be used to maintain the following: <ul style="list-style-type: none"> ○ 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. 	<ul style="list-style-type: none"> • 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. 	<p>See Drainage Management Area Map.</p>
<input type="checkbox"/> Use efficient irrigation systems	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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. 	

**TABLE 3
 SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
<input type="checkbox"/> Need for future indoor & structural pest control	<ul style="list-style-type: none"> Note building design features that discourage entry of pests. 	<ul style="list-style-type: none"> Review Integrated Pest Management information and provide to other maintenance personnel. 	
<input type="checkbox"/> Pools, spas, ponds, decorative fountains, and other water features.	<ul style="list-style-type: none"> Plumb pools to the sanitary sewer in accordance with local requirements. 	<ul style="list-style-type: none"> 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 	
<input type="checkbox"/> Food service	<ul style="list-style-type: none"> 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
<input type="checkbox"/> Refuse areas	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 	
<input type="checkbox"/> Industrial processes.	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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
<input type="checkbox"/> Outdoor storage of equipment or materials	<ul style="list-style-type: none"> • Comply with all requirements of local Hazardous Materials Programs for: <ul style="list-style-type: none"> ○ Hazardous Waste Generation ○ Hazardous Materials Release Response and Inventory ○ California Accidental Release (CalARP) ○ Aboveground Storage Tank ○ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 • Underground Storage Tank • 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. <p>Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.</p>	<ul style="list-style-type: none"> • 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 	

**TABLE 3
 SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
<input type="checkbox"/> Vehicle and Equipment Cleaning	<ul style="list-style-type: none"> • 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). 	<ul style="list-style-type: none"> • Follow operational measures to implement the following (if applicable): <ul style="list-style-type: none"> ○ 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 	<p style="text-align: center;">.</p>

**TABLE 3
 SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
<input type="checkbox"/> Vehicle/Equipment Repair and Maintenance	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • The following restrictions apply to use the site: <ul style="list-style-type: none"> ○ 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
<input type="checkbox"/> Fuel Dispensing Areas	<ul style="list-style-type: none"> • Fueling areas¹ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: <ul style="list-style-type: none"> ○ 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. 	<ul style="list-style-type: none"> • 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
<input type="checkbox"/> Loading Docks	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 	
<input type="checkbox"/> Fire Sprinkler Test Water	<ul style="list-style-type: none"> • Provide a means to drain fire sprinkler test water to the sanitary sewer. 	<ul style="list-style-type: none"> • Review the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com 	

**TABLE 3
 SOURCE CONTROL BMPs**

Potential Pollutant Sources	Description	Operational BMPs	Location
<input type="checkbox"/> Miscellaneous Drain or Wash Water <ul style="list-style-type: none"> • Boiler drain lines • Condensate drain lines • Rooftop equipment • Drainage sumps • Roofing, gutters, and trim 	<ul style="list-style-type: none"> • 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. 		
<input checked="" type="checkbox"/> Plazas, sidewalks, and parking lots		<ul style="list-style-type: none"> • 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. 	See Drainage Management Area Map.

V. DRAINAGE AREAS

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

TABLE 4 DRAINAGE MANAGEMENT AREAS		
DMA No.	Designation	Description
DMA 1		Biofiltration Basin
DMA 2		Filtterra Unit

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
Bioretention	DMA 1 - SW	9100 S.F.	Area Drained
Filtterra Unit	DMA 2 - NE	0.25 C.F.S.	Water Quality Flow

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.

IX. 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.

X. 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.

XI. 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
<input type="checkbox"/> Bioretention			<input type="checkbox"/> Regularly weed and water during plant establishment phase	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Area is free of litter and excess sediment	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Area free of erosion and stabilized	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Plants are healthy and thriving	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Plant types are those from original design	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Filter Strips			<input type="checkbox"/> Regularly weed and water during plant establishment phase	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Plants are healthy and thriving	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Area free of erosion and stabilized	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Area is free of litter and excess sediment	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Plant types are those from original design	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Flow spreader is free of debris and is not clogged	<input type="checkbox"/> No <input type="checkbox"/> Yes	

LID BMP INSPECTION FORM

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

LID BMP INSPECTION FORM

Date:	Inspector:		Weather:		
Reason for Inspection:			Comments:		
LID BMP Type	Description	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<input type="checkbox"/> <i>Green Roofs Cont'd</i>			<input type="checkbox"/> Plants are healthy and thriving	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Rain Barrels / Cisterns		
<input type="checkbox"/> Rain Barrels / Cisterns			<input type="checkbox"/> Roof catchment and gutters are free of debris and sediment	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Downspouts are free of leaks and obstructions	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Rain barrel, top, and seal are free of leaks	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Overflow pipe is not causing erosion	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Porous Pavement		
<input type="checkbox"/> Porous Pavement			<input type="checkbox"/> Pavement is free of debris and sediment	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Pavement is swept monthly	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Pavement is in good condition and stabilized	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Area is dry swept regularly	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Soil Structure Enhancement (use of compost)			<input type="checkbox"/> Area is protected from compaction	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> Limited foot traffic	<input type="checkbox"/> No <input type="checkbox"/> Yes	
			<input type="checkbox"/> 2 to 1 ratio of compost soil and existing soil is present	<input type="checkbox"/> No <input type="checkbox"/> 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
<input type="checkbox"/> On-site storm drain inlets		<input type="checkbox"/> Maintain and periodically replace inlet markers, if necessary.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Review stormwater pollution prevention information applicable to the site.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Adhere to applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> 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.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Interior floor drains and elevator shaft sump pumps		<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Interior parking garages		<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Landscape/ Outdoor Pesticide Use		<input type="checkbox"/> Maintain landscaping using minimum or no pesticides.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> 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	<input type="checkbox"/> No <input type="checkbox"/> 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>		<input type="checkbox"/> Review IMP information and provide to landscape and maintenance personnel.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Use efficient irrigation systems		<input type="checkbox"/> Inspect irrigation system for leaks and/or malfunctions.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Need for future indoor & structural pest control		<input type="checkbox"/> Review Integrated Pest Management information and provide to other maintenance personnel.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Pools, spas, ponds, decorative fountains, and other water features.		<input type="checkbox"/> 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	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Food service		<input type="checkbox"/> Grease traps cleaned, as necessary. <input type="checkbox"/> See Refuse Areas.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Refuse areas		<input type="checkbox"/> Provide adequate number of receptacles.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Inspect receptacles regularly; repair or replace leaky receptacles.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Keep receptacles covered at all times.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Prohibit/prevent dumping of liquid or hazardous wastes.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Post "no hazardous materials" signs.	<input type="checkbox"/> No <input type="checkbox"/> 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>		<input type="checkbox"/> Inspect and pick up litter daily and clean up spills immediately.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> 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	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Industrial processes.		<input type="checkbox"/> Review and adhere to Fact Sheet SC-10, "Non- Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Outdoor storage of equipment or materials		<input type="checkbox"/> 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	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Vehicle and Equipment Cleaning		Follow operational measures to implement the following (if applicable):		
		<input type="checkbox"/> Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.	<input type="checkbox"/> No <input type="checkbox"/> Yes	

SOURCE CONTROL BMP INSPECTION FORM

Date: _____ **Inspector:** _____ **Weather:** _____

Reason for Inspection: _____ **Comments:** _____

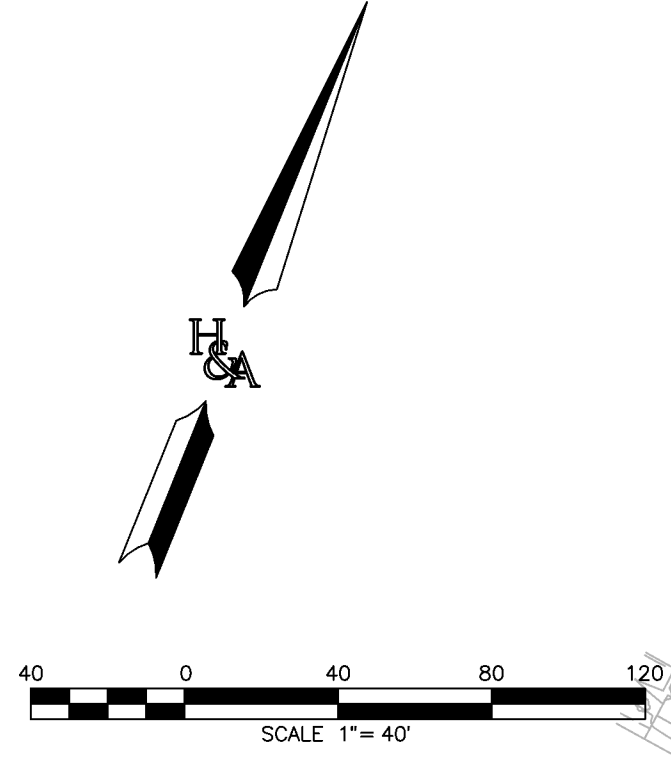
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<i>Vehicle and Equipment Cleaning Continued</i>		<input type="checkbox"/> Car dealerships and similar may rinse cars with potable water only. Any excess water shall be drained through landscaping and dechlorinated prior to discharge to the storm drain system.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Review and adhere to Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Vehicle/Equipment Repair and Maintenance		The following restrictions apply to use the site:		
		<input type="checkbox"/> 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.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> No vehicle fluid removal shall be performed outside a building, Nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.	<input type="checkbox"/> No <input type="checkbox"/> 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/Equipment Repair and Maintenance Continued</i>		<input type="checkbox"/> 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.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Fuel Dispensing Areas		<input type="checkbox"/> The fueling area is to be dry swept routinely.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Review and adhere to the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Fueling areas are covered by a canopy.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> The canopy does not drain onto the fueling area.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Grading of the area prevents run-on of stormwater to the maximum extent practicable.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Loading Docks		<input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible.	<input type="checkbox"/> No <input type="checkbox"/> Yes	
		<input type="checkbox"/> Review and adhere to Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	

SOURCE CONTROL BMP INSPECTION FORM				
Date:	Inspector:	Weather:		
Reason for Inspection:		Comments:		
Potential Pollutant Sources	Location	Operational BMPs	Maintenance Required	Maintenance Performed/Comments
<input type="checkbox"/> Fire Sprinkler Test Water		<input type="checkbox"/> Review the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Miscellaneous Drain or Wash Water <ul style="list-style-type: none"> • Boiler drain lines • Condensate drain lines • Rooftop equipment • Drainage sumps • Roofing, gutters, and trim 			<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> Plazas, sidewalks, and parking lots		<input type="checkbox"/> 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.	<input type="checkbox"/> No <input type="checkbox"/> Yes	

ATTACHMENT 6

SITE MAP



LEGEND

- PROJECT BOUNDARY
- DMA BOUNDARY
- FLOW DIRECTION
- BYPASS STORM DRAIN
- STORM DRAIN
- ON-SITE STORM DRAIN INLETS
- SUBAREA ACREAGE
- DMA 1** DMA ICON
- IMPERVIOUS - ROAD/SIDEWALK/ DRIVEWAY
- IMPERVIOUS - ROOF/BUILDING
- PERVIOUS - LANDSCAPE
- BIOFILTRATION BASIN
- HYDROLOGIC SOIL TYPE
- POINT OF COMPLIANCE
- STRUCTURAL BMP
- SOIL BOUNDARY
- EXISTING IMPERVIOUS AREA
- DECOMPOST GRANIT
- DISTURBED AREA BOUNDARY

- SITE DESIGN BMPs**
- SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
 - SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
 - SD-3 MINIMIZE IMPERVIOUS AREAS
 - SD-4 MINIMIZE SOIL COMPACTION
 - SD-5 IMPERVIOUS AREA DISPERSION
 - SD-6 RUNOFF COLLECTION
 - SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

- SOURCE CONTROL BMPs**
- SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
 - SC-2 STORM DRAIN STENCILING OR SIGNAGE
 - SC-6 ADDITIONAL BMPs BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
 - SC-6A ON-SITE STORM DRAIN INLETS
 - SC-6D2 LANDSCAPE/OUTDOOR PESTICIDE USE
 - SC-6N FIRE SPRINKLE TEST WATER
 - SC-6O MISCELLANEOUS DRAIN OR WASH WATER
 - SC-6P PLAZAS, SIDEWALKS, AND PARKING LOTS

UNDERLYING SOIL GROUP : B & D
 APPROXIMATE DEPTH TO GROUNDWATER > 20'
 NO CRITICAL COARSE AREAS REQUIRE PRESERVATION



PREPARED BY: HUNSAKER & ASSOCIATES SAN DIEGO, INC. <small>PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(858)558-4500 - FX(858)558-1414</small>	<h2 style="margin: 0;">DMA MAP</h2> <h2 style="margin: 0;">PACIFIC SITE</h2> <p style="margin: 0;">CITY OF OCEANSIDE, CALIFORNIA</p>	MAP <b style="font-size: 2em;">1 OF <b style="font-size: 2em;">2 <small>W.C.# 2027-2010</small>
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ATTACHMENT 7

AS-BUILT DRAWINGS

ATTACHMENT 8

TREATMENT CONTROL BMP INSPECTION AND MAINTENANCE CHECKLIST(S)

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

Vegetated Buffer Strip 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
 Other: _____

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

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. Sediment Accumulation on Vegetation	Sediment accumulating near culverts and/or in channels builds up to 75 millimeters (3 inches) at any spot, or it covers vegetation			Remove accumulated sediment deposits. When finished, buffer strip should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased. Dispose of sediment properly.	
2. Standing Water	Water stands in the buffer strip 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 buffer strip, removed clogged check dams, added underdrains or converted to a wet buffer strip.	

Vegetated Buffer Strip - 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
3. Flow spreader (if any)	Flow spreader uneven or clogged such that flows are not uniformly distributed through entire buffer strip width.			Spreader leveled and cleaned so that flows are spread evenly over entire buffer strip width.	
4. Constant Baseflow	When small quantities of water continually flow through the buffer strip, even when it has been dry for weeks, and an eroded, muddy channel has formed in the buffer strip bottom.			No eroded, muddy channel on the bottom. A low-flow pea-gravel drain may be added the length of the buffer strip.	
5. Poor Vegetation Coverage	When planted vegetation is sparse or bare or eroded, patches occur in more than 10% of the buffer strip bottom.			Vegetation coverage in more than 90% of the buffer strip bottom. Determine why growth of planted vegetation is poor and correct that condition. Replant with plugs of vegetation from the upper slope: plant in the buffer strip bottom at 8-inch intervals, or reseed into loosened, fertile soil.	

Vegetated Buffer Strip - 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. Vegetation	When the planted vegetation becomes excessively tall; when nuisance weeds and other vegetation start to take over.			Vegetation mowed per specifications or maintenance plan, or nuisance vegetation removed so that flow is not impeded. Vegetation should never be mowed lower than the design flow depth. Remove clippings from the buffer strip and dispose appropriately.	
7. Excessive Shading	Growth of planted vegetation is poor because sunlight does not reach buffer strip.			Healthy growth of planted vegetation. If possible, trim back over-hanging limbs and remove brushy vegetation on adjacent slopes.	
8. Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.			Material removed so that there is no clogging or blockage in the inlet and outlet areas.	
9. Trash and Debris Accumulation	Trash and debris accumulated in the buffer strip.			Trash and debris removed from buffer strip. Dispose of trash and debris properly.	

Vegetated Buffer Strip - 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
10. Erosion/ Scouring	Eroded or scoured buffer strip bottom due to flow channelization, or higher flows.			No erosion or scouring in buffer strip bottom. For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the buffer strip should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the buffer strip bottom at 8-inch intervals.	
11. Miscellaneous	Any condition not covered above that needs attention in order for the vegetated buffer strip 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

Constructed Wetlands 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
General				
Trash & Debris	Trash and debris accumulated in basin at a minimum of once prior to October 1st, once around Feb 1st, and once May 15th. Visual evidence of dumping.			Trash and debris cleared from site and disposed of properly.
Poisonous Vegetation and noxious weeds	Poisonous or nuisance vegetation or noxious weeds, e.g., morning glory, English ivy, reed canary grass, Japanese knotweed, purple loosestrife, blackberry, Scotch broom, poison oak, stinging nettles, or devil's club.			Use Integrated Pest Management techniques to control noxious weeds or invasive species.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. Note signs of hydrocarbon buildup such as floating oil on water surface.			No contaminants or pollutants present.

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.			The design specifications are not compromised by holes. Any rodent control activities are in accordance with applicable laws and do not affect any protected species.
Insects	<p>Insects such as wasps and hornets interfere with maintenance activities.</p> <p>Where permitted by CA DFG, or other agency regulations, stock regularly with mosquito fish (<i>Gambusia</i> spp.) to enhance natural mosquito and midge control.</p> <p>Maintain vegetation to assist <i>Gambusia</i> spp. movements to control mosquitoes, as well as to provide access for vector inspectors.</p> <p>Maintain emergent and perimeter shoreline vegetation as well as site and road access to facilitate vector surveillance and control activities.</p>			<p>Insects do not interfere with maintenance activities.</p> <p>No mosquitoes or other vectors present in unusual abundance.</p>

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Vegetation	<p>Inspect for invasive vegetation, differential settlement, cracking; erosion, leakage, or tree growth on the embankment. Correct observed problems as necessary.</p> <p>Mow side slopes and remove grass clippings every other month or as necessary.</p> <p>Supplement wetland plants if a significant portion have not established (at least 50% of the surface area) on an annual basis.</p> <p>Remove nuisance plant species.</p>			<p>Wetland vegetation should be at proper vigor and density, no nuisance or noxious weeds or invasive species should be visible, and growth should not hinder physical characteristics or requirements of wetland area.</p>
Tree/Brush Growth and Hazard Trees	<p>Growth does not allow maintenance access or interferes with maintenance activity.</p> <p>Vegetation harvesting should occur preferably between June to September (CASCA TC-21)</p> <p>Dead, diseased, or dying trees.</p>			<p>Trees do not hinder maintenance activities.</p> <p>Remove hazard trees as approved by the City.</p> <p>(Use a certified Arborist to determine health of tree or removal requirements).</p>

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Drainage time	Standing water remains in basin more than five days.			Correct any circumstances that restrict the flow of water from the system. Restore drainage to design condition. If the problem cannot be corrected and problems with standing water recur, then mosquitoes should be controlled with larvicides, applied by a licensed pesticide applicator.
Outfall structure	Debris or silt build-up obstructs an outfall structure.			Remove debris and/or silt build-up and dispose of properly.
Side Slopes				
Erosion	Eroded over 2 in. deep where cause of damage is still present or where there is potential for continued erosion. Any erosion on a compacted berm embankment.			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.
Storage Area				

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Sediment	Monitor for sediment accumulation in the facility and forebay. Remove accumulated sediment in the forebay and regrade about every 5-7 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Sediment removal may not be required in the main pool area for as long as 20 years.			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion. Sediment disposed of properly.
Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Emergency Overflow/Spillway and Berms				
Settlement	Berm settlement 4 inches lower than the design elevation.			Dike is built back to the design elevation.

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Tree Growth	Tree growth on berms or emergency spillway >4 ft in height or covering more than 10% of spillway.			Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A civil engineer should be consulted for proper berm/spillway restoration.
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed and disposed of properly.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack.
Fencing and Gates				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.

Constructed Wetlands Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.
Flow Duration Control Outlet (if included in design to meet Hydromodification Management Standard) [[==refer to any attachments with additional provisions==]]				
Risers, orifices and screens	Any debris or clogging			Restore unobstructed flow through discharge structure; to meet original design; dispose of debris properly.
Miscellaneous				
Miscellaneous	Any condition not covered above that needs attention to restore extended detention basin to design conditions.			Meets 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

Detention Basin 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
General				
Trash & Debris	Trash and debris accumulated in basin. Visual evidence of dumping.			Trash and debris cleared from site and disposed of properly.
Poisonous Vegetation and noxious weeds	Poisonous or nuisance vegetation or noxious weeds, e.g., morning glory, English ivy, reed canary grass, Japanese knotweed, purple loosestrife, blackberry, Scotch broom, poison oak, stinging nettles, or devil's club.			Use Integrated Pest Management techniques to control noxious weeds or invasive species.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			No contaminants or pollutants present.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.			The design specifications are not compromised by holes. Any rodent control activities are in accordance with applicable laws and do not affect any protected species.
Insects	Insects such as wasps and hornets interfere with maintenance activities.			Insects do not interfere with maintenance activities.
Tree/Brush Growth and Hazard Trees	Growth does not allow maintenance access or interferes with maintenance activity. Dead, diseased, or dying trees.			Trees do not hinder maintenance activities. Remove hazard trees as approved by the City. (Use a certified Arborist to determine health of tree or removal requirements).

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Drainage time	Standing water remains in basin more than five days.			Correct any circumstances that restrict the flow of water from the system. Restore drainage to design condition. If the problem cannot be corrected and problems with standing water recur, then mosquitoes should be controlled with larvicides, applied by a licensed pesticide applicator.
Outfall structure	Debris or silt build-up obstructs an outfall structure.			Remove debris and/or silt build-up and dispose of properly.
Side Slopes				
Erosion	Eroded over 2 in. deep where cause of damage is still present or where there is potential for continued erosion. Any erosion on a compacted berm embankment.			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Storage Area				
Sediment	Accumulated sediment >10% of designed basin depth or affects inletting or outletting condition of the facility.			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion. Sediment disposed of properly.
Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Emergency Overflow/ Spillway and Berms				
Settlement	Berm settlement 4 inches lower than the design elevation.			Dike is built back to the design elevation.
Tree Growth	Tree growth on berms or emergency spillway >4 ft in height or covering more than 10% of spillway.			Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A civil engineer should be consulted for proper berm/spillway restoration.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed and disposed of properly.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack.
Fencing and Gates				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.

Detention Basin - 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Flow Duration Control Outlet (if included in design to meet Hydromodification Management Standard)				
[[==refer to any attachments with additional provisions==]]				
Risers, orifices and screens	Any debris or clogging			Restore unobstructed flow through discharge structure; to meet original design; dispose of debris properly.
Miscellaneous				
Miscellaneous	Any condition not covered above that needs attention to restore extended detention basin to design conditions.			Meets 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

Flow-Through Planter 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. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.
2. Soil	Soil too deep or too shallow.			Soil is at proper depth (per soil specifications) 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. Sediment, Trash and Debris Accumulation	Sediment, trash and debris accumulated in the flow-through planter. Planter does not drain as specified.			Sediment, trash and debris removed from flow-through planter and disposed of properly. Planter drains within 3-4 hours.

