The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

The Lot – Del Mar

PTS No. 537664

ENGINEER OF WORK:

Antony K. Christensen, RCE 54021
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Adolfo Fastlict
7611 Fay Avenue
La Jolla, CA 92037
adolfo@thelotent.com
(858) 442-8009

PREPARED BY:

Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126
858-271-9901

DATE:
April 24, 2017
July 24, 2017
November 06, 2017

Approved by: City of San Diego Date

TABLE OF CONTENTS

ACRONYMS

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

CERTIFICATION PAGE

Project Name: The Lot – Del Mar
Permit Application Number: PTS No. 537664

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 Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP 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 PDP SWQMP by the City Engineer 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.

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

Antony K. Christensen, RCE 54021

Christensen Engineering & Surveying

November 06, 2017
Date

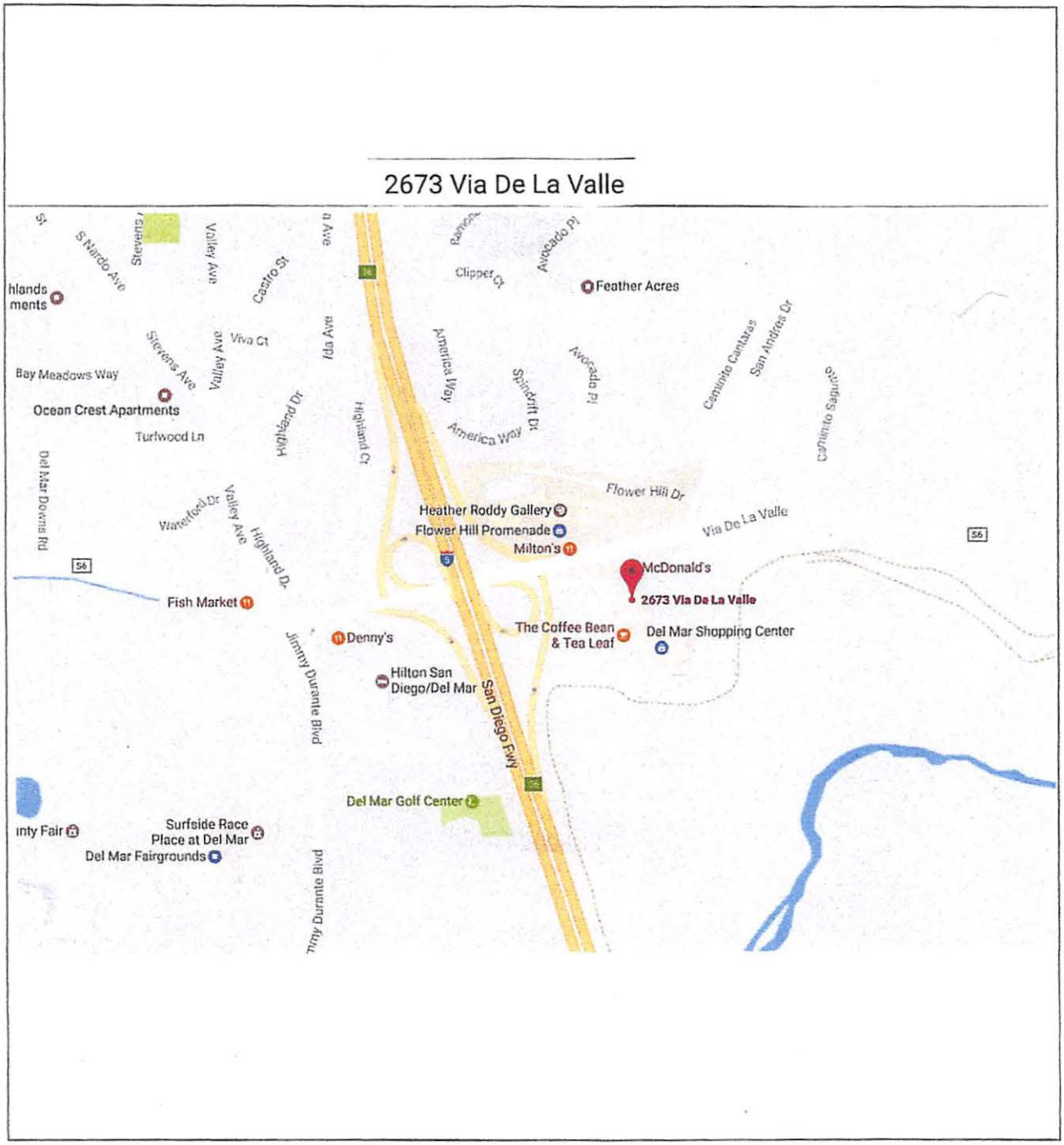
SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP 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 plan check comments is included. When applicable, insert response to plan check comments.

Submittal Number	Date	Project Status	Changes
1	04-24-2017	☒ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	07-24-2017	☒ Preliminary Design/Planning/CEQA ☐ Final Design	Address City Comments
3	11-06-2017	☒ Preliminary Design/Planning/CEQA ☐ Final Design	Address City Comments
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

PROJECT VICINITY MAP

Project Name: The Lot – Del Mar
Permit Application Number: PTS No. 537664



STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST

Complete and attach DS-560 Form included in Appendix A.1

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM DS-560
October 2016

Project Address: 2673 Via De La Valle

Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administered by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

☐ Yes; SWPPP required, skip questions 2-4 ☒ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and contact with storm water runoff?

☒ Yes; WPCP required, skip 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

☐ Yes; WPCP required, skip 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

- Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
- Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☐ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☒ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed.

2. ☐ **High Priority**
   a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.
   b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects 1 acre or more but not subject to an ASBS or high priority designation.
   b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☒ **Low Priority**
   a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).
Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1. **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No
2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☒ Yes ☐ No
3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. ☒ Yes ☐ No
4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ☐ Yes ☒ No
5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ☐ Yes ☒ No
6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ☐ Yes ☒ No

7.	**New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges 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).	☒ Yes ☐ No
8.	**New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☒ No
9.	**New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10.	**Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1.	The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.**	☐
2.	The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3.	The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4.	The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management	☒

Joy D. Christensen	Assistant Engineer
Name of Owner or Agent *(Please Print)*	Title
Joy D. Christensen	04/25/2017
Signature	Date

Applicability of Permanent, Post-Construction Storm Water BMP Requirements	Form I-1

Project Identification

Project Name: The Lot – Del Mar

Permit Application Number: PTS No. 537664 | Date: April 24, 2017

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop".
Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☒ Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.

Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):

Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist.	☐ Standard Project	Stop. Standard Project requirements apply.
	☒ PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	☐ PDP Exempt	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below.

Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:

Form I-1 Page 2		
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 BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☒ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☒ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply: The project directly discharges to the San Dieguito River below Lake Hodges which is an exempt river reach.		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☒ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: The project site and area upstream of it is not in a CCSYA.		

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	**The Lot – Del Mar**
Project Address	2673 Via de la Valle Del Mar, CA 92104
Assessor's Parcel Number(s) (APN(s))	298-490-41-00
Permit Application Number	PTS NO. 537664
Project Watershed	Select One: ☒San Dieguito River ☐ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	Solana Beach Hydrologic Area (905.1)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	14,946 Acres (_____ Square Feet)
Area to be disturbed by the project (Project Footprint)	0.792 Acres (_____ Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.696 Acres (_____ Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.096 Acres (_____ Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition.	(0.571 Acre increase) (0.696-0.125 increase) sf) 72.1%

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:
Site has had previous grading, including the construction of sewer mains and storm drains and pervious easement access area.

Existing Land Cover Includes (select all that apply):
☐ Vegetative Cover
☒ Non-Vegetated Pervious Areas
☒ Impervious Areas
Description / Additional Information:

Existing site is has had demolition of a former structure.

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 (GW):
☐ GW Depth < 5 feet
☐ 5 feet < GW Depth < 10 feet
☐ 10 feet < GW Depth < 20 feet
☒ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒None
Description / Additional Information:

Site abuts the San Dieguito River but no natural hydrologic feature exists onsite.

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. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Description / Additional Information:

The existing and proposed runoff is urban. No runoff is conveyed through the site. Existing drainage flows to the San Dieguito River southerly of the site. Following development the same pattern will persist. The portion of the site to be developed was formerly developed but is currently vacant. The portion of the site to be developed accounts for 34,500 sf. Currently 5,460 sf of this area is pervious. Following development 29,527 sf of the site will be impervious and 4,973 sf will be pervious, due to the proposed biofiltration basin and pervious paving. The site is hydromodification exempt due to flow to a hardened conveyance system (6.5' x 4' box culvert) that discharges to the San Dieguito River (Lagoon), and exempt water body, within the 100-yr floodplain as shown on FEMA FIRM No. 06073C1326G. All runoff from impervious surfaces will be treated by the biofiltration basin.

A detailed description of the drainage patterns and flows are discussed and demonstrated in the Drainage Study and were developed using the City of San Diego Drainage Design Manual rational method. See attachment "D".

.

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project site is currently developed as a commercial development though the previous commercial building has been demolished. The development will be for a theater with cafe.

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

The project includes the construction of building and walkways.

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

This project includes pervious paving amongst the impervious areas as well as vegetated biofiltration basin.

Does the project include grading and changes to site topography?

☐ Yes

☒ No

Description / Additional Information:

The site will be disturbed to construct footing and possibly soil remediation but no actual grading is proposed.

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

☒ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

The site, in its existing pre-construction condition, drains southwesterly and southeasterly to two existing catch basins located in the existing parking lot. Following the construction this same general trend continues with a small area of runoff flowing to a more northerly driveway catch basin and the remainder flowing to the southerly driveway catch basin (roof and biofiltration basin by 8" PVC drain). All runoff from the site was previously conveyed to these catch basins when the subject development area was previous improved. The total runoff increases from 1.28 cfs to 2.42 cfs. All runoff, before and after development flows to a City of San Diego 6.5' x 4' box culvert drain that discharges to the San Dieguito River

See the attached drainage study for a detailed discussion of drainage.

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

- ☐ On-site 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
- ☐ Large Trash Generating Facilities
- ☐ Animal Facilities
- ☐ Plant Nurseries and Garden Centers
- ☐ Automotive-related Uses

Description / Additional Information:

There will be onsite café. Refuse will be collected in existing facilities.

Identification and Narrative of Receiving Water

Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)

According to the California 2010 303d list published by the San Diego Regional Water Quality Control Board the nearest impaired water body is the San Dieguito River impaired by Enterococcus, Fecal Coliform, Nitrogen, Phosphorus, TDS, Toxicity The San Dieguito River abuts the project site. Runoff to the river is comingled with that from the public storm drains.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.

Surface water beneficial uses include water contact recreational activities, non-contact recreational activities, warm freshwater habitat and wildlife habitat. Groundwater beneficial uses include municipal water supply.

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations.
None exist downstream of this project.

Provide distance from project outfall location to impaired or sensitive receiving waters.

San Dieguito River abuts the project site.

Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands

No MHPA is located in proximity to the site.

Identification of Receiving Water Pollutants of Concern

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 and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
San Dieguito River	Bacteria; Dissolved copper,	Bacteria; Dissolved copper,
	lead, and zinc	lead, and zinc

Identification of Project Site Pollutants*

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

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):

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

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design 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):

The site is hydromodification exempt due to flow to a hardened conveyance system (6.5' x 4' box culvert) that discharges to the San Dieguito River (Lagoon), an exempt water body, within the 100-yr flood plain as shown on FEMA FIRM No. 06073C1326G.

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

- ☐ Yes
- ☒ No

Discussion / Additional Information:

While Potential Critical Coarse Sediment Yield Areas exist upstream they do not drain through the project site.

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.

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)

Other Site Requirements and Constraints

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

Optional Additional Information or Continuation of Previous Sections As Needed

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

Source Control BMP Checklist for All Development Projects	Form I-4

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 BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design 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	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-1 not implemented: No non-storm water discharges are expected from this site.			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: No drains will exist that will require stenciling.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-3 not implemented: No materials will be stored outside the building and there is no run-on to the site.			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-4 not implemented: No materials will be stored outside the buildings			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented: Trash will be contained in an existing refuse area.			

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☐ Yes	☐ No	☒ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☒ N/A
Interior parking garages	☐ Yes	☐ No	☒ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☒ N/A
Landscape/Outdoor Pesticide Use	☐ Yes	☐ No	☒ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☒ N/A
Food service	☐ Yes	☐ No	☒ N/A
Refuse areas	☒ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☒ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☒ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☒ N/A
Loading Docks	☐ Yes	☐ No	☒ N/A
Fire Sprinkler Test Water	☒ Yes	☐ No	☐ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☒ N/A
Plazas, sidewalks, and parking lots	☐ Yes	☐ No	☒ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☒ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☒ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☒ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☒ N/A

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

Refuse will be contained in existing refuse areas. Fire sprinkler test water will be conveyed to the sewer. No new parking lots are proposed. Pervious walkways are proposed.

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Site Design BMP Checklist for All Development Projects	Form I-5

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 BMP Design Manual (Part 1 of Storm Water Standards) 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 BMP Design 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.

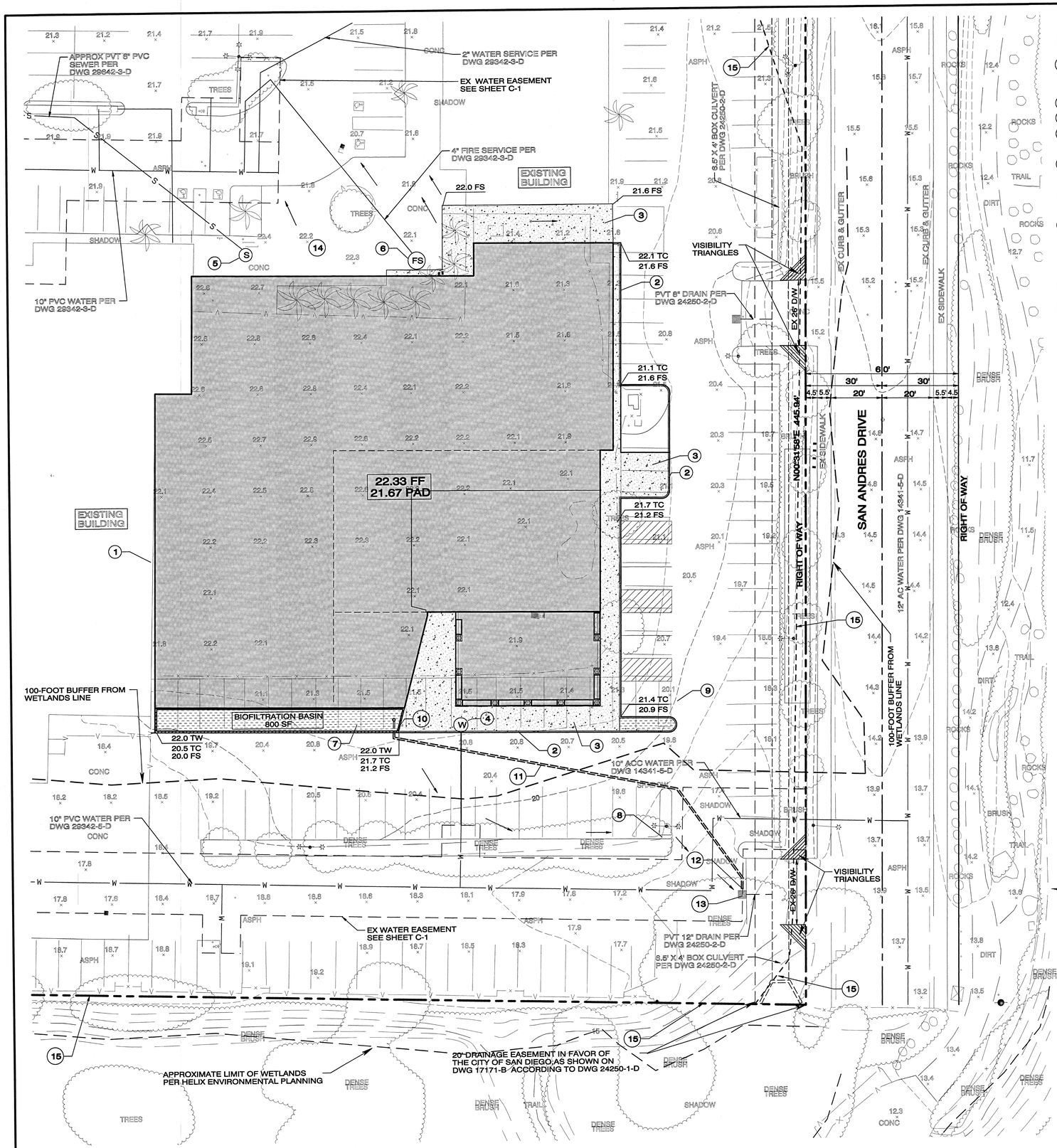
A site map with implemented site design BMPs must be included at the end of this checklist.

Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-1 not implemented: No natural drainage pathways exist in the project area.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☒ No	
1-2 Are trees implemented? If yes, are they shown on the site map?	☒ Yes	☐ No	
1-3 Implemented trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☒ No	
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☒ No	
SD-2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-2 not implemented: While trees will be incorporated into site design no credit is sought for their use. No natural undisturbed areas exist onsite.			

Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented: The site uses areas of pervious paving to decrease impervious surface area.			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☒ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☒ Yes	☐ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Form I-5 Page 3 of 4			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☒ No	
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	☒ Yes	☐ No	
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☒ No	
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-8 not implemented: The landscape area does not afford an opportunity to use the minimum required volume of runoff to drawdown in 36 hrs based on criteria found in the Storm Water Manual. Neither does the use for Toilet and Urinal flushing.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Insert Site Map with all site design BMPs identified:



CONSTRUCTION NOTES

1. ROOF DRAIN, VENT, GAS SERVICE AND OTHER IMPROVEMENTS EXIST ALONG NEIGHBORING BUILDING. FINAL DESIGN SHALL INCORPORATE ALLOWANCES FOR THESE IMPROVEMENT.
2. PROPOSED PRIVATE 6" CURB PER G-1
3. PROPOSED PERVIOUS CONCRETE (TYPICAL)
4. EX 2" WATER SERVICE PER DWG 29342-5-D TO BE USED FOR DOMESTIC SERVICE. EXISTENCE TO BE VERIFIED
5. EX 6" SEWER LATERAL PER DWG 29342-3-D TO BE USED FOR SEWER LATERAL. EXISTENCE TO BE VERIFIED
6. EX 4" FIRE SERVICE PER DWG 29342-3-D TO BE USED FOR FIRE SERVICE. EXISTENCE TO BE VERIFIED.
7. BIOFILTRATION BASIN (BMP-1) 800 SF MINIMUM
   22.0 TOP OF BASIN WALL
   21.5 TOP OF PONDING (OVERFLOW)
   21.0 TOP OF SOIL LAYER
   19.0 TOP OF GRAVEL LAYER
   18.0 BOTTOM OF GRAVEL LAYER
   18.25 I.E. 8" PVC UNDERDRAIN
8. EXISTING CONCRETE CHANNEL THROUGH PARKING LOT ISLAND
9. RE-STRIPE OF PARKING STRIPES
10. BASIN SUBDRAIN/OVERFLOW JOINS 8" PVC DRAIN
11. 166'~ 8" PVC DRAIN @ 3% TO EXISTING SOUTHERLY DRIVEWAY CATCH BASIN
12. 8" PVC DRAIN TO CONNECT TO EX CATCH BASIN
    Q100 = 2.13 CFS
    V100 = 8.9 FPS
13. EXISTING PRIVATE CATCH BASIN CONNECTED TO CITY OF SAN DIEGO STORM DRAIN
14. EXISTING CONCRETE TO REMAIN
15. FEMA ZONE "A" FLOODWAY BOUNDARY LINE FIRM MAP NO. 06073C1326G, MAY 16, 2012
16. 100-FOOT ESL WETLAND BUFFER ZONE BOUNDARY

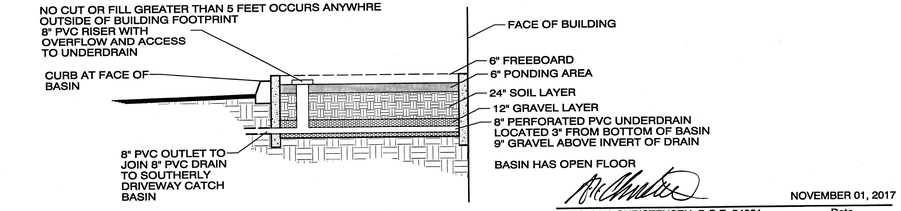
GRADING DATA

AREA OF SITE - 14.946 AC
AREA OF SITE TO BE GRADED: 34,510 SF (0.792 AC)
PERCENT OF SITE TO BE GRADED: 5.4% (ENTIRE SITE PREVIOUSLY GRADED)
AREA OF SITE WITH SLOPES GREATER THAN 25%: 0 S.F.

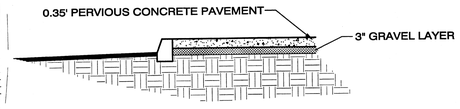
AMOUNT OF CUT - 1,350 C.Y.
AMOUNT OF FILL - 750 C.Y.
AMOUNT OF IMPORT - 600 C.Y.
MAXIMUM FILL - < 2'
MAXIMUM CUT - 3' VERTICAL IN BASIN AREA
MAXIMUM HEIGHT OF FILL SLOPE - NONE
MAXIMUM HEIGHT OF CUT SLOPE - NONE
RETAINING WALL: NONE

EARTHWORK CALCULATIONS ARE APPROXIMATE TO PAD

NO CUT OR FILL GREATER THAN 5 FEET OCCURS ANYWHRE OUTSIDE OF BUILDING FOOTPRINT



BIOFILTRATION BASIN DETAIL
NOT TO SCALE



PERVIOUS CONCRETE DETAIL
NOTE: NOT TO SCALE

ASSUMES A MINIMUM INFILTRATION RATE OF SOIL OF 0.025 IN/HR WITH A 36 HR DRAWDOWN TIME. IF AT TIME OF CONSTRUCTION INFILTRATION RATE IS LESS THAN THE MIMIMUM, AN UNDERDRAIN WILL BE REQUIRED.