Flow-Through Planter - 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
5. Clogs	Soil too deep or too shallow. Sediment, trash and debris accumulated in the flow-through planter. Planter does not drain within five days after rainfall.			Planter drains per design specifications.
6. Downspouts and Sheet Flow	Flow to planter is impeded. Downspouts are clogged or pipes are damaged. Splash blocks and rocks in need of repair, replacement or replenishment.			Downspouts and sheet flow is conveyed efficiently to the planter.
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. Structural Soundness	Planter is cracked, leaking or falling apart.			Cracks and leaks are repaired and planter is structurally sound.
9. Miscellaneous	Any condition not covered above that needs attention in order for the flow-through planter 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

Hydrodynamic Separators INSPECTION AND MAINTENANCE CHECKLIST

Property Applicant: _____

Property Address: _____

Date of Inspection: _____

Type of Inspection: Monthly Pre-Wet Season
 After heavy runoff End of Wet Season

System Type: _____

Installer/Contractor: _____

Overall Facility Score*: _____

Manufacturer: _____

Inspector(s): _____

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. Sediment, trash and debris accumulation on Filter	Sediment, trash and debris accumulated in the sedimentation basin, riser pipe, retention pipes and filter bed. Filter does not drain as specified.			Sediment, trash and debris removed from sedimentation basin, riser pipe and filter bed and disposed of properly. Filter drains per design specifications. Empty cartridge should be reassembled and reinstalled.
2. Standing water	Manufactured treatment measure does not drain within five days after rainfall.			Clogs removed from filters, sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.
3. Mosquitoes	Evidence of mosquito larvae in manufactured treatment measure.			Clogs removed from sedimentation basin, riser pipe and filter bed. Filter drains per

Hydrodynamic Separators - 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
				design specifications.
4. Miscellaneous	Any condition not covered above that needs attention in order for the manufactured treatment measure 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.

Infiltration Trench 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 infiltration trench between storms and does not drain within 5 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 infiltration trench, removed clogging at check dams, or added underdrains.
2. Trash and Debris Accumulation	Trash and debris accumulated in the infiltration trench.			Trash and debris removed from infiltration trench and disposed of properly.
3. Sediment	Evidence of sedimentation in trench. Less than 50% storage volume remaining in sediment traps, forebays or pretreatment swales.			Material removed and disposed of properly so that there is no clogging or blockage.
4. Inlet/Outlet	Inlet/outlet areas clogged with sediment or debris, and/or eroded.			Material removed and disposed of properly so that there is no clogging or blockage in the inlet and outlet areas.
5. Overflow	Clogged with sediment or			Material removed and disposed

Infiltration Trench - 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
Spillway	debris, and/or eroded.			of properly so that there is no clogging or blockage, and trench is restored to design condition.
6. Filter Fabric	Annual inspection, by removing a small section of the top layer, shows sediment accumulation that may lead to trench failure.			Replace filter fabric, as needed, to restore infiltration trench to design condition.
7. Observation Well	Routine monitoring of observation well indicates that trench is not draining within specified time or observation well cap is missing.			Restore trench to design conditions. Observation well cap is sealed.
8. Miscellaneous	Any condition not covered above that needs attention in order for the infiltration trench 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.

Manufactured Stormwater Treatment Measure INSPECTION AND MAINTENANCE CHECKLIST

Property Applicant: _____

Property Address: _____

Date of Inspection: _____

Type of Inspection: Monthly Pre-Wet Season
 After heavy runoff End of Wet Season

System Type: _____

Installer/Contractor: _____

Overall Facility Score*: _____

Manufacturer: _____

Inspector(s): _____

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. Sediment, trash and debris accumulation on Filter	Sediment, trash and debris accumulated in the sedimentation basin, riser pipe, retention pipes and filter bed. Filter does not drain as specified.			Sediment, trash and debris removed from sedimentation basin, riser pipe and filter bed and disposed of properly. Filter drains per design specifications. Empty cartridge should be reassembled and reinstalled.
2. Standing water	Manufactured treatment measure does not drain within five days after rainfall.			Clogs removed from filters, sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.

Manufactured Treatment System O&M - 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
3. Mosquitoes	Evidence of mosquito larvae in manufactured treatment measure.			Clogs removed from sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.
4. Miscellaneous	Any condition not covered above that needs attention in order for the manufactured treatment measure 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.

Non-Proprietary Media 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. Sediment, trash and debris accumulation	Sediment, trash and debris accumulated in the sedimentation basin, riser pipe and filter bed. Filter does not drain as specified.			Sediment, trash and debris removed from sedimentation basin, riser pipe and filter bed and disposed of properly. Filter drains per design specifications.	
2. Standing water	Non-proprietary media filter does not drain within three days after rainfall.			Clogs removed from sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.	
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	

Non-Proprietary Media 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
<i>Erosion Cont'd</i>				properly.	
5. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.	
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. Mosquitoes	Evidence of mosquito larvae in non-proprietary media filter.			Clogs removed from sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.	
8. Filter bed	Overall media depth 300 millimeters (12 inches) or less.			Media depth restored to 450 millimeters (18 inches).	
9. Miscellaneous	Any condition not covered above that needs attention in order for the non-proprietary media 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

Pervious Pavement 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. Sediment, trash and debris accumulation	Sediment, trash and debris accumulated in the pervious pavement valley gutter and downstream catch basin. Pavement does not drain as specified.			Sediment, trash and debris removed from pervious pavement and catch basin and disposed of properly. Pavement drains per design specifications.	
2. Standing water	Pervious Pavement does not drain within three days after rainfall.			Clogs removed from pervious pavement. Pavement drains per design specifications.	
3. Sediment	Evidence of sedimentation in Pervious Pavement.			Material removed so that there is no clogging or blockage. Material is disposed of properly.	
4. Mosquitoes	Evidence of mosquito larvae in Pervious Pavement.			Clogs removed from pervious pavement. Pavement drains per design specifications.	

Pervious Pavement - 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
5. Miscellaneous	Any condition not covered above that needs attention in order for the non-proprietary media 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.

Trash Racks INSPECTION AND MAINTENANCE CHECKLIST

Property Applicant: _____

Property Address: _____

Date of Inspection: _____

Type of Inspection: Monthly Pre-Wet Season
 After heavy runoff End of Wet Season

System Type: _____

Installer/Contractor: _____

Overall Facility Score*: _____

Manufacturer: _____

Inspector(s): _____

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. Sediment, trash and debris accumulation on Filter	Sediment, trash and debris accumulated in the sedimentation basin, riser pipe, retention pipes and filter bed. Filter does not drain as specified.			Sediment, trash and debris removed from sedimentation basin, riser pipe and filter bed and disposed of properly. Filter drains per design specifications. Empty cartridge should be reassembled and reinstalled.
2. Standing water	Manufactured treatment measure does not drain within five days after rainfall.			Clogs removed from filters, sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.
3. Mosquitoes	Evidence of mosquito larvae in manufactured treatment measure.			Clogs removed from sedimentation basin, riser pipe and filter bed. Filter drains per design specifications.

Trash Racks - 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
4. Miscellaneous	Any condition not covered above that needs attention in order for the manufactured treatment measure 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.

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
 Other: _____

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

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.	

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.

Vegetated Swale Maintenance Plan 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
Sediment Accumulation on Vegetation	Sediment accumulating near culverts and/or in channels builds up to 75 millimeters (3 inches) at any spot, or it covers vegetation			When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased and sediment is disposed of properly.	
Standing Water	When water stands in the swale between storms and does not drain within 5 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 swale, removed clogged check dams, added underdrains or converted to a wet swale.	

Vegetated Swale - 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
Flow spreader (if any)	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.			Spreader leveled and cleaned so that flows are spread evenly over entire swale width.	
Constant Baseflow	When small quantities of water continually flow through the swale, even when it has been dry for weeks, and an eroded, muddy channel has formed in the swale bottom.			No eroded, muddy channel on the bottom. A low-flow pea-gravel drain may be added the length of the swale.	
Poor Vegetation Coverage	When planted vegetation is sparse or bare or eroded patches occur in more than 10% of the swale bottom.			Vegetation coverage in more than 90% of the swale bottom. Determine why growth of planted vegetation is poor and correct that condition. Re-plant with plugs of vegetation from the upper slope: plant in the swale bottom at 8-inch intervals, or re-seed into loosened, fertile soil.	

Vegetated Swale - 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
Vegetation	When the planted vegetation becomes excessively tall; when nuisance weeds and other vegetation start to take over.			Vegetation mowed per specifications or maintenance plan, or nuisance vegetation removed so that flow is not impeded. Vegetation should never be mowed lower than the design flow depth. Remove clippings from the swale and dispose appropriately.	
Excessive Shading	Growth of planted vegetation is poor because sunlight does not reach swale.			Healthy growth of planted vegetation. If possible, trim back over-hanging limbs and remove brushy vegetation on adjacent slopes.	
Inlet/Outlet	Inlet/outlet areas clogged with sediment and/or debris.			Material removed so that there is no clogging or blockage in the inlet and outlet areas.	
Trash and Debris Accumulation	Trash and debris accumulated in the swale.			Trash and debris removed from swale.	

Vegetated Swale - 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
Erosion/ Scouring	Eroded or scoured swale bottom due to flow channelization, or higher flows.			No erosion or scouring in swale bottom. For ruts or bare areas less than 12 inches wide, repair the damaged area by filling with crushed gravel. If bare areas are large, generally greater than 12 inches wide, the swale should be re-graded and re-seeded. For smaller bare areas, overseed when bare spots are evident, or take plugs of grass from the upper slope and plant in the swale bottom at 8-inch intervals.	
Miscellaneous	Any condition not covered above that needs attention in order for the vegetated swale 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.

Wet Pond 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 any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
General				
Trash & Debris	Trash and debris accumulated in basin at a minimum of once prior to October 1st, once around Feb 1st, and once May 15th. Visual evidence of dumping.			Trash and debris cleared from site and disposed of properly.
Poisonous Vegetation and noxious weeds	Poisonous or nuisance vegetation or noxious weeds, e.g., morning glory, English ivy, reed canary grass, Japanese knotweed, purple loosestrife, blackberry, Scotch broom, poison oak, stinging nettles, or devil's club.			Use Integrated Pest Management techniques to control noxious weeds or invasive species.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			No contaminants or pollutants present.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.			The design specifications are not compromised by holes. Any rodent control activities are in accordance with applicable laws and do not affect any protected species.
Insects	Insects such as wasps and hornets interfere with maintenance activities. Mosquitoes and other vectors Where permitted by CA DFG, or other agency regulations, stock regularly with mosquito fish (<i>Gambusia</i> spp.) to enhance natural mosquito and midge control. Maintain vegetation to assist <i>Gambusia</i> spp. movements to control mosquitoes, as well as to provide access for vector inspectors. Maintain emergent and perimeter shoreline vegetation as well as site and road access to facilitate vector surveillance and control activities.			Insects do not interfere with maintenance activities. No mosquitoes or other vectors present in unusual abundance.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Tree/Brush Growth and Hazard Trees	Growth does not allow maintenance access or interferes with maintenance activity. Vegetation harvesting should occur preferably between June to September (CASCA TC-20) Dead, diseased, or dying trees.			Trees do not hinder maintenance activities. Remove hazard trees as approved by the City. (Use a certified Arborist to determine health of tree or removal requirements).
Drainage time	Standing water remains in basin more than five days.			Correct any circumstances that restrict the flow of water from the system. Restore drainage to design condition. If the problem cannot be corrected and problems with standing water recur, then mosquitoes should be controlled with larvicides, applied by a licensed pesticide applicator.
Outfall structure	Debris or silt build-up obstructs an outfall structure.			Remove debris and/or silt build-up and dispose of properly.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Side Slopes				
Erosion	Eroded over 2 in. deep where cause of damage is still present or where there is potential for continued erosion. Any erosion on a compacted berm embankment.			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.
Storage Area				
Sediment	Remove accumulated sediment in the forebay and regrade about every 5-7 years or when the accumulated sediment volume exceeds 10 percent of the basin volume. Sediment removal may not be required in the main pool area for as long as 20 years.			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion. Sediment disposed of properly.
Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Emergency Overflow/ Spillway and Berms				
Settlement	Berm settlement 4 inches lower than the design elevation.			Dike is built back to the design elevation.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Tree Growth	Tree growth on berms or emergency spillway >4 ft in height or covering more than 10% of spillway.			Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A civil engineer should be consulted for proper berm/spillway restoration.
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed and disposed of properly.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack.
Fencing and Gates				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.

Defect	Conditions When Maintenance Is Needed	Maintenance Score**	Comments (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	Results Expected When Maintenance Is Performed
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.
Flow Duration Control Outlet (if included in design to meet Hydromodification Management Standard) [[==refer to any attachments with additional provisions==]]				
Risers, orifices and screens	Any debris or clogging			Restore unobstructed flow through discharge structure; to meet original design; dispose of debris properly.
Miscellaneous				
Miscellaneous	Any condition not covered above that needs attention to restore extended detention basin to design conditions.			Meets 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

Filterterra Owner's Manual



filterterra[®]
Bioretention Systems

C NTECH[®]
ENGINEERED SOLUTIONS



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Enclosed

Local Area Filterra Plant List



Introduction

Thank you for your purchase of the Filterra® Bioretention System. Filterra is a specially engineered stormwater treatment system incorporating high performance biofiltration media to remove pollutants from stormwater runoff. The system’s biota (vegetation and soil microorganisms) then further breakdown and absorb captured pollutants. All components of the system work together to provide a sustainable long-term solution for treating stormwater runoff.

The Filterra system has been delivered to you with protection in place to resist intrusion of construction related sediment which can contaminate the biofiltration media and result in inadequate system performance. These protection devices are intended as a best practice and cannot fully prevent contamination. It is the purchaser’s responsibility to provide adequate measures to prevent construction related runoff from entering the Filterra system.

Included with your purchase is Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system and 1-year of routine maintenance (mulch replacement, debris removal, and pruning of vegetation) up to twice during the first year after activation.

Design and Installation

Each project presents different scopes for the use of Filterra systems. Information and help may be provided to the design engineer during the planning process. Correct Filterra box sizing (by rainfall region) is essential to predict pollutant removal rates for a given area. The engineer shall submit calculations for approval by the local jurisdiction. The contractor is responsible for the correct installation of Filterra units as shown in approved plans. A comprehensive installation manual is available at www.ContechES.com.

Activation Overview

Activation of the Filterra system is a procedure completed by the manufacturer to place the system into working condition. This involves the following items:

- Removal of construction runoff protection devices
- Planting of the system’s vegetation
- Placement of pretreatment mulch layer using mulch certified for use in Filterra systems.

Activation **MUST** be provided by the manufacturer to ensure proper site conditions are met for Activation, proper installation of the vegetation, and use of pretreatment mulch certified for use in Filterra systems.



Minimum Requirements

The minimum requirements for Filterra Activation are as follows:

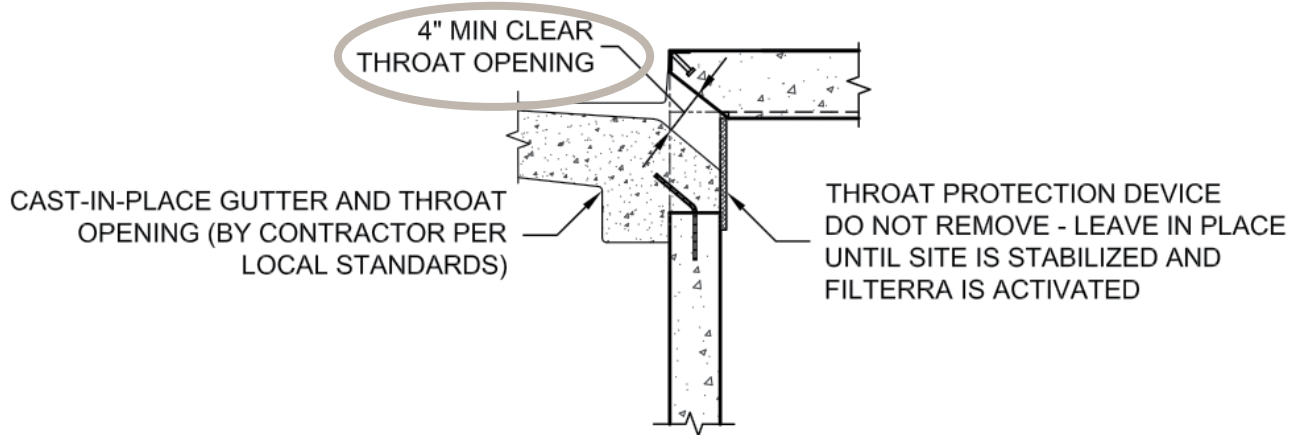
1. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.



2. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.



3. Filterra throat opening should be at least 4" in order to ensure adequate capacity for inflow and debris.



An Activation Checklist is included on page 12 to ensure proper conditions are met for Contech to perform the Activation services. A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation.

Filterra Plant Selection Overview

A Plant List has been enclosed with this packet highlighting recommended plants for Filterra systems in your area. Keep in mind that plants are subject to availability due to seasonality and required minimum size for the Filterra system. Plants installed in the Filterra system are container plants (max 15 gallon) from nursery stock and will be immature in height and spread at Activation.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the Filterra system.

The “Planting Requirements for Filterra Systems” document is included as an appendix and discusses proper selection and care of the plants within Filterra systems.

Warranty Overview

Refer to the Contech Engineered Solutions LLC Stormwater Treatment System LIMITED WARRANTY for further information. The following conditions may void the Filterra system’s warranty and waive the manufacturer provided Activation and Maintenance services:

- Unauthorized activation or performance of any of the items listed in the activation overview
- Any tampering, modifications or damage to the Filterra system or runoff protection devices
- Removal of any Filterra system components
- Failure to prevent construction related runoff from entering the Filterra system
- Failure to properly store and protect any Filterra components (including media and underdrain stone) that may be shipped separately from the vault

Routine Maintenance Guidelines

With proper routine maintenance, the biofiltration media within the Filterra system should last as long as traditional bioretention media. Routine maintenance is included by the manufacturer on all Filterra systems for the first year after activation. This includes a maximum of 2 visits to remove debris, replace pretreatment mulch, and prune the vegetation. More information is provided in the Operations and Maintenance Guidelines. Some Filterra systems also contain pretreatment or outlet bays. Depending on site pollutant loading, these bays may require periodic removal of debris, however this is not included in the first year of maintenance, and would likely not be required within the first year of operation.

These services, as well as routine maintenance outside of the included first year, can be provided by certified maintenance providers listed on the Contech website. Training can also be provided to other stormwater maintenance or landscape providers.



Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Contech includes a 1-year maintenance plan with each system purchase. Annual included maintenance consists of a maximum of two (2) scheduled visits. Additional maintenance may be necessary depending on sediment and trash loading (by Owner or at additional cost). The start of the maintenance plan begins when the system is activated.

Maintenance visits are scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally required; regions with less rainfall often only require (1) one visit per annum. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Supplier and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the (maintenance) Supplier of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology. Owners should also advise other landscape or maintenance contractors to leave all maintenance to the Supplier (i.e. no pruning or fertilizing) during the first year.



Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the Supplier maintenance contract. Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra. The Supplier should be informed immediately.

Maintenance Visit Summary

Each maintenance visit consists of the following simple tasks (detailed instructions below).

1. Inspection of Filterra and surrounding area
2. Removal of tree grate and erosion control stones
3. Removal of debris, trash and mulch
4. Mulch replacement
5. Plant health evaluation and pruning or replacement as necessary
6. Clean area around Filterra
7. Complete paperwork

Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing and barricades when working in close proximity to traffic and also safety hats and shoes. A T-Bar or crowbar should be used for moving the tree grates (up to 170 lbs ea.). Most visits require minor trash removal and a full replacement of mulch. See below for actual number of bagged mulch that is required in each media bay size. Mulch should be a double shredded, hardwood variety. Some visits may require additional Filterra engineered soil media available from the Supplier.

Box Length	Box Width	Filter Surface Area (ft ²)	Volume at 3" (ft ³)	# of 2 ft ³ Mulch Bags
4	4	16	4	2
6	4	24	6	3
8	4	32	8	4
6	6	36	9	5
8	6	48	12	6
10	6	60	15	8
12	6	72	18	9
13	7	91	23	12

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.



1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes no
Damage to Box Structure	yes no
Damage to Grate	yes no
Is Bypass Clear	yes no

If yes answered to any of these observations, record with close-up photograph (numbered).



2. Removal of tree grate and erosion control stones

- Remove cast iron grates for access into Filterra box.
- Dig out silt (if any) and mulch and remove trash & foreign items.

3. Removal of debris, trash and mulch

Record on Maintenance Report the following:

Silt/Clay	yes no
Cups/ Bags	yes no
Leaves	yes no
Buckets Removed	_____



- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Distance to Top of Top Slab (inches)	_____
Inches of Media Added	_____



4. Mulch replacement

- Add double shredded mulch evenly across the entire unit to a depth of 3".
- Refer to Filterra Mulch Specifications for information on acceptable sources.
- Ensure correct repositioning of erosion control stones by the Filterra inlet to allow for entry of trash during a storm event.
- Replace Filterra grates correctly using appropriate lifting or moving tools, taking care not to damage the plant.



5. Plant health evaluation and pruning or replacement as necessary

- Examine the plant's health and replace if necessary.
- Prune as necessary to encourage growth in the correct directions

Record on Maintenance Report the following:

Height above Grate	_____	(ft)
Width at Widest Point	_____	(ft)
Health	healthy unhealthy	
Damage to Plant	yes no	
Plant Replaced	yes no	



6. Clean area around Filterra

- Clean area around unit and remove all refuse to be disposed of appropriately.



7. Complete paperwork

- Deliver Maintenance Report and photographs to appropriate location (normally Contech during maintenance contract period).
- Some jurisdictions may require submission of maintenance reports in accordance with approvals. It is the responsibility of the Owner to comply with local regulations.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Structure	Structure has visible cracks.	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.		Vault should be repaired.

Maintenance is ideally to be performed twice annually.

Filterra Inspection & Maintenance Log

Filterra System Size/Model: _____ Location: _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Height of Vegetation Above Grate	Vegetation Species	Issues with System	Comments
1/1/17	5 – 5 gal Buckets	3"	Lowe's Premium Brown Mulch	4'	Galaxy Magnolia	- Standing water in downstream structure	- Removed blockage in downstream structure

Appendix 1 – Filterra® Activation Checklist



Project Name: _____ Company: _____

Site Contact Name: _____ Site Contact Phone/Email: _____

Site Owner/End User Name: _____ Site Owner/End User Phone/Email: _____

Preferred Activation Date: _____ (provide 2 weeks minimum from date this form is submitted)

Site Designation	System Size	Final Pavement / Top Coat Complete	Landscaping Complete / Grass Emerging	Construction materials / Piles / Debris Removed	Throat Opening Measures 4" Min. Height	Plant Species Requested
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Attach additional sheets as necessary.

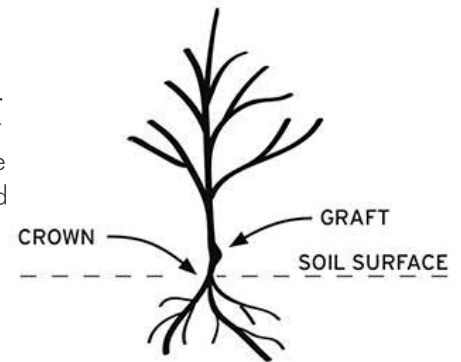
NOTE: A charge of \$500.00 will be invoiced for each Activation visit requested by Customer where Contech determines that the site does not meet the conditions required for Activation. ONLY Contech authorized representatives can perform Activation of Filterra systems; unauthorized Activations will void the system warranty and waive manufacturer supplied Activation and 1st Year Maintenance.

Signature _____ Date _____

Appendix 2 – Planting Requirements for Filterra® Systems

Plant Material Selection

- Select plant(s) as specified in the engineering plans and specifications.
- Select plant(s) with full root development but not to the point where root bound.
- Use local nursery container plants only. Ball and burlapped plants are not permitted.
- For precast Filterra systems with a tree grate, plant(s) must not have scaffold limbs at least 14 inches from the crown due to spacing between the top of the mulch and the tree grate. Lower branches can be pruned away provided there are sufficient scaffold branches for tree or shrub development.
- For precast Filterra systems with a tree grate, at the time of installation, it is required that plant(s) must be at least 6" above the tree grate opening at installation for all Filterra configurations. This DOES NOT apply to Full Grate Cover designs.
- Plant(s) shall not have a mature height greater than 25 feet.
- For standard 21" media depth, a 7 – 15 gallon container size shall be used. Media less than 21" (Filterra boxes only) will require smaller container plants.
- For precast Filterra systems, plant(s) should have a single trunk at installation, and pruning may be necessary at activation and maintenance for some of the faster growing species, or species known to produce basal sprouts.



Plant Installation

- During transport protect the plant leaves from wind and excessive jostling.
- Prior to removing the plant(s) from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
- Cut away any roots which are growing out of the container drain holes. Plants with excessive root growth from the drain holes should be rejected.
- Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively the pot can be cut away to minimize root ball disturbance.
- Remove any excess soil from above the root flare after removing plant(s) from container.
- Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
- If plant(s) have any circling roots from being pot bound, gently tease them loose without breaking them.
- If root ball has a root mat on the bottom, it should be shaved off with a knife just above the mat line.
- Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
- All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
- With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
- To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
- Plant staking may be required.

Mulch Installation

- Only mulch that has been meeting Contech Engineered Solutions' mulch specifications can be used in the Filterra system.
- Mulch must be applied to a depth of 3" evenly over the surface of the media.

Irrigation Requirements

- Each Filterra system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required. It is also important to recognize that plants which are exposed to windy areas and reflected heat from paved surfaces may need more frequent irrigation. Long term care should develop a history which is more site specific.

** Five gallons per square yard approximates 1 inch of water Therefore for a 6' by 6' Filterra approximately 20-60 gallons of water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate then calculate the time needed to irrigate the Filterra. For example, if the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6' by 6' filter.





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West Chester, OH 45069
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www.ContechES.com

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ATTACHMENT 10

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

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO:

CITY OF OCEANSIDE
OFFICE OF THE CITY CLERK
300 NORTH COAST HIGHWAY
OCEANSIDE, CA 92054

Above Space for Recorder's Use

STORMWATER FACILITIES MAINTENANCE AGREEMENT
WITH ACCESS RIGHTS AND COVENANTS

PACFICA ELEMENTARY SCHOOL

This AGREEMENT for the maintenance and repair of certain Stormwater Management Facilities is entered into between Meritage Homes (hereinafter referred to as "OWNER") and the City of Oceanside (hereinafter referred to as "CITY") for the benefit of the CITY, the OWNER, the successors in interest to the CITY or the OWNER, and the public generally.

RECITALS

A. OWNER is the owner of certain real property located in the City of Oceanside, California, more particularly described in Exhibit "A" attached hereto and made a part of (hereinafter referred to as the "PROPERTY"), and has proposed that the PROPERTY be developed as 164 unit Condominium project in accordance with applications for Tentative Map No. _____, Development Plan No. _____, Grading Plan (Permit) No _____, which are on file with the CITY. This Agreement is required as a condition of approval for such development as set forth in Resolution No _____.

B. In accordance with the City of Oceanside's Urban Runoff Regulations, Oceanside City Code, Chapter 40 (the "Stormwater Ordinance"), the City of Oceanside Subdivision Ordinance, the City of Oceanside Zoning Ordinance, The City of Oceanside Grading Ordinance and/or other ordinances or regulations of CITY which regulate land development and urban runoff, OWNER has prepared and submitted to CITY, a Stormwater Quality Mitigation Plan (hereinafter referred to as SWQMP), which is on file at the CITY. The SWQMP proposes that stormwater runoff from the PROPERTY be managed by the use of Stormwater Management Facilities which are identified in the SWQMP as "Best Management Practices" or "BMPs".

The precise location(s) and extent of the post construction BMPs are indicated in the approved SWQMP dated June 13th, 2022. The SWQMP specifies the manner and standards by which the BMPs 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 PLAN”). The approved SWQMP and O&M PLAN containing any revisions thereto are on file with the CITY.

C. The information contained in the SWQMP and OWNER’s representations that the BMPs will be maintained pursuant to the SWQMP have been relied upon by CITY in approving OWNER’s development applications. It is the purpose of this Agreement to assure that the BMPs are maintained, by creating obligations which are enforceable against the OWNER and the OWNER’s successors in interest in the PROPERTY. It is intended that these obligations be enforceable notwithstanding other provisions related to BMP maintenance which are provided by law.

AGREEMENT

NOW, THEREFORE, for consideration of (a) CITY’s approval of the above development applications and (b) the mutual covenants set forth herein, IT IS HEREBY AGREED AS FOLLOWS:

1. **Maintenance of Stormwater Management Facilities.** OWNER agrees, for itself and its successors in interest, to all or any portion of the PROPERTY, to comply in all respects with the requirements of the Stormwater Ordinance and the SWQMP with regards to the maintenance of BMPs designated in the SWQMP, and in particular agrees to perform, at its sole cost, expense and liability, the following “MAINTENANCE ACTIVITIES”: all inspections, cleaning, repairs, servicing, maintenance and other actions specified in the O&M PLAN, with respect to all of the BMPs listed at Recital “B” above, at the times and in the manner specified in the O&M PLAN. OWNER shall initiate, perform and complete all MAINTENANCE ACTIVITIES at the required time, without request or demand from CITY or any other agency. OWNER further agrees that “MAINTENANCE ACTIVITIES” shall include replacement or modification of the BMPs in the event that said BMPs do not function as intended. Replacement shall be with an identical type, size and model of BMP, except that:

- (a) The CITY Engineer may authorize substitution of an alternative BMP if he or she determines that it will function as well or better than the original BMP; and
- (b) Pursuant to Section 40.2.3(c) of the Stormwater Ordinance, if the failure of the BMP, in the judgment of the CITY Engineer indicates that the BMP in use is inappropriate or inadequate to the circumstances, the BMP must be modified or replaced with an upgraded BMP to prevent future failure.

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

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

If CITY performs any of the MAINTENANCE ACTIVITIES, after CITY has demanded that OWNER perform the same and OWNER has failed to do so within a reasonable time stated in the CITY's demand, then OWNER shall pay all of CITY's costs incurred in performing the MAINTENANCE ACTIVITIES. OWNER's obligation to pay CITY's costs of performing MAINTENANCE ACTIVITIES is a continuing obligation and shall apply whether or not CITY has utilized all or any portion of the security provided pursuant to Paragraph 5.

4. **CITY'S Access Rights.** OWNER hereby authorizes the CITY to access perpetually over, under and across all of the property, for purposes of accessing the BMPs and performing any of the MAINTENANCE ACTIVITIES specified in Paragraph 1 above. CITY shall have the right, at any time and without prior notice to OWNER, to enter upon any part of said area as may be necessary or convenient for such purposes. OWNER shall at all times maintain the PROPERTY so as to make CITY's access clear and unobstructed.

5. **Security.** OWNER has provided CITY 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 \$ 25,000.00 _____. CITY may utilize the security to provide funding for the cost of CITY performing any of the MAINTENANCE ACTIVITIES under Paragraph 3 above. CITY 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 CITY, OWNER or a Subsequent Owner, as applicable, shall deposit additional funds in the amount utilized by CITY, thereby restoring the security to the amount initially deposited by OWNER.

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

City Engineer
City of Oceanside
300 North Coast Highway
Oceanside, CA 92054

The City Engineer is also granted authority to enter into appropriate amendments to this Agreement on behalf of CITY, provided that the amendment is consistent with the purposes of this Agreement as set forth above.

7. **Defense and Indemnity.** CITY shall not be liable for, and OWNER and its successors in interest shall defend and indemnify CITY and the employees and agents of CITY (collectively "CITY PARTIES"), 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 "CLAIMS"), related to this Agreement and arising either directly or indirectly from any act, error, omission or negligence of OWNER, OWNER'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 CITY PARTIES. OWNER shall have no obligation, however, to defend or indemnify CITY PARTIES 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 CITY PARTIES. Nothing in this Agreement, CITY'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 CITY PARTIES shall have absolutely no responsibility or liability therefor unless otherwise provided by applicable law.

8. **Common Interest Developments.** If the PROPERTY is developed as a "Common Interest Development" as defined in Civil Code section 1351(c) which will include membership in or ownership of an "ASSOCIATION" as defined in Civil Code section 1351(a), then the following provisions of this Paragraph 8 shall apply during such time as the PROPERTY is encumbered by a "DECLARATION" as defined in Civil Code section 1351(h), and the Common Area, as "Common Area" is defined in Civil Code section 1351(b), of the PROPERTY is managed and controlled by the ASSOCIATION:

(a) The ASSOCIATION, through its Board of Directors, shall assume full responsibility to perform the MAINTENANCE ACTIVITIES pursuant to this Agreement, and shall undertake all actions and efforts necessary to accomplish the MAINTENANCE ACTIVITIES, including but not limited to, levying regular or special assessments against each member of the ASSOCIATION sufficient to

provide funding for the MAINTENANCE ACTIVITIES, 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 ASSOCIATION 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 ASSOCIATION shall take all action authorized by the DECLARATION or California law to collect delinquent assessments, including but not limited to, the recording and foreclosure of assessment liens.

(b) No provision of the DECLARATION, nor any other governing document of the ASSOCIATION 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 PROPERTY in any manner which would impair the functioning of the BMPs to manage drainage or stormwater runoff as described in the SWQMP. In the event of any conflict between the terms of this Agreement and the DECLARATION or other ASSOCIATION governing documents, the provisions of this Agreement shall prevail.

9. **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 OWNER and CITY, shall be deemed to be for the benefit of all persons owning any interest in the PROPERTY (including the interest of CITY 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 PROPERTY, who shall be deemed to have consented to and become bound by all the provisions hereof.

10. **OWNER's Continuing Responsibilities Where Work Commenced or Permit Obtained.** Notwithstanding any other provision of this Agreement, no transfer or conveyance of the PROPERTY or any portion thereof shall in any way relieve OWNER of or otherwise affect OWNER's responsibilities for installation or maintenance of BMPs which may have arisen under the ordinances or regulations of CITY referred to in Recital B above, or other federal, state or CITY laws, on account of OWNER 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 CITY and by OWNER or OWNER's successor(s) in interest. This Agreement may be terminated and OWNER and the PROPERTY released from the covenants set forth herein, by a Release which CITY may execute if it determines that another mechanism will assure the ongoing maintenance of the BMPs 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:

OWNER(s):

CITY OF OCEANSIDE:

By: _____
Name/Title

By: _____
City Engineer

Date: _____

Date: _____

By: _____
Name/Title

APPROVED AS TO FORM:

Date: _____

City Attorney

NOTARY ACKNOWLEDGEMENT OF OWNER'S SIGNATURE(S) MUST BE ATTACHED

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:

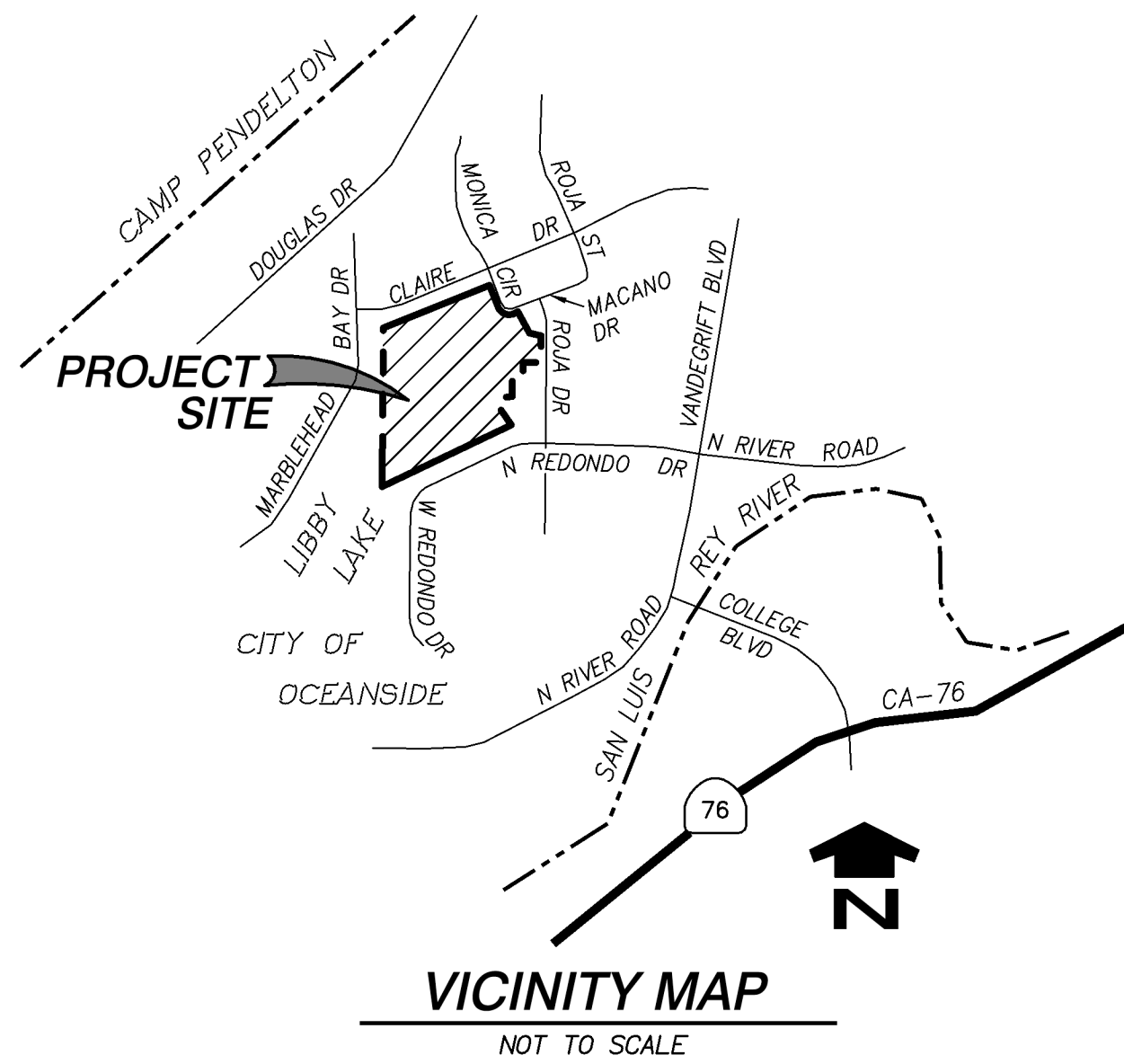
- Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- Details and specifications for construction of structural BMP(s)
- Signage indicating the 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. Broucher photocopies are not allowed.



TENTATIVE MAP/ DEVELOPMENT PLAN

PACIFICA ELEMENTARY SCHOOL

CITY OF OCEANSIDE, CALIFORNIA



LEGEND

PROJECT BOUNDARY	
EXISTING TOPO CONTOUR	
BUILDING NUMBER	BLDG #2
UNIT NUMBER	
FINISH FLOOR ELEVATION	FF=100.75
PAD ELEVATION	P=100.00
SLOPE (2:1 MAX)	
DAYLIGHT LINE	
PERCENT OF GRADE	2%
ST. ELEVATION	350.4
6" PVC PRIVATE SEWER STUB W/ CLEAN OUT *UNLESS SHOWN OTHERWISE ON PLAN	
8" PVC PRIVATE SEWER MAIN W/ MANHOLE *UNLESS SHOWN OTHERWISE ON PLAN	
8" PVC PUBLIC SEWER MAIN W/ MANHOLE	
4" PVC PUBLIC SEWER FORCE MAIN W/ MANHOLE	
SEWER INVERT ELEVATION	343.4 IE
4" PVC WATER MAIN *UNLESS SHOWN OTHERWISE ON PLAN	
8" PVC PRIVATE WATER FIRE	
WATER METER	
BACKFLOW PREVENTER	
FIRE HYDRANT	
18" PRIVATE HDPE STORM DRAIN* *UNLESS SHOWN OTHERWISE ON PLAN	
18" PRIVATE BYPASS HDPE STORM DRAIN* *UNLESS SHOWN OTHERWISE ON PLAN	
24" PUBLIC BYPASS HDPE STORM DRAIN* *UNLESS SHOWN OTHERWISE ON PLAN	
RETAINING WALL* *PER COASTAL STANDARD DRAWINGS	
TOP OF WALL ELEVATION/ FINISH GRADE	TW/FG
ST. LIGHT	
EASEMENT LINE	
TRANSFORMER	
DRAINAGE SWALE PATH	
BROW DITCH	
ACCESSIBLE UNIT	

PARKING SUMMARY

USE	PARKING STANDARD	# OF UNITS	REQUIRED	PROVIDED
ATTACHED RESIDENTIAL	2 spaces / two or more bedroom units	164	328	328
GUEST PARKING	Minimum amount equal to 1 Space plus 20% of the total dwelling units	164	34	61
SUBTOTAL		164	362	389

DISABLED ACCESS REQUIREMENTS:

Total Parking Spaces Provided	Min. Accessible Parking Spaces Required	# Accessible Parking Spaces Provided	Min. Van Accessible Parking Spaces Required	# Van Accessible Parking Spaces Provided
61	3	3	1	1

SHEET INDEX

- SHEET 1 - TITLE SHEET
- SHEET 2 - SECTIONS / DETAILS
- SHEET 3 - SITE DETAILS
- SHEET 4 - EXISTING CONDITIONS
- SHEET 5 - TM / DEVELOPMENT PLAN
- SHEET 6 - TM / DEVELOPMENT PLAN
- SHEET 7 - OPEN SPACE & BUILDING TYPES
- SHEET 8 - BOUNDARIES & ENCUMBRANCES
- SHEET 9 - ACCESSIBLE PATHS
- SHEET 10 - SITE SETBACKS



CIVIL ENGINEER

HUNSAKER & ASSOCIATES, SAN DIEGO, INC
9707 WAPLES STREET
SAN DIEGO, CA 92121
(858) 558-4500

OPEN SPACE

SEE SHEET 7

BASIS OF BEARING

THE BASIS OF BEARINGS IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM NAD 83, ZONE 6, EPOCH 2011.00 AND IS BASED ON THE GRID BEARING BETWEEN STATION NO. 1055 AND STATION NO. 1065, PER RECORD OF SURVEY 21787. I.E. N23°01'30"E

TOPOGRAPHY SOURCE

VERTICAL RELIEF SHOWN HEREON WAS PRODUCED BY FIELD METHODS COMBINED WITH AERIAL PHOTOGRAPHY BY R. J. LUNG AND ASSOCIATES FLOWN ON OCTOBER 13, 2021. VERTICAL DATUM BASED ON COH88, STATION 1055 PER CITY OF OCEANSIDE SURVEY CONTROL NETWORK AS ESTABLISHED BY R.O.S. NO. 21787. 2.5" BRASS DISK IN CURB INLET WITH TRIANGLE/PUNCH STAMPED "LS 7854". ELEV. 119.39'

ALISA S. VIALPANDO R.C.E. 47945 DATE

LEGAL DESCRIPTION

SEE SHEET 8

EASEMENTS

SEE SHEET 8

CONDOMINIUM NOTE

THIS IS A MAP OF A CONDOMINIUM PROJECT AS DEFINED IN SECTION 4125 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT. THE MAXIMUM NUMBER OF RESIDENTIAL UNITS 164.