THICKNESSES DETERMINED USING CALTRANS PERVIOUS PAVEMENT DESIGN GUIDANCE MANUAL (2016) METHOD

SCALE 1" = 20'

0 20 40 60 80

NOTES

1. UNDERGROUND UTILITIES ARE SHOWN AT RECORD LOCATIONS AS OBTAINED FROM CITY OF SAN DIEGO IMPROVEMENT PLANS. ACTUAL STRUCTURES AND LOCATION WILL NEED TO BE VERIFIED IN THE FIELD BY CONTRACTOR AND/OR UTILITY SPECIALISTS.
2. THE SOURCE OF THE TOPOGRAPHIC INFORMATION SHOWN HEREON IS FROM SURVEY BY CHRISTENSEN ENGINEERING & SURVEYING, DATED 04-12-17.
3. THE SUBJECT PROPERTY IS SERVED BY CITY OF SAN DIEGO SANITARY SEWER AND WATER MAINS.
4. UTILITIES SHOWN HEREON ARE FROM CITY OF SAN DIEGO RECORDS AND ARE THEIR LOCATION ARE APPROXIMATE. NOT ALL UTILITIES MAY BE SHOWN. BEFORE ANY WORK TAKES PLACE CONTRACTOR SHALL HAVE ALL UTILITIES MARKED OUT AND SHALL USE SPECIAL CARE DURING CONSTRUCTION.
5. AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR ANY PRIVATE IMPROVEMENTS WITHIN PUBLIC EASEMENTS (PRIVATE 8" PVC DRAIN WITHIN WATER AND DRAINAGE EASEMENT.
6. NO ESL, INCLUDING FEMA FLOODWAYS EXIST ONSITE.
7. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.
8. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSRY TO COMPY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
9. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN PART 2 CONSTRUCTION BMP STANDARDS CHAPTER 4 OF THE CITY'S STORM WATER STANDARDS.
10. NO OBSTRUCTION, INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT. PLANT MATERIAL, OTHER THAN TREES, WITHIN THE PUBLIC RIGHT-OF-WAY THAT IS LOCATED WITHIN VISIBILITY AREAS SHALL NTO EXCEED 24 INCHES IN THEIGHT, MEASURED FROM THE TOP OF THE ADJACENT CURB.
11. NO APPROVED IMPROVEMENTS OR LANDSCAPING, INCLUDING PRIVATE UTILITIES, GRADING AND ENHANCED PAVING, SHALL BE INSTALLED IN OR OVER WATER EASEMENT PRIOR TO THE APPLICANT OBTAINING AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT.
12. NO STRUCTURES OR LANDSCAPING SHALL BE INSTALLED IN OR OVER ANY WATER EASEMENT THAT WOULD INHIBIT VEHICULAR ACCESS TO REPLACE A SECTION OF MAIN OR PROVIDE ACCESS TO ANY APPURTENANCE OR ISOLATED SECTION OF MAIN.
13. THE OWNER/PERMITTEE SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO CITY OF SAN DIEGO WATER FACILITES IN THE VICINITY OF THE PROJECT SITE, DUE TO THE CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT. IN ACCORDANCE WITH MUNICIPAL CODE SECTION 142.0607. IN THE EVENT THAT ANY SUCH FACILITY LOSES INTEGRITY THEN, THE OWNER/PERMITTEE SHALL REPAIR OR RECONSTRUCT ANY DAMAGED PUBLIC WATER FACILITY IN A MANNER ACCEPTABLE TO THE PUBLIC UTILITES DIRECTOR AND THE CITY ENGINEER.
14. DRIVEWAY CURB CUTS SHALL BE RECONSTRUCTED ALONG SAN ANDRES DRIVE TO CURRENT CITY STANDARDS WITH COMMERCIAL CONCRETE DRIVEWAYS PER SDG-163.

ANTONY K. CHRISTENSEN, R.C.E. 54021 — NOVEMBER 01, 2017 (Date)

REGISTERED PROFESSIONAL ENGINEER — Antony K. Christensen — No. 54021 — Exp. 12-31-17 — CIVIL — STATE OF CALIFORNIA

Owners:

ADOLFO FASTLICHT
CARLOS WELLMAN
7611 FAY AVENUE
LA JOLLA, CA 92037

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

2673 VIA DE LA VALLE
DEL MAR, CA 92014

Project Name:

THE LOT - DEL MAR

Revision 4:
Revision 3:
Revision 2: 11-01-17 ADDRESS CITY COMMENTS
Revision 1: 07-23-17 ADDRESS CITY COMMENTS
Original Date: APRIL 24, 2017

Sheet Title:

PRELIMINARY GRADING PLAN

Sheet of Sheets

C-2

A2017-30

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). 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 BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design 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.

Infiltration is used for this project. It was determined the site could be developed using infiltration due to the expected high infiltration rate and the groundwater level. Type A hydrologic soil is expected onsite. The basin is sized using the Storm Water Manual worksheets for pollutant treatement.

(Continue on page 2 as necessary.)

(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

(Continued from page 1)

Form I-6 Page 3 of X (Copy as many as needed)
Structural BMP Summary Information
Structural BMP ID No. BMP-1
Construction Plan Sheet No. Sheet C-2
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 ○ 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 form DS-563	Antony K. Christensen, RCE Christensen Engineering & Surveying 7888 Silverton Avenue, Suite "J" San Diego, CA 92126 858-271-9901
Who will be the final owner of this BMP?	Adolfo Fastlicht Carlos Wellman 7611 Fay Avenue La Jolla, CA 92037
Who will maintain this BMP into perpetuity?	Adolfo Fastlicht Carlos Wellman or assigns
What is the funding mechanism for maintenance?	Funding will be maintained through a Storm Water Management and Discharge Control Maintenance Agreement

THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Permanent BMP Construction** **Self Certification Form**	FORM DS-563 February 2016

Date Prepared:	Project No.:
Project Applicant:	Phone:
Project Address:	
Project Engineer:	Phone:

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and 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 as amended by R9-2015-0001 and R9-2015-0100. 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 San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. _____; 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 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