PRELIMINARY SET

GENERAL NOTES

- EXISTING GROSS SUBDIVISION AREA: 14.546 AC
- PROPOSED SUBDIVISION AREA: 14.231 AC
- NET PROJECT AREA: 10.231 AC
- TOTAL NUMBER OF EXISTING LOTS: 2
- TOTAL NUMBER OF PROPOSED LOTS: 1
- TOTAL NUMBER OF UNITS: 164 (ATTACHED UNITS)
- ASSESSOR PARCEL NUMBER: 157-070-42, 122-190-19 & 122-190-22
- EXISTING GENERAL PLAN: CIVIC INSTITUTIONAL
- PROPOSED GENERAL PLAN: MD8-R MEDIUM DENSITY-B RESIDENTIAL
- EXISTING ZONING: PUBLIC/SEMI-PUBLIC
- PROPOSED ZONING: PD PLANNED DEVELOPMENT
- PROPOSED DENSITY: 12.8 DU/AC (164 DU's/12.82 AC)
- TOPOGRAPHIC CONTOUR INTERVAL: 2 FOOT
- MAXIMUM SLOPE GRADIENT: 2:1
- AREA/PERCENT OF TOTAL BUILDING COVERAGE: 3.23 AC. (22.2%)
- AREA/PERCENT OF PROJECT IN STREETS, DRIVEWAYS & DRIVE AISLES: 2.51 AC (17.3%)
- AREA/PERCENT OF SIDEWALKS: 1.08 AC. (7.4%)
- AREA/PERCENT OF LANDSCAPING: 7.73 AC (53.1%)
- GRADING QUANTITIES: RAW CUT: 28,645 C.Y. RAW FILL: 28,645 C.Y.
- GRADED AREA: 10.231 AC

DESIGN NOTES

- ALL STREET DESIGN SHALL CONFORM TO THE CITY OF OCEANSIDE DESIGN STANDARDS AS REQUIRED BY THE CITY ENGINEER.
- EASEMENTS SHALL BE PROVIDED, REMOVED OR RELOCATED AS REQUIRED BY THE CITY ENGINEER.
- ALL PROPOSED UTILITIES SHALL BE UNDERGROUND AND EASEMENTS PROVIDED.
- GEOTECHNICAL INVESTIGATION PREPARED BY: GEOTEK, DATED DECEMBER 11, 2021.
- THE DEVELOPER SHALL INSTALL STREET LIGHTS PER THE CITY OF OCEANSIDE ENGINEERING DEPARTMENT TRAFFIC DIVISION, THE STREET LIGHT DESIGN MANUAL AND THE CITY OF OCEANSIDE STANDARD DRAWING NO. M-4. STREET LIGHT LOCATIONS MAY VARY IN FINAL DESIGN.
- ALL RETAINING WALLS IN EXCESS OF 4 FEET SHALL BE PLANTABLE.
- THE PROPOSED SEWER SHALL BE INSTALLED PER CITY OF OCEANSIDE STANDARDS. ALL ON-SITE SEWER IS PRIVATE.
- THE PROPOSED WATER SHALL BE INSTALLED PER CITY OF OCEANSIDE STANDARDS. ALL ON-SITE WATER IS PRIVATE.
- FINISH GRADES ARE APPROXIMATE AND SUBJECT TO CHANGE IN FINAL DESIGN.
- MODEL UNITS MAY BE BUILT PRIOR TO FINAL MAP WITH APPROVAL FROM THE CITY ENGINEER AND PLANNING DIRECTOR.
- ALL FUTURE DRIVEWAYS AND GEOMETRIC DESIGN SHALL BE DESIGNED IN COMPLIANCE WITH THE CITY OF OCEANSIDE ENGINEERS DESIGN STANDARDS.
- THE PRESENT OR FUTURE OWNER/DEVELOPER SHALL INDEMNIFY AND SAVE CITY OF OCEANSIDE, ITS OFFICERS, AGENTS, AND EMPLOYEES HARMLESS FROM ANY AND ALL LIABILITIES, CLAIMS ARISING FROM ANY FLOODING THAT OCCURS ON THIS SITE AND FLOODING THAT MAYBE DISCHARGED FROM THIS SITE INTO ADJACENT PROPERTIES.
- ALL SIDEWALK AND PATHWAYS SHALL BE ADA COMPLIANT.

APPLICANT

MLC HOLDINGS, INC. / MERITAGE HOMES
JOHANNA CROOKER
5 PETERS CANYON ROAD
SUITE 310
IRVINE, CA 92606

JOHANNA CROOKER DATE
APPLICANT

OWNER

OCEANSIDE UNIFIED SCHOOL DISTRICT
2111 MISSION AVE
OCEANSIDE, CA 92058
(760) 966-4000

OWNER DATE

PREPARED BY:

HUNSAKER & ASSOCIATES
SAN DIEGO, INC.
PLANNING: 9707 Waples Street
ENGINEERING: San Diego, CA 92121
SURVEYING: PH(858)558-4500 - FX(858)558-1414

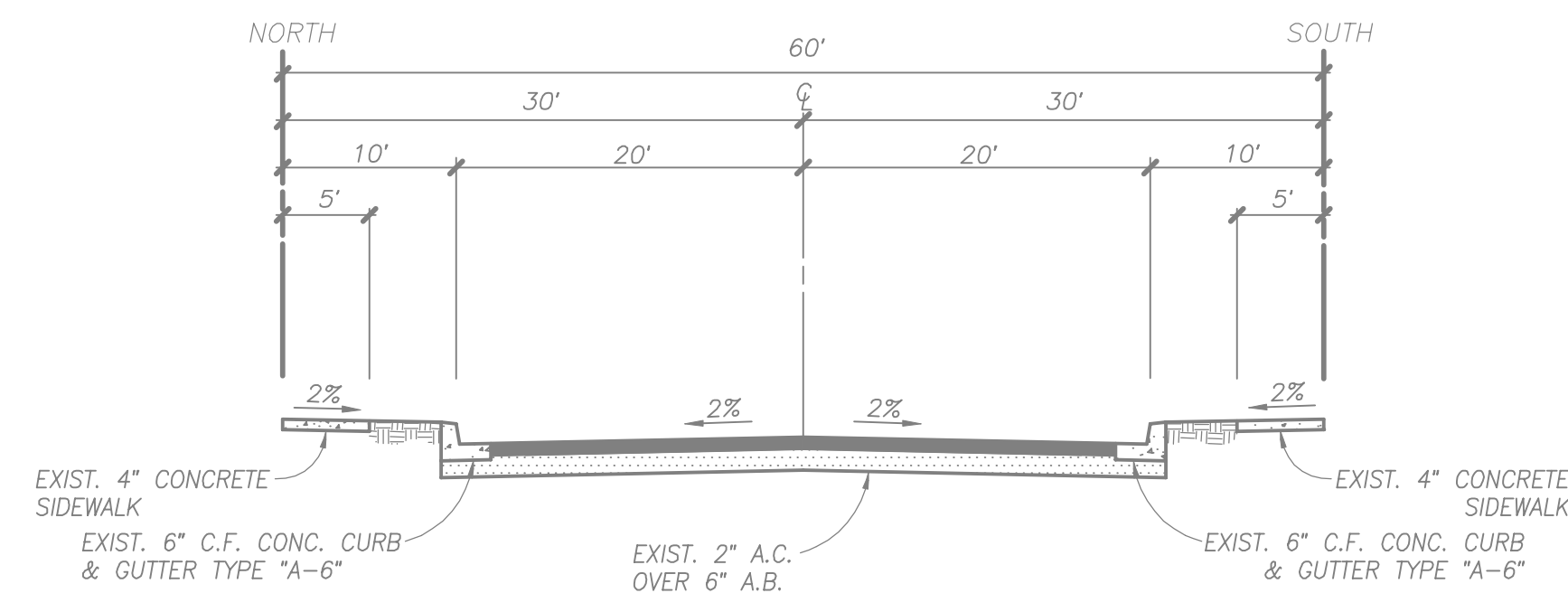
NO.	REVISIONS	DATE	BY
1	1st SUBMITTAL	06/17/2022	H&A
2	2nd SUBMITTAL	11/23/2022	H&A
3	3rd SUBMITTAL	03/29/2023	H&A
4			
5			
6			
7			
8			
9			
10			

TENTATIVE MAP / DEVELOPMENT PLAN
PACIFICA ELEMENTARY SCHOOL
CITY OF OCEANSIDE, CALIFORNIA

SHEET
1
OF
10

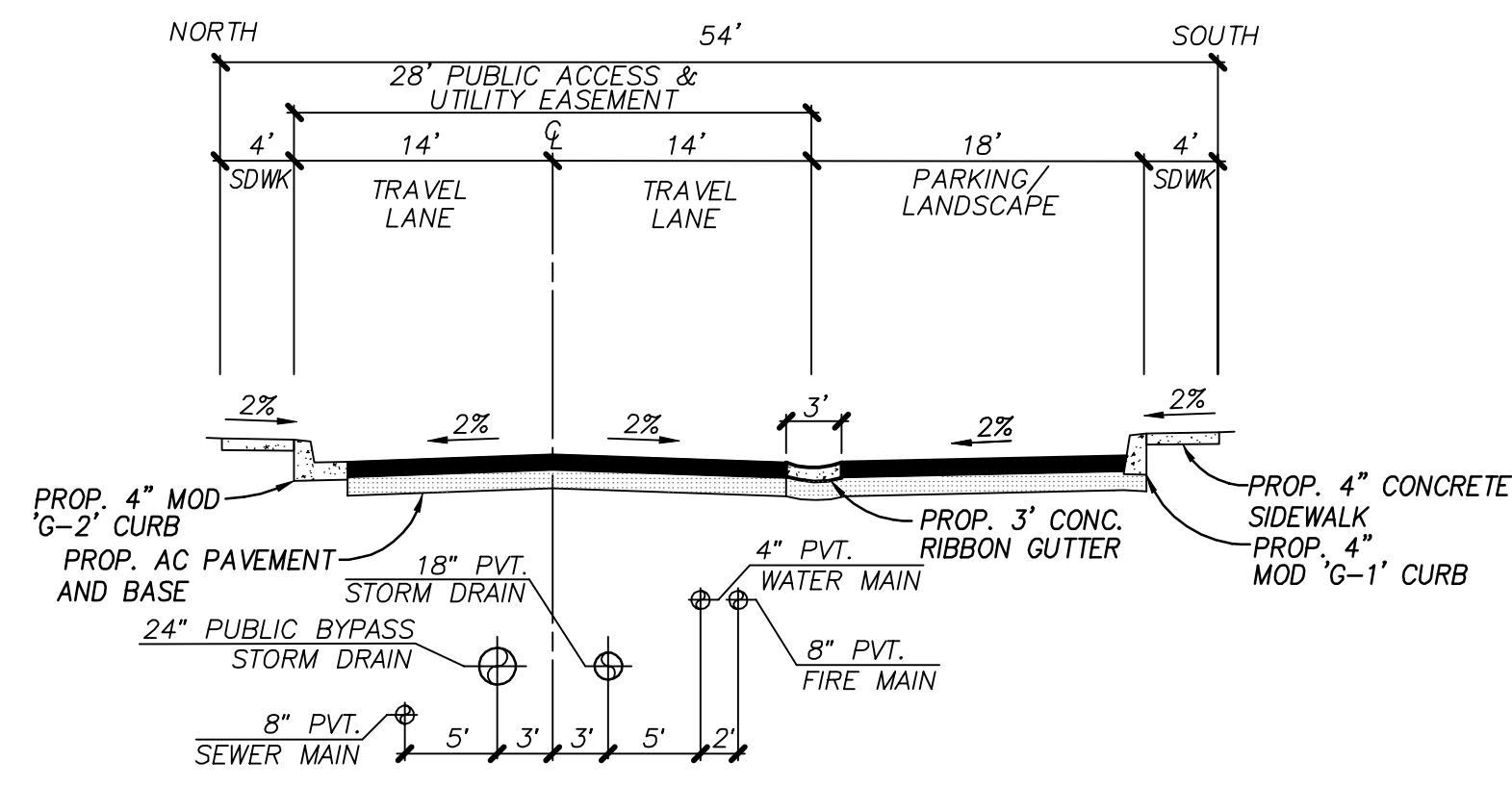
PACIFICA ELEMENTARY SCHOOL, OCEANSIDE

WD # 3087-0010



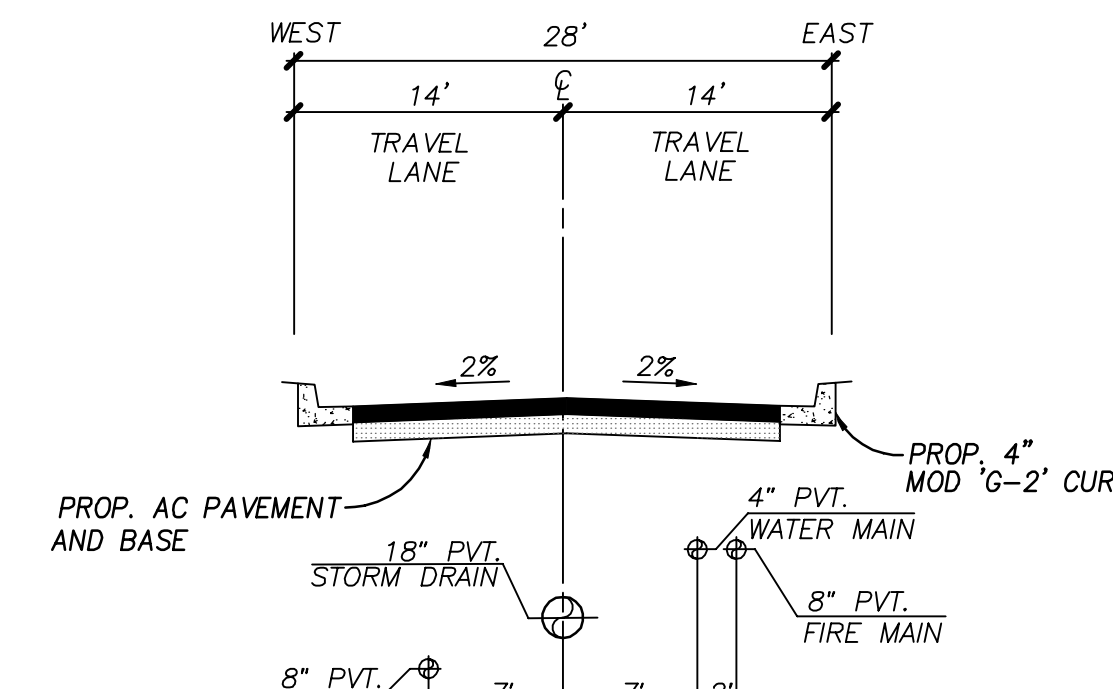
EXISTING MACARIO DRIVE

NOT TO SCALE



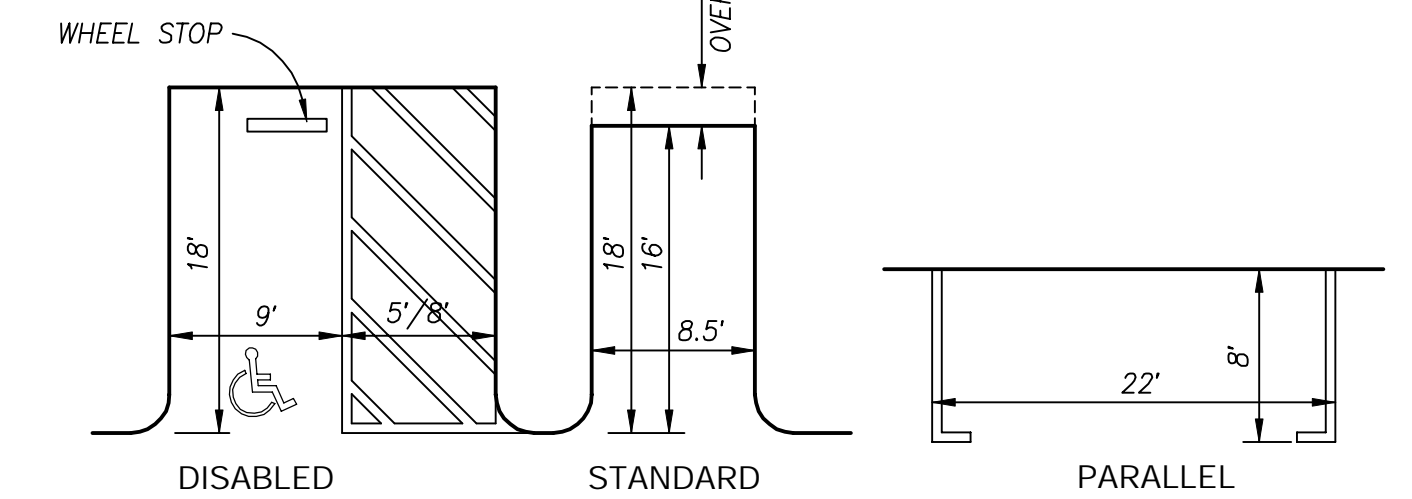
PROPOSED PORTION OF PVT. DRIVE 'A'
(FROM PVT. DRIVE 'B' TO PVT. DRIVE 'E')

NOT TO SCALE



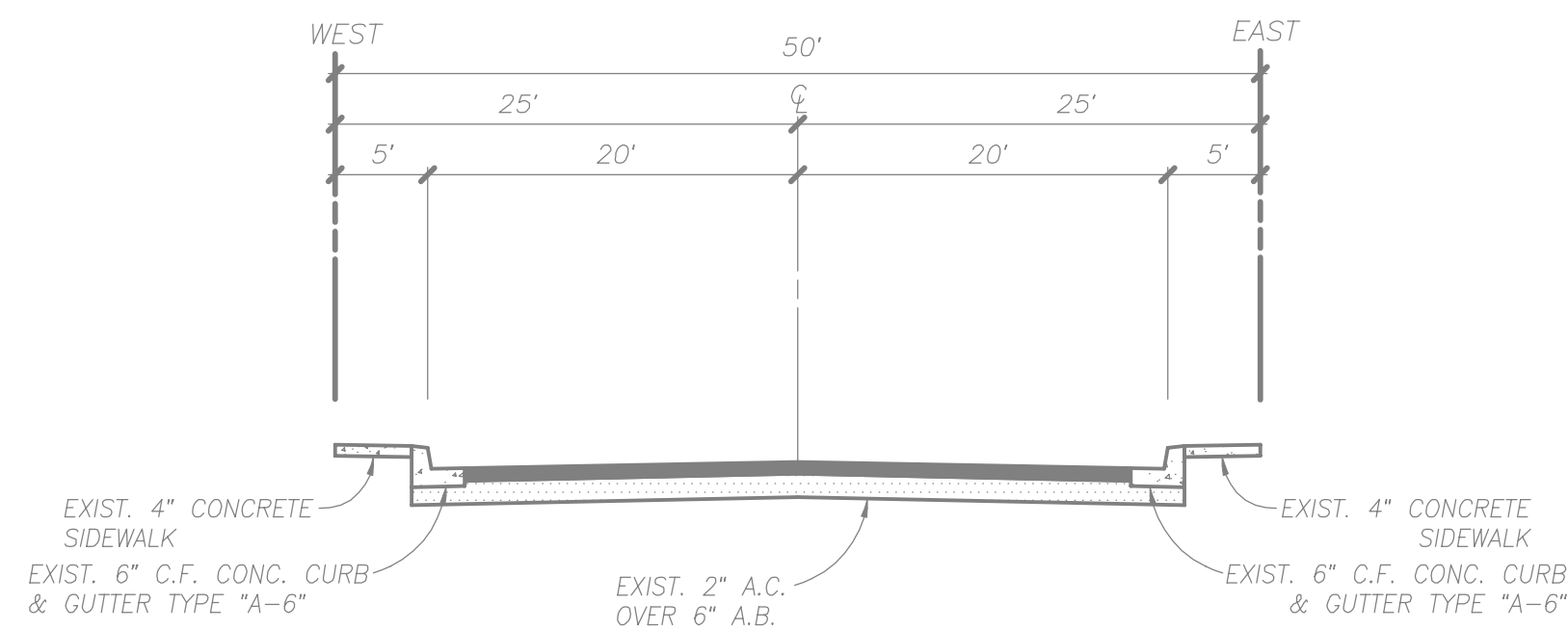
PROPOSED PVT. DRIVE 'E'