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

Signature: _____

Date of Signature: _____

Printed Name: _____

Title: _____

Phone No. _____

Engineer's Stamp

ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

DRAINAGE MANAGEMENT AREA MAP

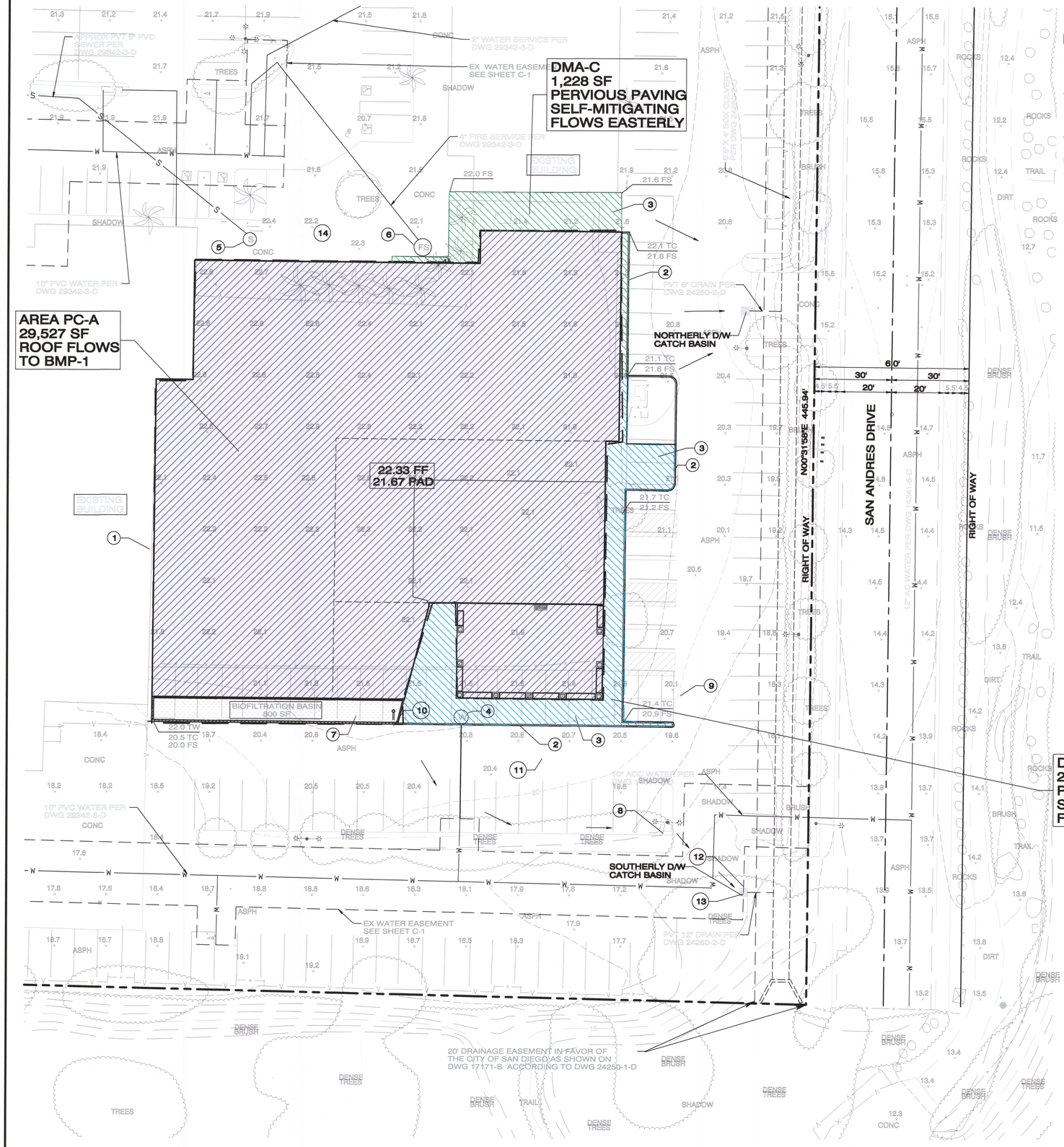


EXHIBIT CHECKLIST:

HYDROLOGIC SOIL GROUP: "A" (UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY)

APPROXIMATE DEPTH TO GROUNDWATER: GREATER THAN 20'

EXISTING NATURAL HYDROLOGIC RESOURCES: NO WATERCOURSES, SEEP. SPRINGS OR WETLANDS EXIST IN THE PROJECT AREA

CRITICAL COARSE SEDIMENT YIELD AREAS: POTENTIAL CCSYAs (PCCSYAs) DO NOT OCCUR ONSITE OR UPSTREAM

EXISTING TOPOGRAPHY AND IMPERVIOUS AREAS: TOPOGRAPHY IS SHOWN SITE IS A RETAIL SHOPPING CENTER

EXISTING AND PROPOSED SITE DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE: DRAINAGE FLOWS CURRENTLY FLOWS SOUTHERLY FOLLOWING DEVELOPMENT IT WILL CONTINUE TO DO SO, FLOWING TO A CITY OF SAN DIEGO 6.5' X 4' BOX CULVERT

PROPOSED GRADING: IS SHOWN ON DMA MAP

PROPOSED IMPERVOUS FEATURES: IMPERVIOUS ROOF (WALKWAYS ARE PERVIOUS PAVING)

PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS USED TO MINIMIZE IMPERVIOUSNESS: APERVIOUS PAVING IS USED TO MINIMIZE IMPERVOUSNESS.

DMA MANAGEMENT AREA BOUNDARIES, NUMBERS, AREAS AND TYPES: SHOWN

POTENTIAL POLLUTANT SOURCE AREAS AND SOURCE CONTROLS:

EXISTING ONSITE STORM DRAIN INLET: EXIST AND DRAIN TO PUBLIC STORM DRAIN (BOX CULVERT)
INDOOR DRAINS, GARAGES AND PESTICIDE USE: DO NOT EXIST OR ARE PROPOSED
LANDSCAPE/OUTSIDE PESTICIDE USE: NOT ANTICIPATED TO BE USED
POOLS, SPAS, PONDS: DO NOT EXIST
FOOD SERVICE: EXIST AND WILL BE PART OF NEW THEATER COMPLEX
REFUSE AREAS: EX COVERED REFUSE AREAS WILL BE EMPLOYED
INDUSTRIAL PROCESSES: DO NOT OCCUR
OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS: DOES NOT EXIST FOR THIS USE
VEHICLE CLEANING: DOES NOT EXIST
VEHICLE AND EQUIPMENT REPAIR: DOES NOT EXIST
FUEL DISPENSING AREAS: DO NOT EXIST
LOADING DOCKS: DO NOT EXIST FOR THIS PROPOSED USE
FIRE SPRINKLER TEST WATER: WILL BE CONVEYED TO SEWER
MISCELLANEOUS DRAIN OR WASH WATER: DOES NOT EXIST
PLAZAS, SIDEWALKS AND PARKING LOTS: ARE AS SHOWN

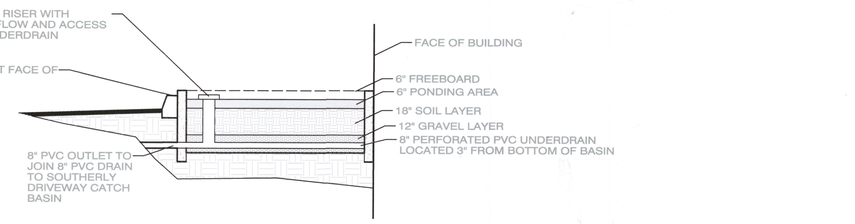
STRUCTURAL BMP SHOWN AS TO LOCATION, TYPE, SIZE AND DETAIL ARE SHOWN (BIOFILTRATION BASIN BMP-1)

HYDROMODIFICATION REQUIREMENTS: IS EXEMPT. RUNOFF FLOWS VIA HARDENED CONVEYANCE TO AN EXEMPT WATER BODY (SAN DIEGUITO RIVER)

NOTE:
PERVIOUS PAVING HAS NO UNDERDRAINA AND IS EXPECTED TO INFILTRATE INTO UNDERLYING HYDROLOGIC SOIL TYPE "A"

DMA/IMP AREA SUMMARY

DMA	IMPERVIOUS AREA	PERMEABLE AREA	TOTAL AREA CONVEYED TO IMP	IMP NAME	IMP SURFACE AREA	SELF-MITIGATING AREA	SELF-RETAINING AREA	*C* VALUE
A	29,527 SF	0 SF	29,527 SF	BMP-1	800 SF	NONE	NONE	0.9
B	2,724 SF	2,724 SF	0 SF				2,724	N/A
C	1,228 SF	1,228 SF	0 SF				1,228	N/A



BIOFILTRATION BASIN DETAIL
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
ANTONY K. CHRISTENSEN
No. 54021
Exp. 12-31-17
CIVIL
STATE OF CALIFORNIA

APRIL 24, 2016
ANTONY K. CHRISTENSEN, R.C.E. 54021 — Date

Owners:

ADOLFO FASTLICHT
CARLOS WELLMAN
7611 FAY AVENUE
LA JOLLA, CA 92037

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

2673 VIA DE LA VALLE
DEL MAR, CA 92014

Project Name:

THE LOT - DEL MAR

Revision 4:
Revision 3:
Revision 2:
Revision 1:

Original Date: APRIL 24, 2017

Sheet Title:

PRELIMINARY GRADING PLAN

Sheet of Sheets

C-2

A2017-30

Indicate which Items are Included:

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

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

Note: This checklist is 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)

The Lot – Del Mar
BMP-1

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	0.677	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.90	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	1218	cubic-feet

Harvest and Use Feasibility Checklist	Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?

☐ Toilet and urinal flushing
☐ Landscape irrigation
☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]

From Table B.3-3 for Low Plant Water use 390 gal/36hr/Ac
Area of landscaping = none
Landscape water demand = 390 x 0.0= 0 gallon = 0 cf

While the demand for toilet and urinal flushing exists the site makes it use impractical due to space considerations and the complexity of such a system.

3. Calculate the DCV using worksheet B-2.1.
DCV = 1218 (cubic feet)

3a. Is the 36 hour demand greater than or equal to the DCV?	3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36 hour demand less than 0.25DCV?
☐ Yes / ☒ No ⇨ ⇩	☐ Yes / ☒ No ⇨ ⇩	☒ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Is harvest and use feasible based on further evaluation?

☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☒ No, select alternate BMPs.