NOT TO SCALE



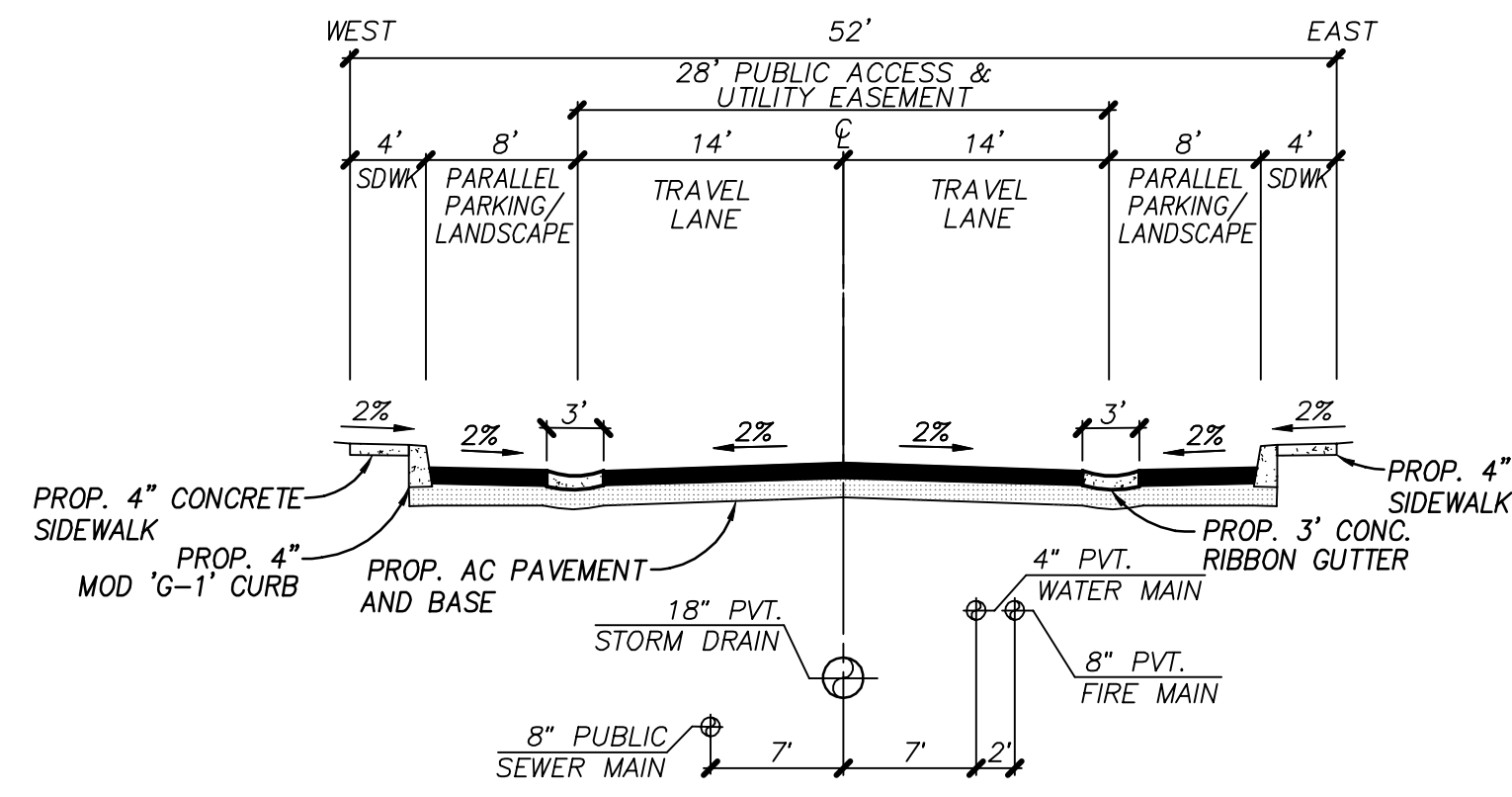
TYPICAL PARKING DETAIL

NOT TO SCALE



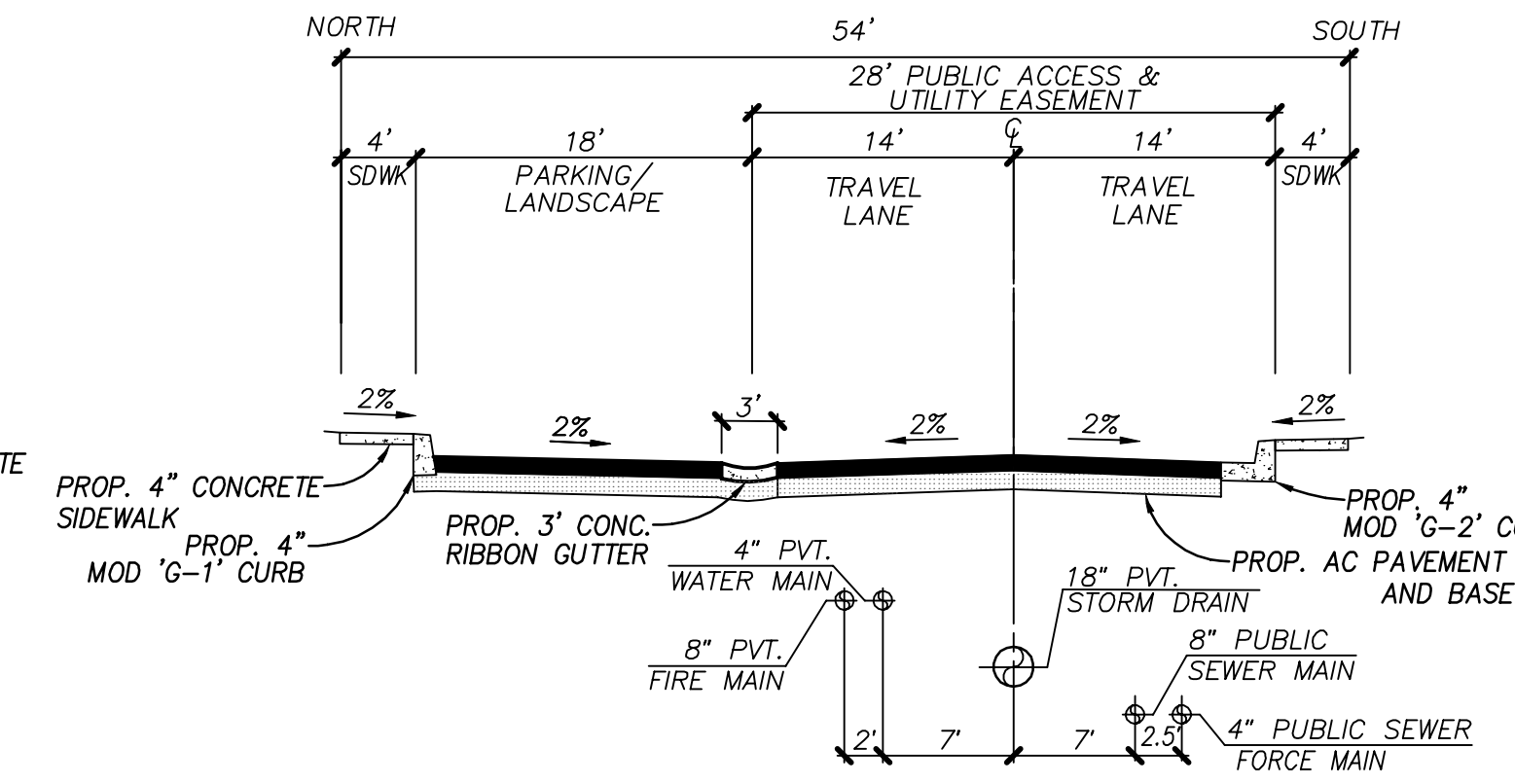
EXISTING MONICA CIRCLE

NOT TO SCALE



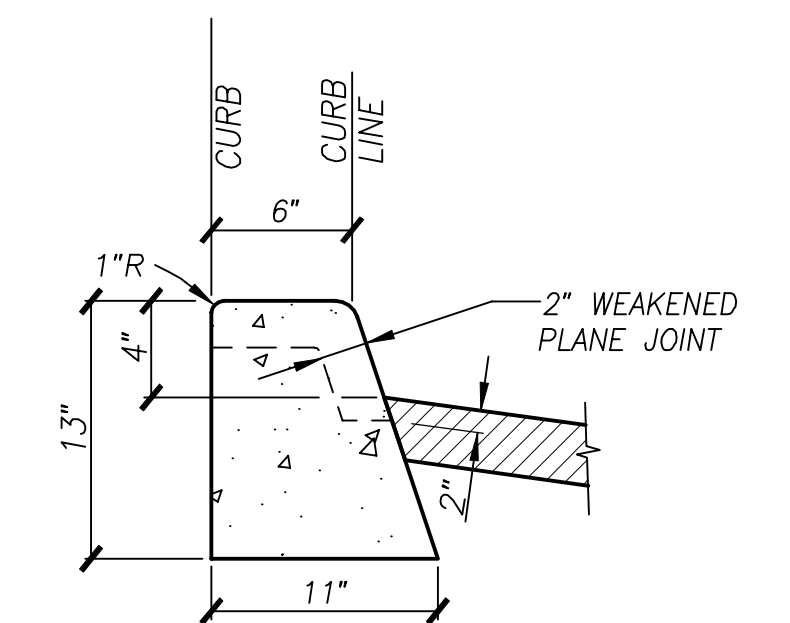
PROPOSED PVT. DRIVE 'B'

NOT TO SCALE



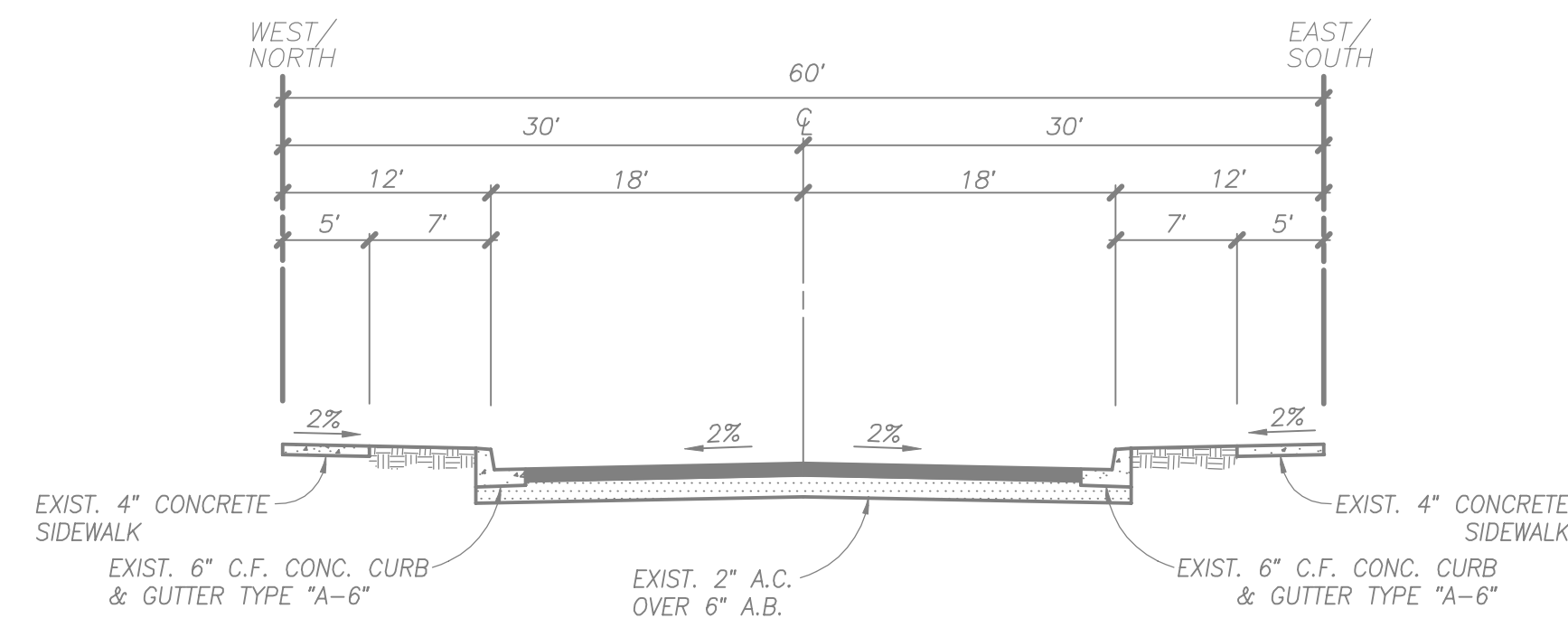
PROPOSED PVT. DRIVE 'F'

NOT TO SCALE



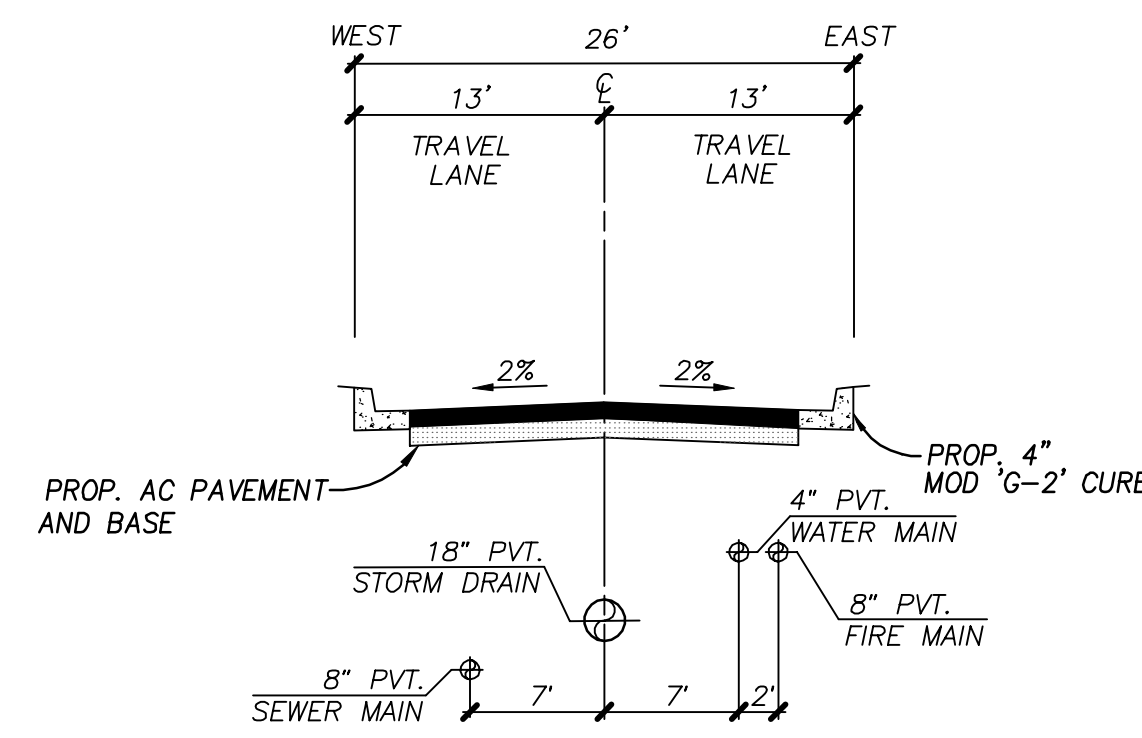
4" MOD. 'G-1' CURB

NOT TO SCALE



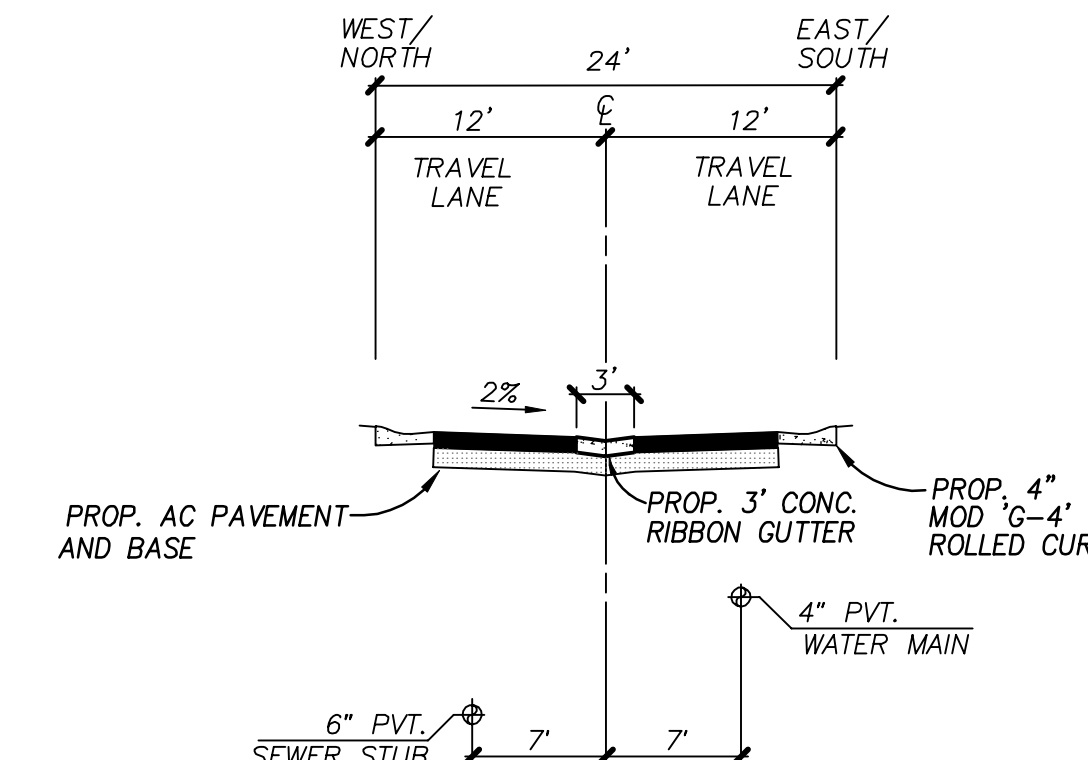
EXISTING ROJA DRIVE & MALAGA DRIVE

NOT TO SCALE



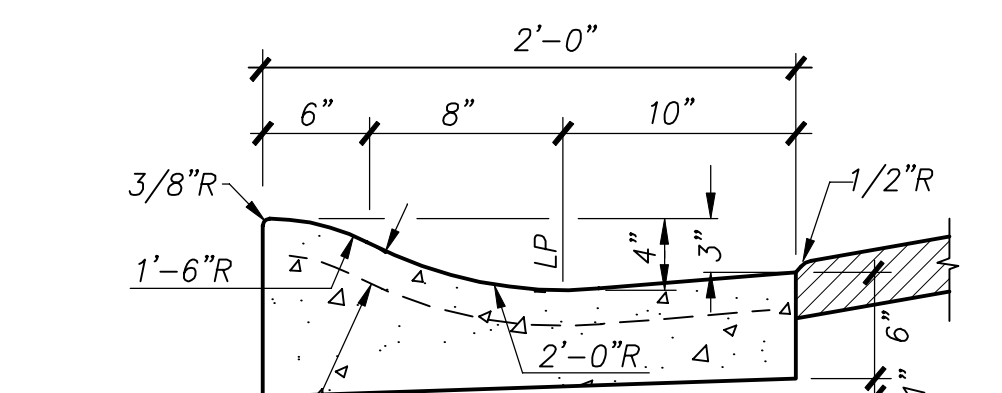
PROPOSED PVT. DRIVES 'C' & 'D'

NOT TO SCALE



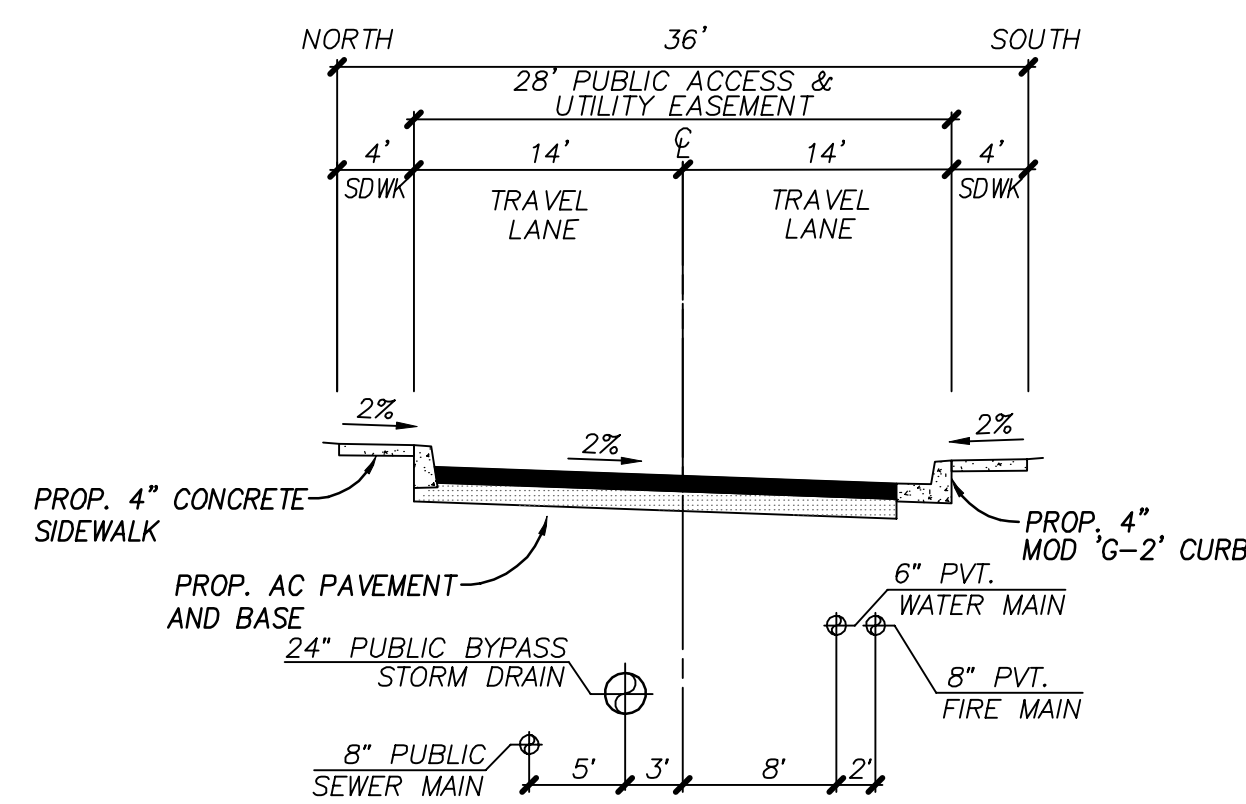
PROPOSED PVT. DRIVES 'H', 'I', 'J', 'K', 'L' & 'M'

NOT TO SCALE



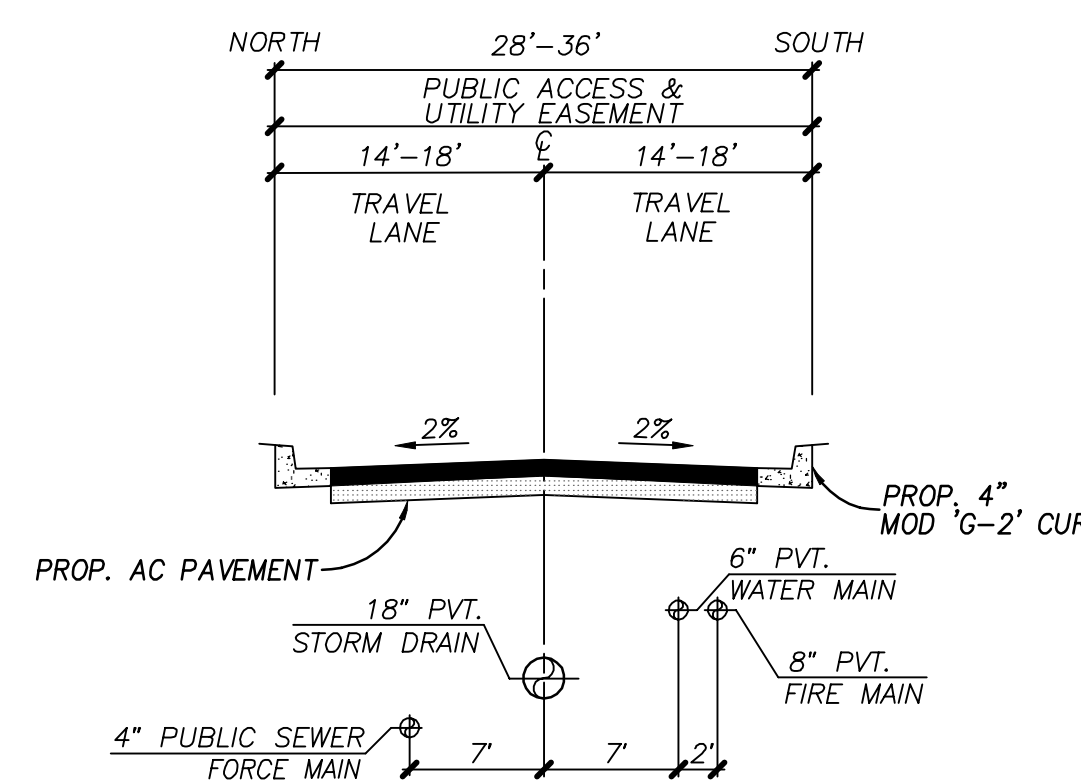
4" MOD. 'G-4' ROLLED CURB

NOT TO SCALE



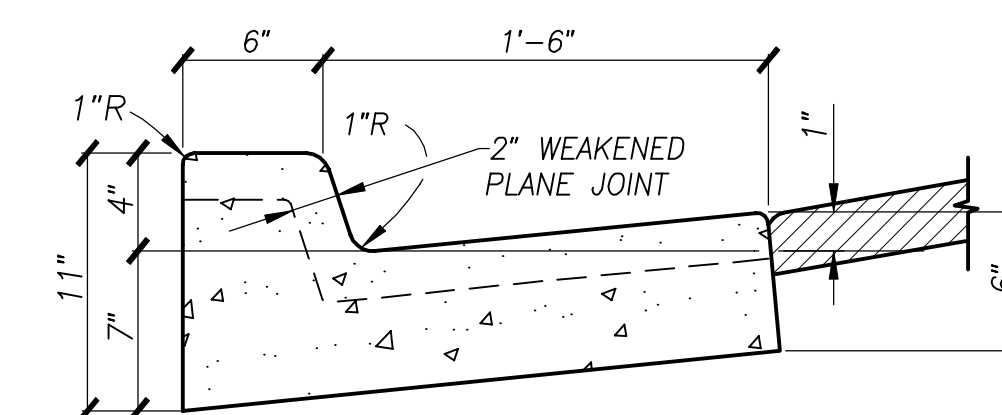
PROPOSED PORTION OF PVT. DRIVE 'A'
(FROM PROJECT ENTRY TO PVT. DRIVE 'B')

NOT TO SCALE



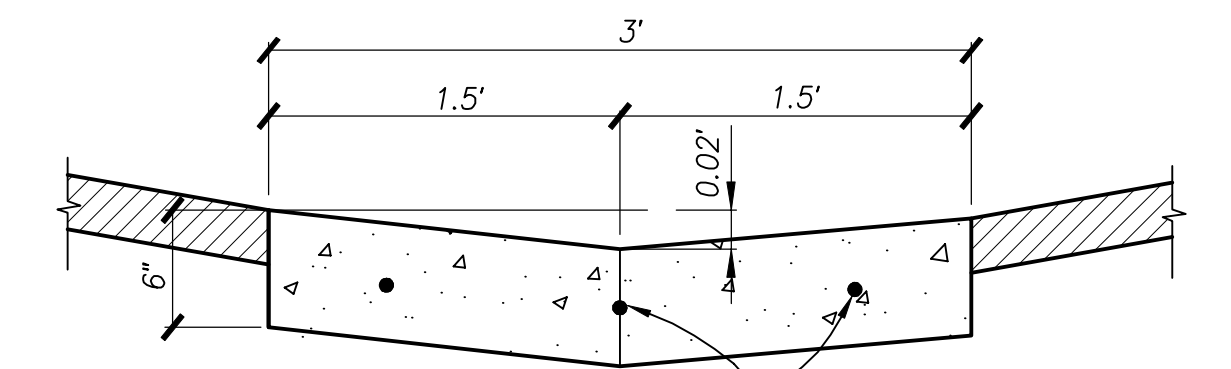
PROPOSED PVT. DRIVE 'D'
CONNECTION TO EX. MALAGA DR.

NOT TO SCALE



4" MOD. 'G-2' CURB & GUTTER

NOT TO SCALE



3' CONCRETE RIBBON GUTTER

NOT TO SCALE

PREPARED BY:



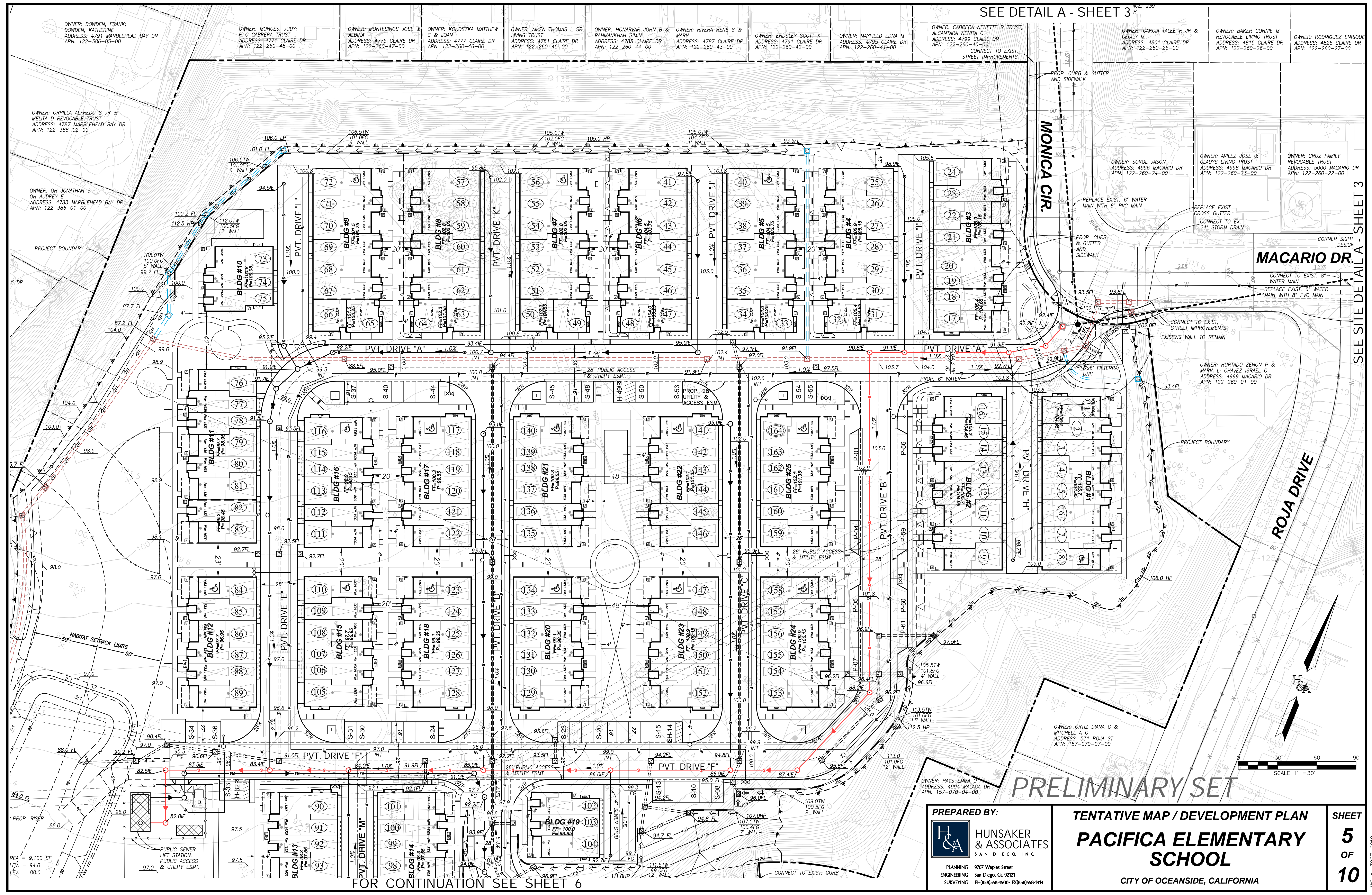
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(650)558-4500 - FX(650)558-1414

SECTIONS / DETAILS
PACIFICA ELEMENTARY SCHOOL
CITY OF OCEANSIDE, CALIFORNIA

SHEET
2
OF
10

PRELIMINARY SET

SEE DETAIL A - SHEET 3



OWNER: DOWDEN, FRANK;
DOWDEN, KATHERINE
ADDRESS: 4701 MARBLEHEAD BAY DR
APN: 122-386-03-00

OWNER: MONGES, JUDY;
R G CABRERA TRUST
ADDRESS: 4771 CLAIRE DR
APN: 122-260-48-00

OWNER: MONTESINOS JOSE &
ALBINA
ADDRESS: 4775 CLAIRE DR
APN: 122-260-47-00

OWNER: KOKOSZKA MATTHEW
C & JOAN
ADDRESS: 4777 CLAIRE DR
APN: 122-260-46-00

OWNER: AIKEN THOMAS L SR
LIVING TRUST
ADDRESS: 4781 CLAIRE DR
APN: 122-260-45-00

OWNER: HONARIYAR JOHN B &
RAHAWKHAH SHIM
ADDRESS: 4785 CLAIRE DR
APN: 122-260-44-00

OWNER: RIVERA RENE S &
MARIA
ADDRESS: 4787 CLAIRE DR
APN: 122-260-43-00

OWNER: ENDSLEY SCOTT K
ADDRESS: 4791 CLAIRE DR
APN: 122-260-42-00

OWNER: MAYFIELD EDNA M
ADDRESS: 4795 CLAIRE DR
APN: 122-260-41-00

OWNER: CABRERA NENETTE R TRUST;
ALCANTARA NENITA C
ADDRESS: 4799 CLAIRE DR
APN: 122-260-40-00

OWNER: GARCIA TALEE R JR &
GECILY M
ADDRESS: 4801 CLAIRE DR
APN: 122-260-25-00

OWNER: BAKER CONNIE M
REVOCABLE LIVING TRUST
ADDRESS: 4815 CLAIRE DR
APN: 122-260-26-00

OWNER: RODRIGUEZ ENRIQUE
ADDRESS: 4825 CLAIRE DR
APN: 122-260-27-00

OWNER: ORPILLA ALFREDO S JR &
MELITA D REVOCABLE TRUST
ADDRESS: 4787 MARBLEHEAD BAY DR
APN: 122-386-02-00

OWNER: OH JONATHAN S;
OH AUDREY E
ADDRESS: 4783 MARBLEHEAD BAY DR
APN: 122-386-01-00

OWNER: SOKOL JASON
ADDRESS: 4998 MACARIO DR
APN: 122-260-24-00

OWNER: AVILEZ JOSE &
GLADYS LIVING TRUST
ADDRESS: 4815 CLAIRE DR
APN: 122-260-23-00

OWNER: CRUZ FAMILY
REVOCABLE TRUST
ADDRESS: 5000 MACARIO DR
APN: 122-260-22-00

OWNER: HURTADO ZENON P &
MARIA L; CHAVEZ ISRAEL C
ADDRESS: 4999 MACARIO DR
APN: 122-260-01-00

OWNER: ORTIZ DIANA C &
MITCHELL A C
ADDRESS: 531 ROJA ST
APN: 157-070-07-00

OWNER: HAYS EMMA O
ADDRESS: 4904 MALAGA DR
APN: 157-070-04-00

REA = 9,100 SF
LEV. = 94.0
LEV. = 88.0

PUBLIC SEWER
LIFT STATION
PUBLIC ACCESS
& UTILITY ESMT.

FOR CONTINUATION SEE SHEET 6

PREPARED BY:



HUNSAKER & ASSOCIATES
SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(605)558-4500 - FX(605)558-1414

TENTATIVE MAP / DEVELOPMENT PLAN

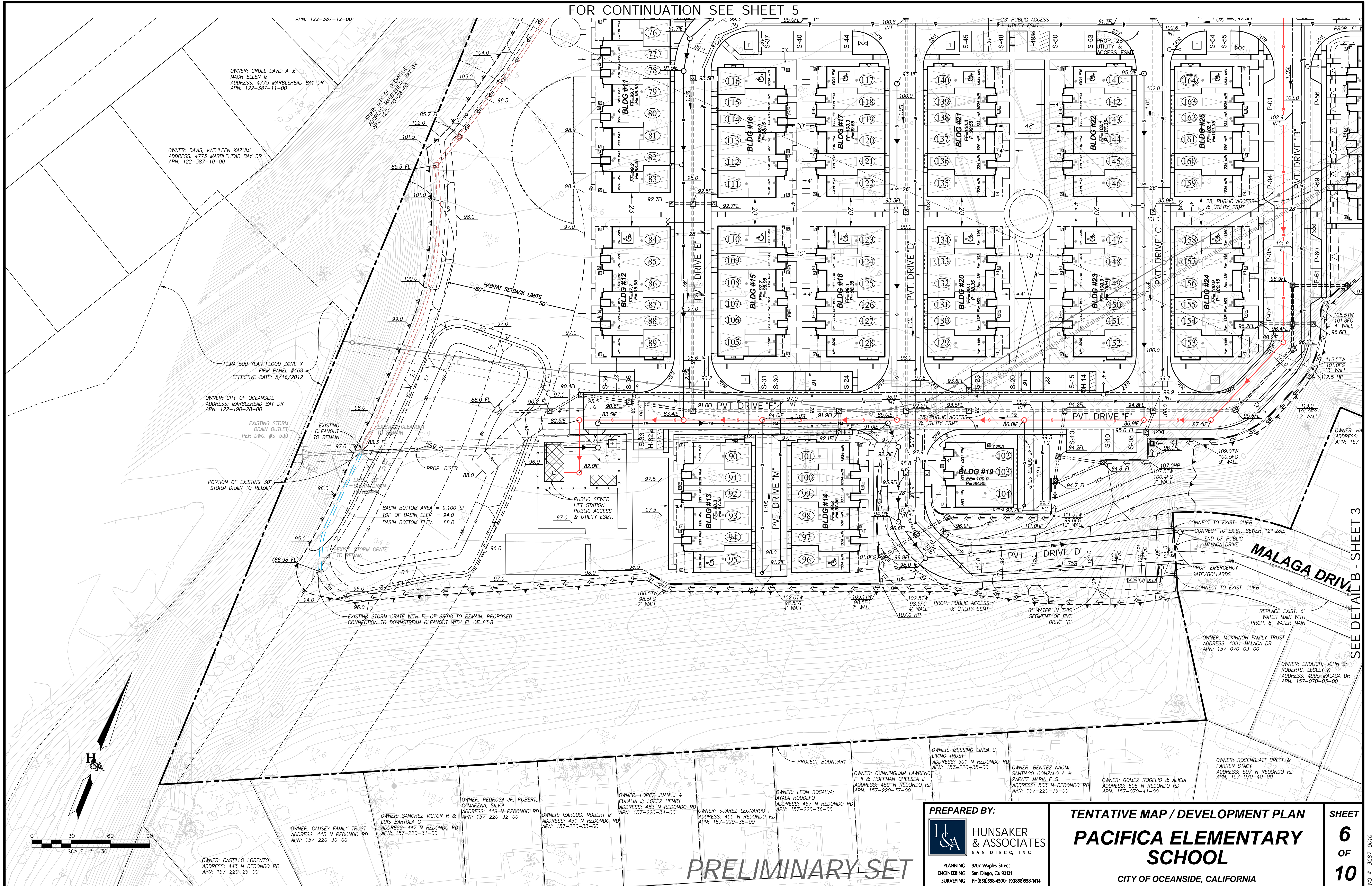
PACIFICA ELEMENTARY SCHOOL

CITY OF OCEANSIDE, CALIFORNIA

SHEET **5** OF **10**

NO # 3087-0010

FOR CONTINUATION SEE SHEET 5



OWNER: GRULL DAVID A & MACH ELLEN M
 ADDRESS: 4775 MARBLEHEAD BAY DR
 APN: 122-387-11-00

OWNER: DAVIS, KATHLEEN KAZUMI
 ADDRESS: 4773 MARBLEHEAD BAY DR
 APN: 122-387-10-00

OWNER: CITY OF OCEANSIDE
 ADDRESS: MARBLEHEAD BAY DR
 APN: 122-190-28-00

OWNER: CAUSEY FAMILY TRUST
 ADDRESS: 445 N REDONDO RD
 APN: 157-220-30-00

OWNER: CASTILLO LORENZO
 ADDRESS: 443 N REDONDO RD
 APN: 157-220-29-00

OWNER: SANCHEZ VICTOR R & LUIS BARTOLA G
 ADDRESS: 447 N REDONDO RD
 APN: 157-220-31-00

OWNER: PEDROSA JR, ROBERT; CAMARENA, SILVIA
 ADDRESS: 449 N REDONDO RD
 APN: 157-220-32-00

OWNER: MARCUS, ROBERT M
 ADDRESS: 451 N REDONDO RD
 APN: 157-220-33-00

OWNER: LOPEZ JUAN J & EULALIA J; LOPEZ HENRY
 ADDRESS: 453 N REDONDO RD
 APN: 157-220-34-00

OWNER: SUAREZ LEONARDO I
 ADDRESS: 455 N REDONDO RD
 APN: 157-220-35-00

OWNER: LEON ROSALVA; AYALA RODOLFO
 ADDRESS: 457 N REDONDO RD
 APN: 157-220-36-00

OWNER: CUNNINGHAM LAWRENCE P II & HOFFMAN CHELSEA J
 ADDRESS: 459 N REDONDO RD
 APN: 157-220-37-00

OWNER: MESSING LINDA C LIVING TRUST
 ADDRESS: 501 N REDONDO RD
 APN: 157-220-38-00

OWNER: BENITEZ NAOMI; SANTIAGO GONZALO A & ZARATE MARIA E S
 ADDRESS: 503 N REDONDO RD
 APN: 157-220-39-00

OWNER: GOMEZ ROGELIO & ALICIA
 ADDRESS: 505 N REDONDO RD
 APN: 157-070-41-00

OWNER: ROSENBLATT BRETT & PARKER STACY
 ADDRESS: 507 N REDONDO RD
 APN: 157-070-40-00

OWNER: ENDLICH, JOHN D; ROBERTS, LESLEY K
 ADDRESS: 4995 MALAGA DR
 APN: 157-070-03-00

SEE DETAIL B - SHEET 3

PREPARED BY:

HUNSAKER & ASSOCIATES
 SAN DIEGO, INC
 PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(605)558-4500 - FX(605)558-1414

TENTATIVE MAP / DEVELOPMENT PLAN
PACIFICA ELEMENTARY SCHOOL
 CITY OF OCEANSIDE, CALIFORNIA

SHEET 6 OF 10

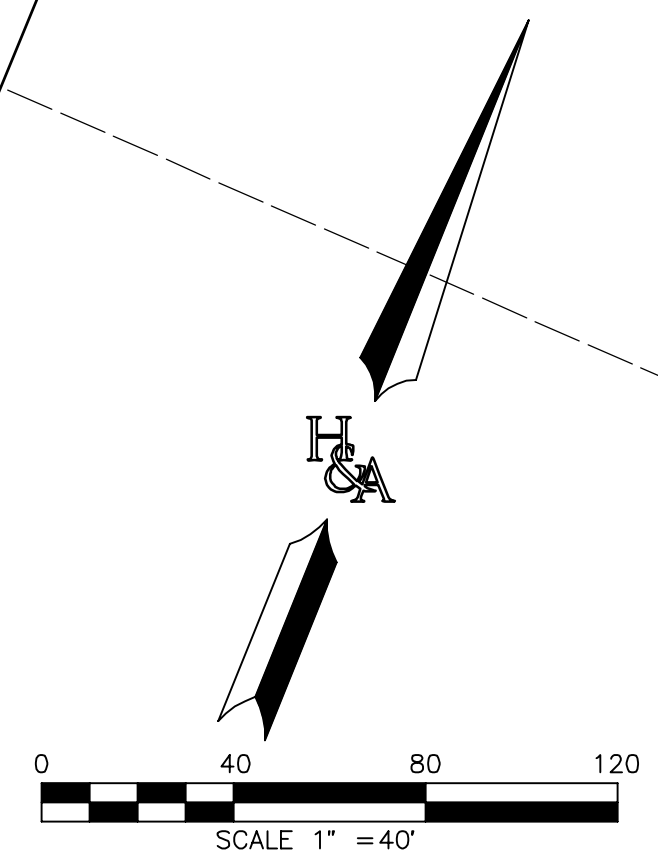
PRELIMINARY SET

BUILDING TYPES & PRIVATE OPEN SPACE				
BUILDING TYPE	COLOR	PRIVATE OS (SF)	# BLDGS	TOTAL
3-PLEX	■	400	2	800
6-PLEX	■	900	13	11,700
8-PLEX	■	1,250	4	5,000
8-PLEX W/SIDE GARAGE	■	1,100	6	6,600
		TOTAL	25	24,100



64,400 SF INDICATES LIMITS OF COMMON USEABLE OPEN SPACE AREAS PROVIDED

USEABLE OPEN SPACE REQUIRED FOR PROJECT	49,200 S.F.
<small>Comprised of Private & Common Open Space Areas PD Plan requires 300 S.F. / Unit @ 164 Units</small>	
COMMON USEABLE OPEN SPACE PROVIDED	64,400 S.F.
PRIVATE USEABLE OPEN SPACE PROVIDED	24,100 S.F.
<small>Includes Private Yards, Patios, Balconies and Terraces</small>	
TOTAL USEABLE OPEN SPACE PROVIDED	88,500 S.F.