The City of SAN DIEGO	Project Name	The LOT	
	BMP ID	BMP-1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	29527	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.9	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1218	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	9	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	14.4	inches
15	Total Depth Treated [Line 13 + Line 14]	44.4	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	1827	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	494	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	913	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	761	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	797	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	797	sq. ft.
23	Provided BMP Footprint	800	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	The LOT	
	BMP ID	BMP-1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	29527	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.9	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1218	cu. ft.
BMP Parameters			
5	Footprint of the BMP	800	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.4	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.2	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	40.0	%
14	Fraction of DCV to be retained (Figure B.5-3) $0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$	0.322	
15	Target volume retention [Line 14 x Line 4]	392	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	60	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	10	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.01	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	133	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.12	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	66.35	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$	0.685	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-442	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	The LOT
	BMP ID	BMP-1

Volume Retention for No Infiltration Condition							Worksheet B.5-5	
1	Area draining to the biofiltration BMP						29527	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.9	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						26574	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						797	sq. ft.
5	Biofiltration BMP Footprint						800	sq. ft.
Landscape Area (must be identified on DS-3247)								
		Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)		0					
7	Impervious area draining to the landscape area (sq. ft.)		0					
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]						0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]						800	sq. ft.
Volume Retention Performance Standard								
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.						**Performance Standard is Met**	

E.12. PR-1 Biofiltration with Partial Retention

Location: 805 and Bonita Road, Chula Vista, CA.

MS4 Permit Category

NA

Manual Category

Partial Retention

Applicable Performance Standard

Pollutant Control

Flow Control

Primary Benefits

Volume Reduction

Treatment

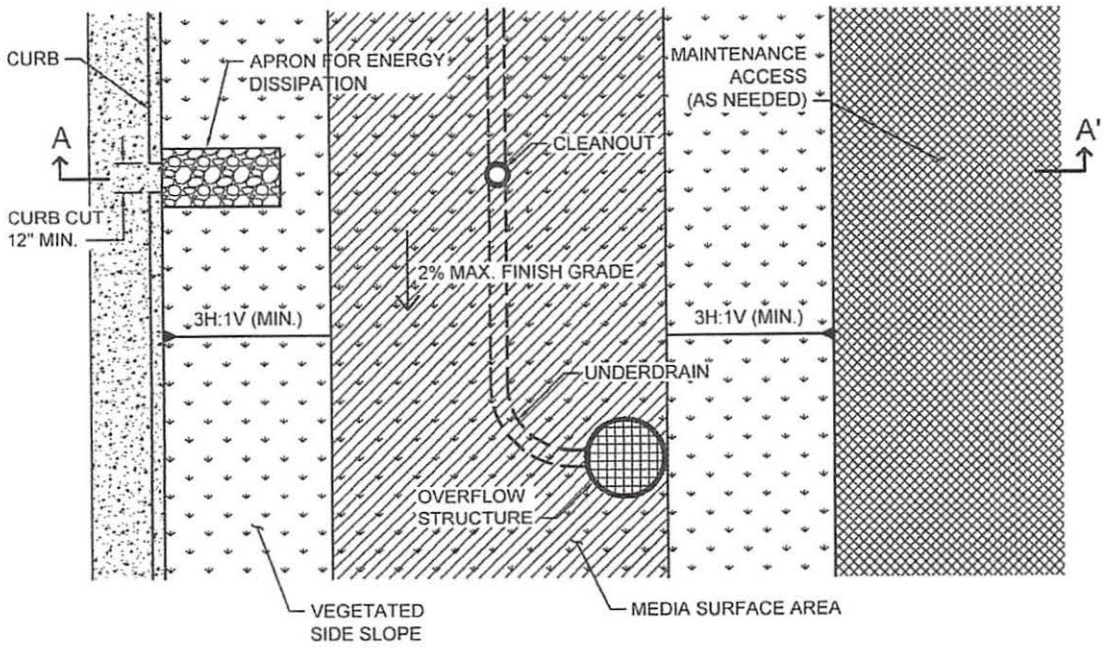
Peak Flow Attenuation

Description

Biofiltration with partial retention (partial infiltration and biofiltration) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to infiltrating into native soils, discharge via underdrain, or overflow to the downstream conveyance system. Where feasible, these BMPs have an elevated underdrain discharge point that creates storage capacity in the aggregate storage layer. Biofiltration with partial retention facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. They can be constructed in ground or partially aboveground, such as planter boxes with open bottoms to allow infiltration. Treatment is achieved through filtration, sedimentation, sorption, infiltration, biochemical processes and plant uptake.

Typical biofiltration with partial retention components include:

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



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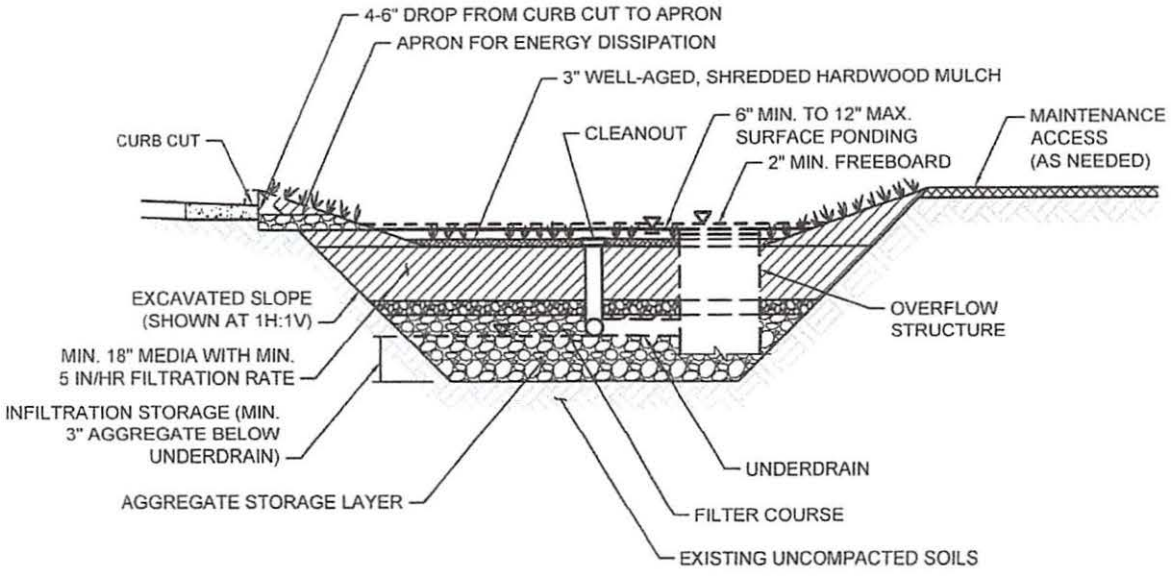

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Figure E.12-E.12-1: Typical plan and Section view of a Biofiltration with Partial Retention BMP

Design Adaptations for Project Goals

Partial infiltration BMP with biofiltration treatment for storm water pollutant control. Biofiltration with partial retention can be designed so that a portion of the DCV is infiltrated by

providing infiltration storage below the underdrain invert. The infiltration storage depth should be determined by the volume that can be reliably infiltrated within drawdown time limitations. Water discharged through the underdrain is considered biofiltration treatment. Storage provided above the underdrain within surface ponding, media, and aggregate storage is included in the biofiltration treatment volume.

Integrated storm water flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer. This will allow for significant detention storage, which can be controlled via inclusion of an orifice in an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Biofiltration with partial retention must meet the following design criteria and considerations. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	Intent/Rationale
□	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
□	Selection and design of basin is based on infiltration feasibility criteria and appropriate design infiltration rate (See Appendix C and D).	Must operate as a partial infiltration design and must be supported by drainage area and in-situ infiltration rate feasibility findings.
□	Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP.
□	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.
Surface Ponding		
□	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hours for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.