PRELIMINARY SET

PREPARED BY:
 **HUNSAKER & ASSOCIATES**
 SAN DIEGO, INC.
 PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(658)558-4500 - FX(658)558-1414

OPEN SPACE & BUILDING TYPES
PACIFICA ELEMENTARY SCHOOL
 CITY OF OCEANSIDE, CALIFORNIA

SHEET
7
 OF
10

EXCEPTIONS

1. GENERAL AND SPECIAL TAXES AND ASSESSMENTS FOR THE FISCAL YEAR 2022-2023 ARE EXEMPT. AFFECTS: PARCELS 1 AND 2
 2. INTENTIONALLY DELETED
 3. THE LIEN OF SUPPLEMENTAL TAXES, IF ANY, ASSESSED PURSUANT TO CHAPTER 3.5 COMMENCING WITH SECTION 75 OF THE CALIFORNIA REVENUE AND TAXATION CODE.
- THE FOLLOWING MATTERS AFFECT PARCEL 1:
4. A CERTIFICATE OF INTEREST IN REAL PROPERTY, CERTIFICATE NO. 663 FILED BY THE DIRECTOR OF FINANCE OF THE STATE OF CALIFORNIA BY VIRTUE OF FUNDS APPORTIONED UNDER THE STATE SCHOOL BUILDING AID LAW OF 1952 (CM.10, DIV. 14, RD. CODE) AGAINST OCEANSIDE UNION SCHOOL DISTRICT RECORDED JANUARY 24, 1964 AS INSTRUMENT NO. 1964-14792 OFFICIAL RECORDS.
 5. AN EASEMENT FOR SANITARY SEWER AND INCIDENTAL PURPOSES, RECORDED APRIL 24, 1972 AS INSTRUMENT NO. 1972-101357 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE, A MUNICIPAL CORPORATION AFFECTS: AS DESCRIBED THEREIN TO BE OUTCLAIMED
 6. AN EASEMENT FOR STORM DRAIN FACILITIES AND INCIDENTAL PURPOSES, RECORDED APRIL 24, 1972 AS INSTRUMENT NO. 1972-101358 OF OFFICIAL RECORDS. IN FAVOR OF: CITY OF OCEANSIDE AFFECTS: AS DESCRIBED THEREIN TO BE OUTCLAIMED
 7. AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS AND INCIDENTAL PURPOSES, RECORDED NOVEMBER 28, 1972 AS INSTRUMENT NO. 1972-317614 OF OFFICIAL RECORDS. IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY AFFECTS: AS DESCRIBED THEREIN TO BE OUTCLAIMED
 8. A LEASE DATED SEPTEMBER 1, 1997, EXECUTED BY OCEANSIDE UNIFIED SCHOOL DISTRICT AS LESSOR AND OCEANSIDE UNIFIED SCHOOL DISTRICT SCHOOL FACILITIES CORPORATION AS LESSEE, RECORDED SEPTEMBER 9, 1997 AS INSTRUMENT NO. 1997-0435456 OF OFFICIAL RECORDS. DEFECTS, LIENS, ENCUMBRANCES OR OTHER MATTERS AFFECTING THE LEASEHOLD ESTATE, WHETHER OR NOT SHOWN BY THE PUBLIC RECORDS.
 9. A TRUST AGREEMENT BY AND BETWEEN OCEANSIDE UNIFIED SCHOOL DISTRICT SCHOOL FACILITIES CORPORATION AND CHASE TRUST COMPANY OF CALIFORNIA, AS TRUSTEE DATED SEPTEMBER 1, 1997 AND DISCLOSED BY THE SITE LEASE RECORDED SEPTEMBER 09, 1997 AS INSTRUMENT NO. 1997-0435456 OFFICIAL RECORDS.
 10. AN EASEMENT FOR PUBLIC UTILITIES, INGRESS AND EGRESS AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 09, 2004 AS INSTRUMENT NO. 2004-0858474 OF OFFICIAL RECORDS. IN FAVOR OF: SAN DIEGO GAS AND ELECTRIC COMPANY, A CORPORATION AFFECTS: AS DESCRIBED THEREIN THE LOCATION OF THE EASEMENT CANNOT BE DETERMINED FROM RECORD INFORMATION. TO BE OUTCLAIMED
 - 10A. THE LACK OF A RIGHT OF ACCESS TO AND FROM THE LAND.
- THE FOLLOWING MATTERS AFFECT PARCEL 2:
11. THE RIGHT TO CONSTRUCT A DAM OR RESERVOIR ON WARNER'S RANCH IN SAN DIEGO COUNTY, AND THE RIGHT TO PERPETUALLY COLLECT AND IMPOUND ANY AND ALL WATERS OF THE SAN LUIS REY RIVER AND DIVERT SAID WATERS SO COLLECTED AND IMPOUNDED FROM THE SAN LUIS REY WATERSHED INTO OTHER WATERSHEDS AND PART OF SAN DIEGO COUNTY GIVEN TO ED FLETCHER, BY INSTRUMENT EXECUTED JANUARY 22, 1912 BY HUB FOUSSAT (OR H. FOUSSAT) RECORDED JANUARY 24, 1912 IN BOOK 546, PAGE 288, OF DEEDS.
 12. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "WATER AGREEMENT" RECORDED OCTOBER 17, 1963 AS INSTRUMENT NO. 1963-186423 OF OFFICIAL RECORDS.
 13. THE EFFECT OF A MAP PURPORTING TO SHOW THE LAND AND OTHER PROPERTY, FILED IN MAP NO. 6402 OF RECORD OF SURVEYS.
 14. INTENTIONALLY DELETED
 - 14A. THE TERMS AND PROVISIONS CONTAINED IN THE DOCUMENT ENTITLED "MEMORANDUM OF AGREEMENT" RECORDED MAY 26, 2022 AS INSTRUMENT NO. 2022-0224911 OF OFFICIAL RECORDS.
 - 14B. A DEED OF TRUST TO SECURE AN ORIGINAL INDEBTEDNESS OF \$1,500,000.00 RECORDED MAY 26, 2022 AS INSTRUMENT NO. 2022-0224912 OF OFFICIAL RECORDS. DATED: MAY 29, 2022 TRUSTOR: OCEANSIDE UNIFIED SCHOOL DISTRICT TRUSTEE: FIRST AMERICAN TITLE COMPANY, A CALIFORNIA CORPORATION BENEFICIARY: MLC HOLDINGS, INC., AN ARIZONA CORPORATION
 15. NOTICE OF PENDENCY OF ACTION RECORDED SEPTEMBER 30, 2022 AS INSTRUMENT NO. 2022-0384473 OF OFFICIAL RECORDS. COURT: SUPERIOR COURT OF THE STATE OF CALIFORNIA COUNTY OF SAN DIEGO CASE NO.: (BLANK) PLAINTIFF: MLC HOLDINGS, INC., AS CONDITIONAL ASSIGNEE OF OCEANSIDE UNIFIED SCHOOL DISTRICT DEFENDANT: SPROUL CONSTRUCTION CORPORATION, ET-AL PURPOSE: A REAL PROPERTY CLAIM ON TITLE
- THE FOLLOWING MATTERS AFFECT BOTH PARCELS:
16. RIGHTS OF THE PUBLIC IN AND TO THAT PORTION OF THE LAND LYING WITHIN ANY ROAD, STREET, ALLEY OR HIGHWAY.
 17. WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT SHOWN BY THE PUBLIC RECORDS.
 18. RIGHTS OF PARTIES IN POSSESSION.

TITLE REFERENCE

THIS SURVEY IS BASED ON THE PRELIMINARY TITLE REPORT ISSUED BY FIRST AMERICAN TITLE COMPANY AS ORDER NO. NHSC-6685058 (jd) DATED NOVEMBER 7, 2022.

LEGAL DESCRIPTION

REAL PROPERTY IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

PARCEL 1: (APNS: 157-070-42-00 AND 122-190-19-00)

THAT PORTION OF LOT 2 IN SECTION 4, TOWNSHIP 11 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, TOGETHER WITH A PORTION OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 33, TOWNSHIP 10 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, ACCORDING TO UNITED STATES GOVERNMENT SURVEY, ALL BEING IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND MORE PARTICULARLY DESCRIBED AS A WHOLE AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF MISSION VALLEY ESTATES UNIT NO. 2, ACCORDING TO MAP NO. 5176, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, MAY 15, 1963, BEING ALSO A POINT ON THE NORTH-SOUTH CENTER LINE OF SAID SECTION 4; THENCE ALONG SAID NORTH-SOUTH CENTER LINE NORTH 00°02'37" WEST, 645.03 FEET TO THE NORTH QUARTER CORNER OF SAID SECTION 4, BEING ALSO THE SOUTH QUARTER CORNER OF SAID SECTION 33; THENCE ALONG THE WESTERLY LINE OF THE SOUTHEAST QUARTER OF SAID SECTION 33, NORTH 00°14'52" WEST, 243.33 FEET; THENCE NORTH 67°39'05" EAST, 615.51 FEET; THENCE SOUTH 27°56'06" EAST, 128.60 FEET; THENCE SOUTH 56°09'13" EAST, 24.47 FEET TO A POINT ON THE ARC OF A NON-TANGENT 62.00 FOOT RADIUS CURVE, CONCAVE NORTHEASTERLY, A RADIAL LINE OF SAID CURVE BEARS NORTH 56°09'13" WEST TO SAID POINT; THENCE COUNTER-CLOCKWISE ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 21°57'44" A DISTANCE OF 238.02 FEET; THENCE SOUTH 29°10'15" EAST, 115.00 FEET; THENCE SOUTH 77°16'24" EAST, 67.36 FEET TO THE NORTHWESTERLY CORNER OF ROJA DRIVE AS SHOWN ON MISSION VALLEY ESTATES UNIT NO. 4, ACCORDING TO MAP NO. 5496, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 13, 1964; THENCE ALONG THE BOUNDARY OF SAID MAP NO. 5496 AS FOLLOWS: SOUTH 00°07'41" EAST, (RECORD - SOUTH 00°09'46" EAST) 150.00 FEET; SOUTH 89°52'19" WEST, (RECORD - SOUTH 89°50'14" WEST) 100.00 FEET; SOUTH 00°07'41" EAST, (RECORD - SOUTH 00°09'46" EAST) 90.00 FEET; SOUTH 89°52'19" WEST, (RECORD - SOUTH 89°50'14" WEST) 60.00 FEET; SOUTH 00°07'41" EAST, (RECORD - SOUTH 00°09'46" EAST) 100.33 FEET TO A POINT ON THE ARC OF A NON-TANGENT 230.00 FOOT RADIUS CURVE, CONCAVE SOUTHEASTERLY, A RADIAL LINE OF SAID CURVE BEARS NORTH 03°10'42" WEST, (RECORD - NORTH 03°12'47" WEST) TO SAID POINT; SOUTHWESTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 22°49'21" A DISTANCE OF 91.62 FEET; SOUTH 26°00'03" EAST, (RECORD - SOUTH 26°02'08" EAST) 80.00 FEET; AND SOUTH 35°08'07" EAST, (RECORD - SOUTH 35°10'12" EAST) 101.28 FEET TO THE MOST NORTHERLY CORNER OF LOT 260 OF MISSION VALLEY ESTATES UNIT NO. 3, ACCORDING TO MAP NO. 5246, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, AUGUST 26, 1963; THENCE ALONG THE NORTHWESTERLY LINE OF SAID LOT 260, SOUTH 63°59'10" WEST, (RECORD - SOUTH 63°57'52" WEST) 92.29 FEET TO THE MOST NORTHERLY CORNER OF LOT 259 OF SAID MAP NO. 5176; THENCE ALONG THE NORTHWESTERLY LINE OF SAID MAP NO. 5176, SOUTH 63°59'10" WEST, 709.39 FEET (RECORD - SOUTH 63°57'52" WEST, 710.32 FEET) TO THE POINT OF BEGINNING.

PARCEL 2: (APN: 122-190-22-00)

LOT 6 AND THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 33, TOWNSHIP 10 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF OCEANSIDE, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF, EXCEPTING FROM SAID LOT 6 ANY PORTION THEREOF UNDERLYING THE WATERS OF THAT CERTAIN POND OR LAKE AS SURVEYED AND SHOWN ON THE OFFICIAL PLAT THEREOF.

ALSO EXCEPTING FROM SAID LOT 6 A STRIP OF LAND 15 FEET IN WIDTH, ADJOINING THE MEANDER LINE OF SAID POND OR LAKE ON THE SOUTHEAST, AS CONVEYED TO JOHN JOHNSTON, JR., BY DEED FROM HUBERT FOUSSAT AND WIFE, DATED MARCH 17, 1912 AND RECORDED IN BOOK 555, PAGE 23, OF DEEDS.

ALSO EXCEPTING FROM THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 33 THAT PORTION LYING WITHIN MISSION VALLEY ESTATES UNIT NO. 4, ACCORDING TO MAP THEREOF NO. 5496, FILED IN THE OFFICE OF COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 13, 1964.

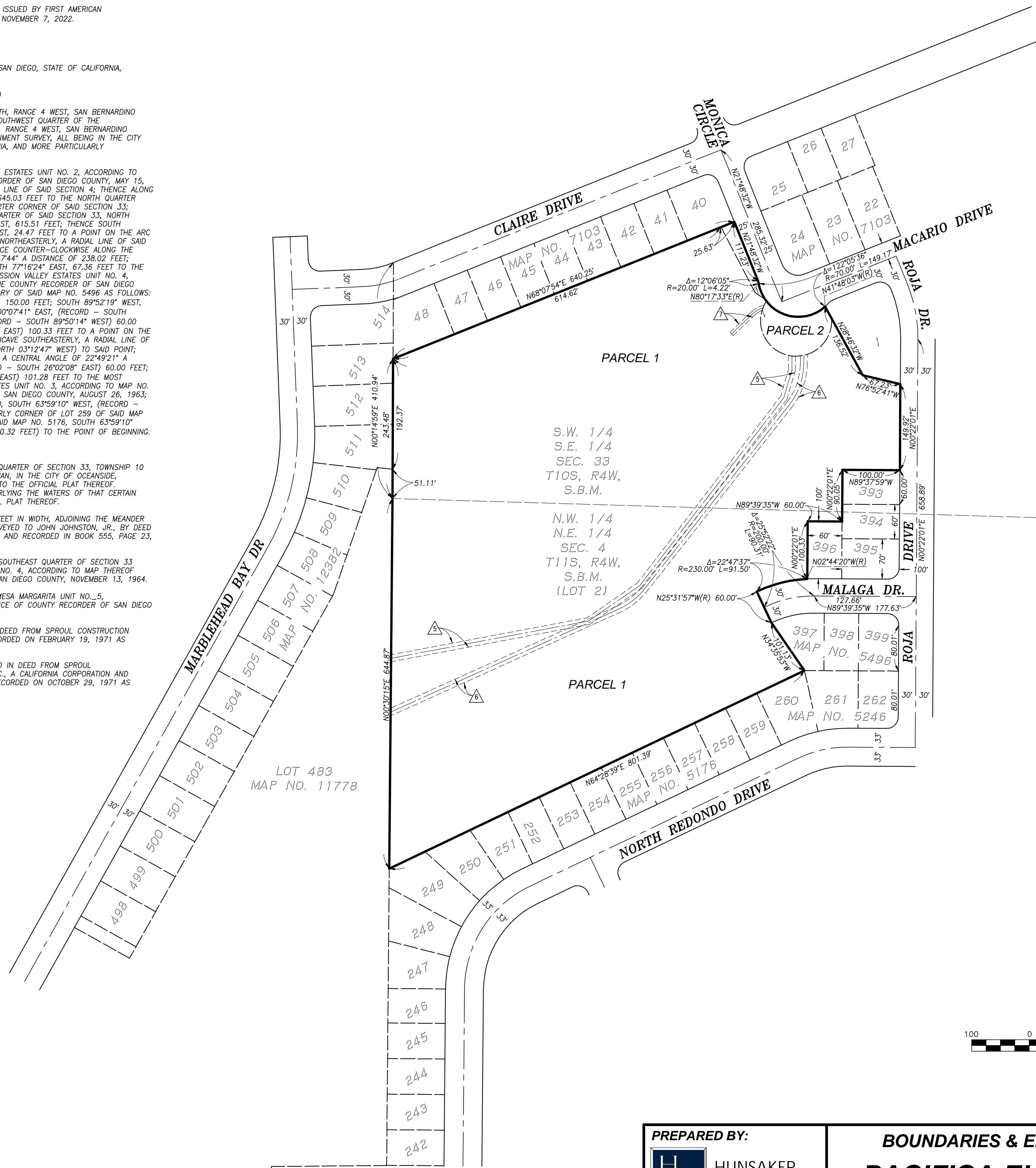
ALSO EXCEPTING THEREFROM THAT PORTION LYING WITHIN MESA MARGARITA UNIT NO. 5, ACCORDING TO MAP THEREOF NO. 6230, FILED IN THE OFFICE OF COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 21, 1968.

ALSO EXCEPTING THEREFROM THAT PORTION DESCRIBED IN DEED FROM SPROUL CONSTRUCTION CORPORATION TO OCEANSIDE UNION SCHOOL DISTRICT, RECORDED ON FEBRUARY 19, 1971 AS INSTRUMENT NO. 31900, OF OFFICIAL RECORDS.

ALSO EXCEPTING THEREFROM, ALL THAT PORTION DESCRIBED IN DEED FROM SPROUL CONSTRUCTION CORPORATION TO HILL TOP DEVELOPERS, INC., A CALIFORNIA CORPORATION AND CHALLENGE BUILDERS, INC., A CALIFORNIA CORPORATION, RECORDED ON OCTOBER 29, 1971 AS INSTRUMENT NO. 250639, OF OFFICIAL RECORDS.

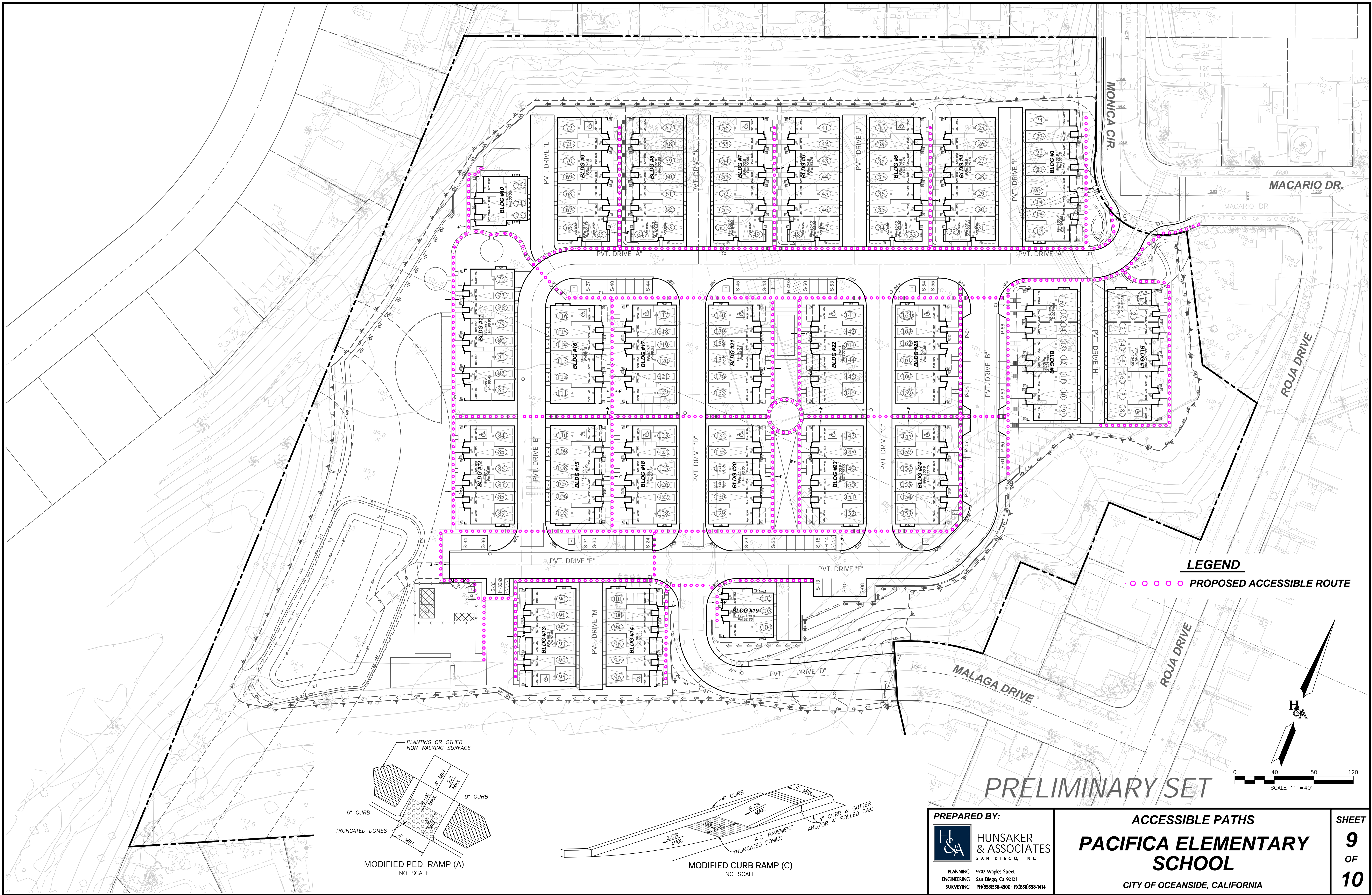
ASSESSOR'S PARCEL NUMBERS

157-070-42-00
122-190-19-00
122-190-22-00

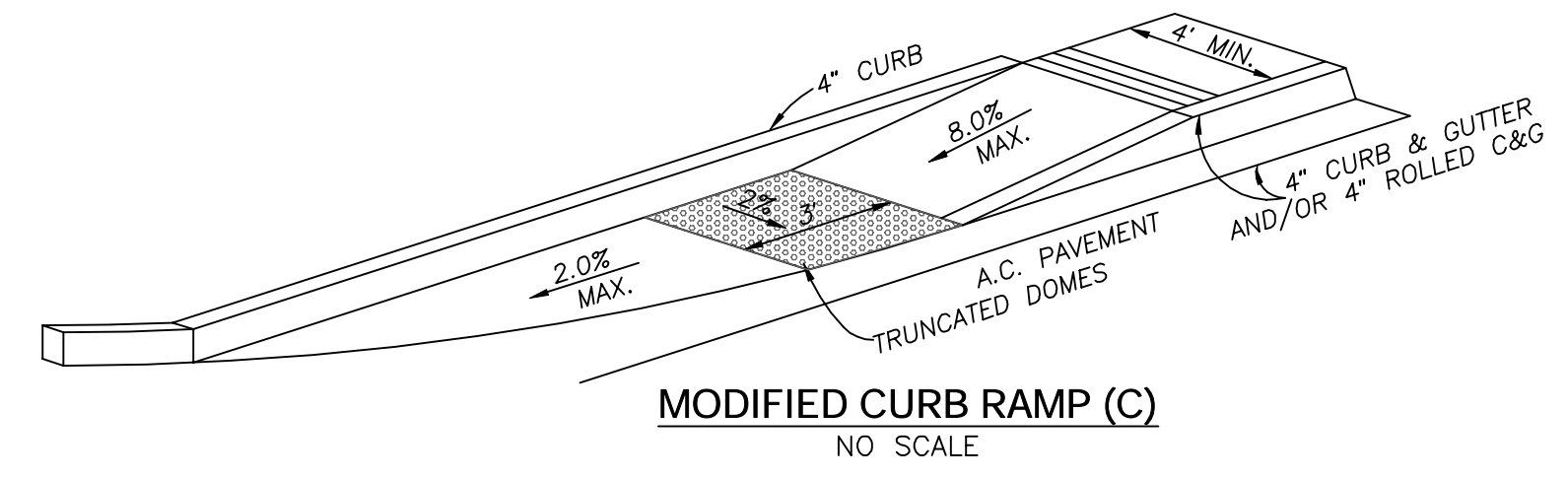
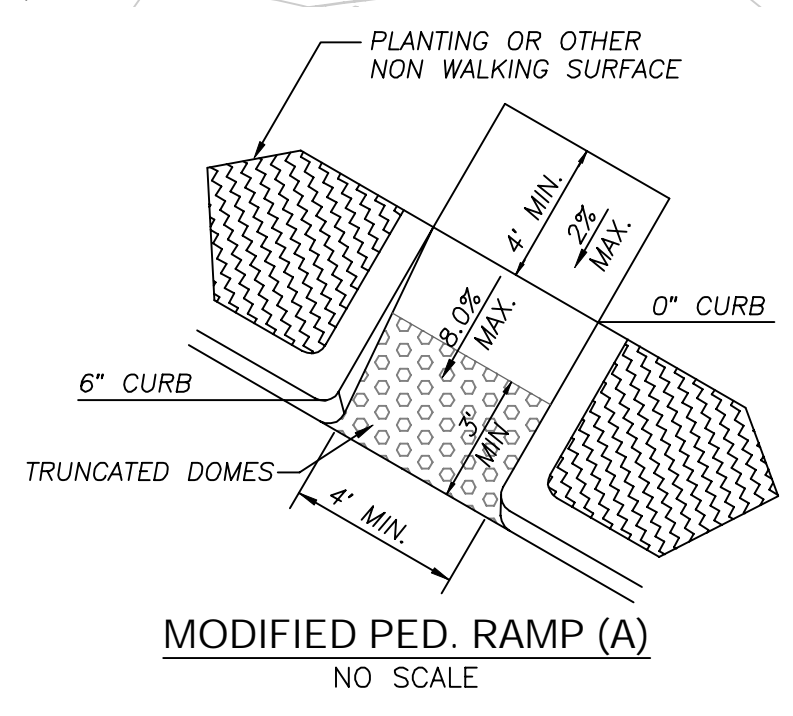