	Siting and Design	Intent/Rationale
□	Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered.
□	A minimum of 2 inches of freeboard is provided.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
□	Side slopes are stabilized with vegetation and are = 3H:1V or shallower.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
Vegetation		
□	Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.20	Plants suited to the climate and ponding depth are more likely to survive.
□	An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
Mulch (Mandatory)		
□	A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided. Mulch must be non-floating to avoid clogging of overflow structure.	Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply.
Media Layer		

	Siting and Design	Intent/Rationale
☐	Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. Additional Criteria for media hydraulic conductivity described in the bioretention soil media model specification (Appendix F.4)	A filtration rate of at least 5 inches per hour allows soil to drain between events, and allows flows to relatively quickly enter the aggregate storage layer, thereby minimizing bypass. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.
☐	Media is a minimum 18 inches deep, meeting the following media specifications: Model bioretention soil media specification provided in Appendix F.4 or County of San Diego Low Impact Development Handbook: Appendix G - Bioretention Soil Specification (June 2014, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications, the media meets the pollutant treatment performance criteria in Section F.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications shall be followed. For non-standard or proprietary designs, compliance with Appendix F.1 ensures that adequate treatment performance will be provided.
☐	Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity. Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance. Use Worksheet B.5-1 Line 26 to estimate the minimum surface area required per this criteria.
☐	Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.
Filter Course Layer		

	Siting and Design	Intent/Rationale
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade and can result in poor water quality performance for turbidity and suspended solids. Filter fabric is more likely to clog.
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility
☐	To reduce clogging potential, a two-layer filter course (aka choking stone system) is used consisting of one 3" layer of clean and washed ASTM 33 Fine Aggregate Sand overlying a 3" layer of ASTM No 8 Stone (Appendix F.5)	This specification has been developed to maintain permeability while limiting the migration of media material into the stone reservoir and underdrain system.
Aggregate Storage Layer		
☐	ASTM #57 open graded stone is used for the storage layer and a two layer filter course (detailed above) is used above this layer	This layer provides additional storage capacity. ASTM #8 stone provides an acceptable choking/bridging interface with the particles in ASTM #57 stone.
☐	Maximum aggregate storage layer depth below the underdrain invert is determined based on the infiltration storage volume that will infiltrate within a 36-hour drawdown time.	A maximum drawdown time is needed for vector control and to facilitate providing storm water storage for the next storm event.
Inflow, Underdrain, and Outflow Structures		
☐	Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐	Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☐	Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☐	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐	Minimum underdrain diameter is 8 inches.	Smaller diameter underdrains are prone to clogging.

	Siting and Design	Intent/Rationale
□	Underdrains should be affixed with an upturned elbow to an elevation at least 9 to 12 inches above the invert of the underdrain.	An upturned elbow reduces velocity in the underdrain pipe and can help reduce mobilization of sediments from the underdrain and media bed.
□	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
□	An underdrain cleanout with a minimum 8-inch diameter and lockable cap is placed every 50 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
□	Overflow is safely conveyed to a downstream storm drain system or discharge point. Size overflow structure to pass 100-year peak flow for on-line infiltration basins and water quality peak flow for off-line basins.	Planning for overflow lessens the risk of property damage due to flooding.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design biofiltration with partial retention and an underdrain for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Generalized sizing procedure is presented in Appendix B.5. The surface ponding should be verified to have a maximum 24-hour drawdown time. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention and/or infiltration storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention

storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.

3. If biofiltration with partial retention cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After biofiltration with partial retention has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

E.11. INF-3 Permeable Pavement (Pollutant Control)

Location: Kellogg Park, San Diego, California

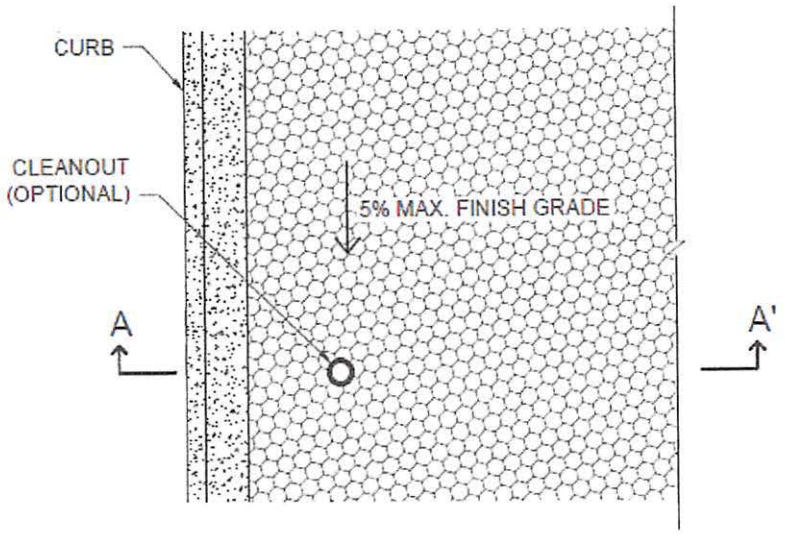
MS4 Permit Category
Retention Flow-thru Treatment Control
Manual Category
Infiltration Flow-thru Treatment Control
Applicable Performance Standard
Pollutant Control Flow Control
Primary Benefits
Volume Reduction Peak Flow Attenuation

Description

Permeable pavement is pavement that allows for percolation through void spaces in the pavement surface into subsurface layers. The subsurface layers are designed to provide storage of storm water runoff so that outflows, primarily via infiltration into subgrade soils or release to the downstream conveyance system, can be at controlled rates. Varying levels of storm water treatment and flow control can be provided depending on the size of the permeable pavement system relative to its drainage area, the underlying infiltration rates, and the configuration of outflow controls. Pollutant control permeable pavement is designed to receive runoff from a larger tributary area than site design permeable pavement (see SD-6B). Pollutant control is provided via infiltration, filtration, sorption, sedimentation, and biodegradation processes. **Permeable pavements proposed as a retention or partial retention BMP should not have an impermeable liner**.

Typical permeable pavement components include, from top to bottom:

- Permeable surface layer
- Bedding layer for permeable surface
- Aggregate storage layer with optional underdrain(s)
- Optional final filter course layer over uncompacted existing subgrade



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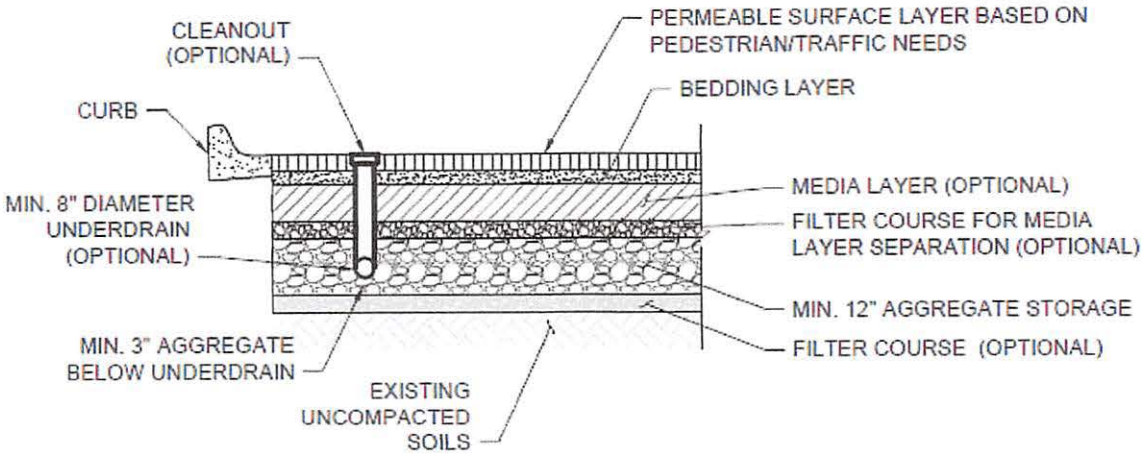

SECTION A-A'
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Figure E.11-E.11-1: Typical plan and Section view of a Permeable Pavement BMP

Subcategories of permeable pavement include modular paver units or paver blocks, pervious concrete, porous asphalt, and turf pavers. These subcategory variations differ in the material used for the permeable surface layer but have similar functions and characteristics below this layer.