PRELIMINARY SET

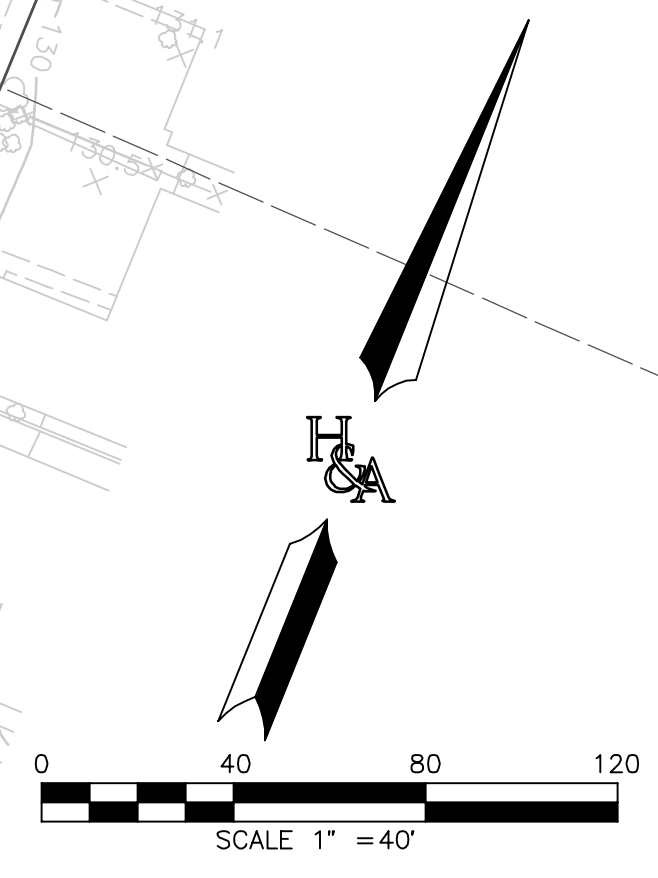
<p>PREPARED BY:</p> <p>HUNSAKER & ASSOCIATES SAN DIEGO, INC.</p> <p>PLANNING 9707 Waples Street ENGINEERING San Diego, Ca 92121 SURVEYING PH(658)558-4500 - FX(658)558-1414</p>	<p>BOUNDARIES & ENCUMBRANCES</p> <p>PACIFICA ELEMENTARY SCHOOL</p> <p>CITY OF OCEANSIDE, CALIFORNIA</p>	<p>SHEET</p> <p>8</p> <p>OF</p> <p>10</p> <p>NO. # 3087-0010</p>
	<p>R:\1714\&Pin\Tentative Map\Pacifica Elementary TM Sht 08.dwg Mar-29-2023:11:07</p>	



LEGEND
 ○ ○ ○ ○ ○ PROPOSED ACCESSIBLE ROUTE



PRELIMINARY SET

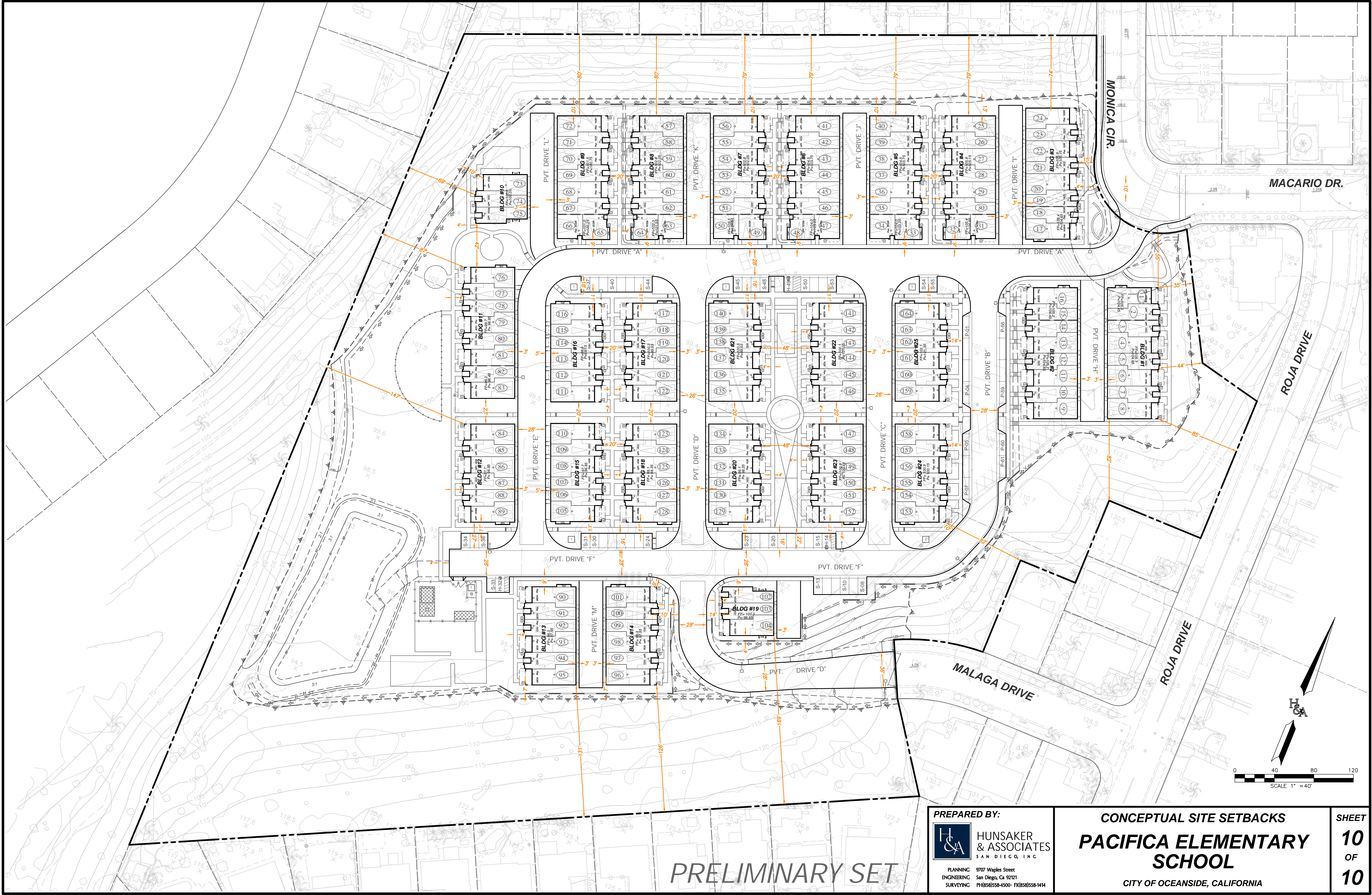


PREPARED BY:

HUNSAKER & ASSOCIATES
 SAN DIEGO, INC.
 PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(658)558-4500 - FX(658)558-1414

ACCESSIBLE PATHS
PACIFICA ELEMENTARY SCHOOL
 CITY OF OCEANSIDE, CALIFORNIA

SHEET
9
 OF
10
 WD # 3087-0010

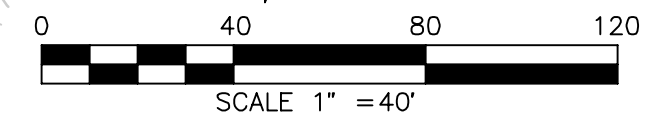


PRELIMINARY SET

PREPARED BY:
 HUNSAKER & ASSOCIATES
 SAN DIEGO, INC.
 PLANNING 9707 Waples Street
 ENGINEERING San Diego, Ca 92121
 SURVEYING PH(650)558-4500 - FX(650)558-1414

CONCEPTUAL SITE SETBACKS
PACIFICA ELEMENTARY SCHOOL
 CITY OF OCEANSIDE, CALIFORNIA

SHEET
10
 OF
10



**ATTACHMENT 5
Drainage Report**

This is the cover sheet for Attachment 5.



Placeholder – **Drainage Report**

Replace placeholder with drainage report.

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.



DRAINAGE STUDY
for
PACIFICA ELEMENTARY SCHOOL

City of Oceanside, California

Prepared for:

Meritage Homes
Johanna Crooker
5 Peters Canyon Road, Suite 310
Irvine, CA 92606

W.O. 3087-0010

Prepared: June 13, 2022

Revised: November 15, 2022

March 22, 2023

Prepared by:

Hunsaker & Associates
9707 Waples St.
San Diego, CA 92121
(858) 558-4500



Alisa S. Vialpando

03/22/2023

Alisa S. Vialpando, RCE # 47945
Date President

Table of Contents

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Appendix

- 1 – Vicinity Map and FIRM Map
- 2 – Soils Information
- 3 – Runoff Coefficient Determination
- 4 – Design Rainfall Determination
- 5 – Existing & Proposed Hydrology Calculations and Exhibits
- 6 – Detention Calculations

ATTACHMENT 6
Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 6.





**PRELIMINARY GEOTECHNICAL EVALUATION REPORT
PROPOSED PACIFICA ELEMENTARY RE-DEVELOPMENT
ASSESSOR PARCEL NUMBERS:
122-190-22-00
122-190-19-00
157-070-42-00
OCEANSIDE, CALIFORNIA**

PREPARED FOR

**MLC HOLDINGS, INC.
5 Peters Canyon Road, Suite 310
Irvine, California 92606**

PREPARED BY

**GEO TEK, INC.
1384 POINSETTIA AVENUE, SUITE A
VISTA, CALIFORNIA 92081**

PROJECT No. 3743-SD

JANUARY 19, 2022



GeoTek, Inc.
1384 Poinsettia Avenue, Suite A Vista, CA 92081-8505
(760) 599-0509 Office (760) 599-0593 Fax www.geotekusa.com

January 19, 2022
Project No. 3743-SD

MLC Holdings, Inc.

5 Peters Canyon, Suite 310
Irvine, CA 92606

Attention: Ms. Johanna Crooker

Subject: **Preliminary Geotechnical Evaluation Report**
Proposed Pacifica Elementary Re-Development
APN: 122-190-22-00, 122-190-19-00, and 157-070-42-00
Oceanside, California

Dear Ms. Crooker:

GeoTek, Inc. (GeoTek) is pleased to present the results of this preliminary geotechnical evaluation for the subject project located in the City of Oceanside, California. This report presents a discussion of GeoTek's field evaluation, analyses, and suitability of the site soils to support the proposed improvements. Based upon review, site development appears feasible from a geotechnical viewpoint provided that recommendations presented in this report are incorporated into the design and construction phases of the project.

We appreciate the opportunity to be of service on this project. Please contact the undersigned if you have any questions.

Respectfully submitted,
GeoTek, Inc.

Christopher D. Livesey
CEG 2733, Exp. 05/31/23
Associate Vice President



Gaby M. Bogdanoff
GE 3133, Exp. 06/30/22
Project Engineer



Distribution: (I) Addressee

ATTACHMENT 7
Storm Water Quality Assessment Form

This is the cover sheet for Attachment 7.





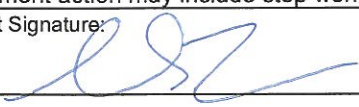
City of Oceanside – Engineering Division – Clean Water Program
**STORM WATER QUALITY ASSESSMENT FOR PLANNING,
 ENGINEERING, AND BUILDING PERMIT APPLICATIONS**

All applications for Planning, Engineering, or Building Division permits are required to complete this assessment form and include it as part of the initial permit application submittal. Staff will review the permit application content to determine the applicability of State and City storm water requirements. Please note a storm water assessment cannot be provided without a complete permit application package.

Section 1 – Project Information	
Applicant Name: Aaron Talarico, MLC Holdings, Inc.	Phone Number: (949) 372-3309
Project Name: Pacifica Elementary School	Project Site Address: Roja Drive and Macario Drive, Oceanside, CA 92054
Permit Applications Number(s): GPA22-00001	Assessor Parcel Number(s): 157-070-42, 122-190-19, & 122-190-22
Project Description: 14.55 acre site - City of Oceanside. Partially developed. Multi-family - 164 Residential Units.	Project Disturbed Area (square feet): 443,150 sft
Existing Impervious Area (square feet): 219,133 sq. ft	Created or Replaced Impervious Area (square feet): 312,149 sft
Section 2 – Identify Applicable Priority Development Project Categories (Check All Boxes that Apply)	
<input type="checkbox"/>	New Development Project – A project that creates 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.
<input checked="" type="checkbox"/>	Redevelopment Project – A project that creates and/or replaces 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.
<input type="checkbox"/>	Restaurants – 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); where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input type="checkbox"/>	Hillside Development – Category includes development on any natural slope that is twenty-five percent or greater; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input checked="" type="checkbox"/>	Parking Lots – 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; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input checked="" type="checkbox"/>	Streets, Roads, Highways, Freeways, and Driveways – Category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles; where new or redevelopment projects that create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input type="checkbox"/>	Water Quality Environmentally Sensitive Area – New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharge directly to a Water Quality Environmentally Sensitive Area (WQESA). “Discharge directly to” includes flow that is conveyed overland a distance of 200 feet or less from the project to the WQESA, 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).
<input type="checkbox"/>	Automotive Repair Shop – Category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539, where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input type="checkbox"/>	Retail Gasoline Outlet (RGOs) – Category includes RGOs that meet the following criteria (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day; where new or redevelopment projects create and/or replace 5,000 square feet or more impervious surface (collectively over the entire project site).
<input checked="" type="checkbox"/>	Development Projects greater than one acre – New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction.



City of Oceanside – Engineering Division – Clean Water Program
**STORM WATER QUALITY ASSESSMENT FOR PLANNING,
 ENGINEERING, AND BUILDING PERMIT APPLICATIONS**

Section 3 – Identify Projects Not Subject to Permanent Stormwater Requirements (Check All Boxes that Apply)	
<input type="checkbox"/>	The project consists of work entirely within an existing structure.
<input type="checkbox"/>	The project consists of construction of overhead or underground utilities (no new impervious surfaces).
<input type="checkbox"/>	The project consists of routine maintenance.
<input type="checkbox"/>	The project consists of less than 50 yards of grading and presents no opportunities to improve water quality.
Section 4 – Project Category Determination	
X	Priority Development Project: If any item in Section 2 is applicable, the project is a Priority Development Project. <u>Please prepare a PDP SWQMP for the project.</u>
<input type="checkbox"/>	Standard Development Project: If none of the items in Section 2 or 3 are applicable, the project is a Standard Development Project. <u>Please prepare an SDP SWQMP.</u>
<input type="checkbox"/>	Project Not Subject to Permanent Stormwater Requirements: If any item in Section 3 is applicable, the project is not subject to Permanent Stormwater Requirements. <u>Please submit the project plans with this form.</u> Note: Projects in this category are subject to typical pollution prevention measures outlined by the pollution prevention checklist on the following page.
Section 5 – Applicant Certification	
Name of Responsible Party: Aaron Talarico, MLC Holdings, Inc.	Title: Division Vice President
Email Address (optional) aaron.talarico@mlcholdings.net	Phone Number: (949) 372-3309
I understand and acknowledge the City of Oceanside has adopted minimum requirements, as mandated by the San Diego Regional Water Quality Control Board – Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100 (NPDES NO. CAS0109266) for mitigating impacts associated with urban runoff, including storm water from construction and land development activities. I certify this assessment has been accurately completed to the best of my knowledge and is consistent with the proposed project. I acknowledge that non-compliance with the City Best Management Practice (BMP) Design Manual, Grading Ordinance, and Erosion Control Ordinance may result in enforcement action by the City, the California State Water Resources Control Board, and/or the San Diego Regional Water Quality Control Board. Enforcement action may include stop work orders, notice of violation, fines, or other actions.	
Applicant Signature: 	Date: 11/17/22



City of Oceanside – Engineering Division – Clean Water Program
**STORM WATER QUALITY ASSESSMENT FOR PLANNING,
 ENGINEERING, AND BUILDING PERMIT APPLICATIONS**

**Stormwater Pollution Prevention Measures
 for Projects Not Subject to Permanent Stormwater Requirements**

Project Activity	Yes	No	Required Pollution Prevention
Trash & Waste Generation <u>**REQUIRED FOR ALL PROJECTS**</u>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Train/inform all employees of pollution prevention requirements • Collect and contain all construction trash, waste, and debris • Promptly contain and clean any spill on site • Routinely inspect site, remove loose trash and prevent spills • Properly dispose of any hazardous materials • Do not wash down surfaces unless water is collected or directed to landscape • Permanent trash collection areas require full structure/enclosure
Digging of Dirt – excavation, trenching, or grading	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Do not allow dirt to migrate into street, sidewalk, or storm drain • Preserve existing vegetation where feasible • Perimeter site controls such as silt fence or straw wattles • Cover exposed dirt using mulch, tarps, or erosion control devices • Install and secure tarps over dirt piles • Routinely sweep site to remove dirt
Landscaping and Irrigation Systems	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Do not store landscape materials in street • Do not allow dirt to migrate into street, sidewalk, or storm drain • Test irrigation system and prevent runoff/overspray • Install and secure tarps over piles of mulch or soil • Routinely sweep site to remove mulch or soil • Do not wash down surfaces unless water is collected or directed to landscape
Concrete, Paint, Mortar, or Stucco Work	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Contain wet mixing areas within confined area • Do not allow material to travel into site soil, street, or storm drain • Properly dispose of waste material
Temporary Storage of Materials Outside	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Elevate material off ground where possible, such as on pallets • Install and secure tarps over materials
Demolition of Structures	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Follow Required Pollution Prevention for “Digging of Dirt”
New Structure – house addition, shed, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Follow Required Pollution Prevention for “Digging of Dirt” • Direct downspouts to landscape, where feasible • Consider rainwater harvesting • Preserve existing vegetation and drainage patterns, where feasible
Patio, Driveway, or Sidewalk	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Consider use of pervious pavers or pervious concrete (refer to Section 3 of page 4 for routine maintenance information) • Direct runoff to landscape areas, where feasible
Re-Roofing	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Contain removed roof debris in waste containers • Follow Required Pollution Prevention for “Temporary Storage of Materials Outside”
Washing of Material, Equipment, or Surface	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Do not wash down surfaces unless water is collected or directed to landscape
Draining of Water Heater, Pool, or Spa	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Direct drain water to landscape areas where possible • Contact Stormwater Division if considering draining to sanitary system cleanout or storm drain system (760-643-2804)
Storm Drain at Industrial or Commercial Property	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Install “No Dumping” or similar signage at each storm drain inlet



City of Oceanside – Engineering Division – Clean Water Program
**STORM WATER QUALITY ASSESSMENT FOR PLANNING,
ENGINEERING, AND BUILDING PERMIT APPLICATIONS**

Completion Guidance

Please note – the Applicant is required to complete and submit this form as part of the project application. For definitions and additional information, please refer to the City of Oceanside BMP Design Manual. For assistance, please contact Development Services Staff at (760) 435-4373.

Section 1 – Project Information

1. Applicant Name – provide name of Individual completing form, i.e. Owner or Owner Representative
2. Phone Number – provide phone number of Individual completing form, i.e. Owner or Owner Representative
3. Project Name – provide project name (consistent with project application)
4. Project Site Address – provide a physical address for the proposed project, or nearest cross street
5. Permit Application Number(s) – provide all applicable permit application numbers
6. Assessor Parcel Number(s) – provide Assessor Parcel Number(s); refer to title documents or contact City Staff for assistance
7. Project Description – provide a brief project description (e.g. single-family dwelling, retail business, repair shop, etc)
8. Project Disturbed Area – provide the disturbed area for the entire project, including onsite and offsite work
9. Existing Impervious Area – provide the total existing impervious area within the property and project boundary
10. Created or Replaced Impervious Area – provide the total area of all newly created or replaced impervious surfaces within the project area

Section 2 – Identify Applicable Priority Development Project Categories

1. Review each category and check the appropriate boxes that apply to your project.
2. General identification of Automotive Repair Shop SIC (Standard Industrial Classifications) as follows:
5013 – Motor vehicle supplies and new parts, 5014 – Tires and tubes, 5541 – Gasoline service stations, 7532 – Top and body repair, and paint shops, 7533 – Auto exhaust system repair shops, 7534 – Tire retreading and repair shops, 7536 – Automotive glass replacement shops, 7537 – Automotive transmission repair shops, 7538 – General automotive repair shops, 7539 – Automotive repair shops-not elsewhere classified
3. Contact Staff for assistance in determining applicability of the Water Quality Environmentally Sensitive Area (WQESA) category

Section 3 – Identify Projects Not Subject to Permanent Stormwater Requirements

1. Please refer to Page 1-6 of the City of Oceanside BMP Design Manual for a complete list of routine maintenance activities.
2. Activities that expose native subgrade in the process of replacing impervious surfaces, are not considered routine maintenance.

Section 4 – Project Category Determination

1. PDP SWQMP – Priority Development Project Stormwater Quality Management Plan
2. SDP SWQMP – Standard Development Project Stormwater Quality Management Plan
3. Contact Staff for assistance in determining the Project Category

Section 5 – Applicant Certification

1. Name of Responsible Party – provide name of Owner
2. Title of Responsible Party – provide responsible party's title, if applicable
3. Phone Number – provide phone number of Owner
4. Email Address (Optional) – provide email address
5. Applicant Signature – provide signature of Individual completing form, i.e. Owner or Owner Representative
6. Date – provide date current date

[Insert other supporting documentation here]