Design Adaptations for Project Goals

Site design BMP to reduce impervious area and DCV. See site design option SD-6B.

Full infiltration BMP for storm water pollutant control. Permeable pavement without an underdrain and without impermeable liners can be used as a pollutant control BMP, designed to infiltrate runoff from direct rainfall as well as runoff from adjacent areas that are tributary to the pavement. The system must be designed with an infiltration storage volume (a function of the aggregate storage volume) equal to the full DCV and able to meet drawdown time limitations.

Partial infiltration BMP with flow-thru treatment for storm water pollutant control. Permeable pavement can be designed so that a portion of the DCV is infiltrated by providing an underdrain with infiltration storage below the underdrain invert. The infiltration storage depth should be determined by the volume that can be reliably infiltrated within drawdown time limitations. Water discharged through the underdrain is considered flow-thru treatment and is not considered biofiltration treatment. Storage provided above the underdrain invert is included in the flow-thru treatment volume.

Flow-thru treatment BMP for storm water pollutant control. The system may be lined and/or installed over impermeable native soils with an underdrain provided at the bottom to carry away filtered runoff. Water quality treatment is provided via unit treatment processes other than infiltration. This configuration is considered to provide flow-thru treatment, not biofiltration treatment. Significant aggregate storage provided above the underdrain invert can provide detention storage, which can be controlled via inclusion of an orifice in an outlet structure at the downstream end of the underdrain. **PDPs have the option to add saturated storage to the flow-thru configuration in order to reduce the DCV that the BMP is required to treat.** Saturated storage can be added to this design by including an upturned elbow installed at the downstream end of the underdrain or via an internal weir structure designed to maintain a specific water level elevation. The DCV can be reduced by the amount of saturated storage provided.

Integrated storm water flow control and pollutant control configuration. With any of the above configurations, the system can be designed to provide flow rate and duration control. This may include having a deeper aggregate storage layer that allows for significant detention storage above the underdrain, which can be further controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Permeable pavements must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	Intent/Rationale
□	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
□	Selection must be based on infiltration feasibility criteria.	Full or partial infiltration designs must be supported by drainage area feasibility findings.

	Siting and Design	Intent/Rationale
☐	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☐	Permeable pavement is not placed in an area with significant overhanging trees or other vegetation.	Leaves and organic debris can clog the pavement surface.
☐	For pollutant control permeable pavement, the ratio of the total drainage area (including the permeable pavement) to the permeable pavement should not exceed 4:1.	Higher ratios increase the potential for clogging but may be acceptable for relatively clean tributary areas.
☐	Finish grade of the permeable pavement has a slope ≤ 5%.	Flatter surfaces facilitate increased runoff capture.
☐	Minimum depth to groundwater and bedrock ≥ 10 ft.	A minimum separation facilitates infiltration and lessens the risk of negative groundwater impacts.
☐	Contributing tributary area includes effective sediment source control and/or pretreatment measures such as raised curbed or grass filter strips.	Sediment can clog the pavement surface.
☐	Direct discharges to permeable pavement are only from downspouts carrying "clean" roof runoff that are equipped with filters to remove gross solids.	Roof runoff typically carries less sediment than runoff from other impervious surfaces and is less likely to clog the pavement surface.
Permeable Surface Layer		
☐	Permeable surface layer type is appropriately chosen based on pavement use and expected vehicular loading.	Pavement may wear more quickly if not durable for expected loads or frequencies.
☐	Permeable surface layer type is appropriate for expected pedestrian traffic.	Expected demographic and accessibility needs (e.g., adults, children, seniors, runners, high-heeled shoes, wheelchairs, strollers, bikes) requires selection of appropriate surface layer type that will not impede pedestrian needs.
Bedding Layer for Permeable Surface		

	Siting and Design	Intent/Rationale
☐	Bedding thickness and material is appropriate for the chosen permeable surface layer type.	Porous asphalt requires a 2- to 4-inch layer of asphalt and a 1- to 2-inch layer of choker course (single-sized crushed aggregate, one-half inch) to stabilize the surface. Pervious concrete also requires an aggregate course of clean gravel or crushed stone with a minimum amount of fines. Permeable Interlocking Concrete Paver requires 1 or 2 inches of sand or No. 8 aggregate to allow for leveling of the paver blocks. Similar to Permeable Interlocking Concrete Paver, plastic grid systems also require a 1- to 2-inch bedding course of either gravel or sand. For Permeable Interlocking Concrete Paver and plastic grid systems, if sand is used, a geotextile should be used between the sand course and the reservoir media to prevent the sand from migrating into the stone media.
☐	Aggregate used for bedding layer is washed prior to placement.	Washing aggregate will help eliminate fines that could clog the permeable pavement system aggregate storage layer void spaces or underdrain.
Media Layer (Optional) –used between bedding layer and aggregate storage layer to provide pollutant treatment control		
☐	The pollutant removal performance of the media layer is documented by the applicant.	Media used for BMP design should be shown via research or testing to be appropriate for expected pollutants of concern and flow rates.
☐	A filter course is provided to separate the media layer from the aggregate storage layer.	Migration of media can cause clogging of the aggregate storage layer void spaces or underdrain.
☐	If a filter course is used, calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.
☐	Consult permeable pavement manufacturer to verify that media layer provides required structural support.	Media must not compromise the structural integrity or intended uses of the permeable pavement surface.
Aggregate Storage Layer		

1. Verify that siting and design criteria have been met, including placement requirements, maximum finish grade slope, and the recommended tributary area ratio for non-self-retaining permeable pavement. If infiltration is infeasible, the permeable pavement can be designed as flow-thru treatment per the sizing worksheet. If infiltration is feasible, calculations should follow the remaining design steps.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet to determine if full or partial infiltration of the DCV is achievable based on the available infiltration storage volume calculated from the permeable pavement footprint, aggregate storage layer depth, and in-situ soil design infiltration rate for a maximum 36-hour drawdown time. The applicant has an option to use a different drawdown time up to 96 hours if the volume of the facility is adjusted using the percent capture method in Appendix B.4.2.
4. Where the DCV cannot be fully infiltrated based on the site or permeable pavement constraints, an underdrain must be incorporated above the infiltration storage to carry away runoff that exceeds the infiltration storage capacity.
5. The remaining DCV to be treated should be calculated for use in sizing downstream BMP(s).

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, maximum finish grade slope, and the recommended tributary area ratio for non-self-retaining permeable pavement. Design for flow control can be achieving using various design configurations, but a flow-thru treatment design will typically require a greater aggregate storage layer volume than designs which allow for full or partial infiltration of the DCV.
2. Iteratively determine the area and aggregate storage layer depth required to provide infiltration and/or detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If the permeable pavement system cannot fully provide the flow rate and duration control required by this manual, a downstream structure with sufficient storage volume such as an underground vault can be used to provide remaining controls.
4. After permeable pavement has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

	Siting and Design	Intent/Rationale
□	Aggregate used for the aggregate storage layer is washed and free of fines.	Washing aggregate will help eliminate fines that could clog aggregate storage layer void spaces or underdrain.
□	Minimum layer depth is 6 inches and for infiltration designs, the maximum depth is determined based on the infiltration storage volume that will infiltrate within a 36-hour drawdown time.	A minimum depth of aggregate provides structural stability for expected pavement loads.
Underdrain and Outflow Structures		
□	Underdrains and outflow structures, if used, are accessible for inspection and maintenance.	Maintenance will improve the performance and extend the life of the permeable pavement system.
□	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
□	Minimum underdrain diameter is 8 inches.	Smaller diameter underdrains are prone to clogging.
□	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
Filter Course (Optional)		
□	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog subgrade and impede infiltration.

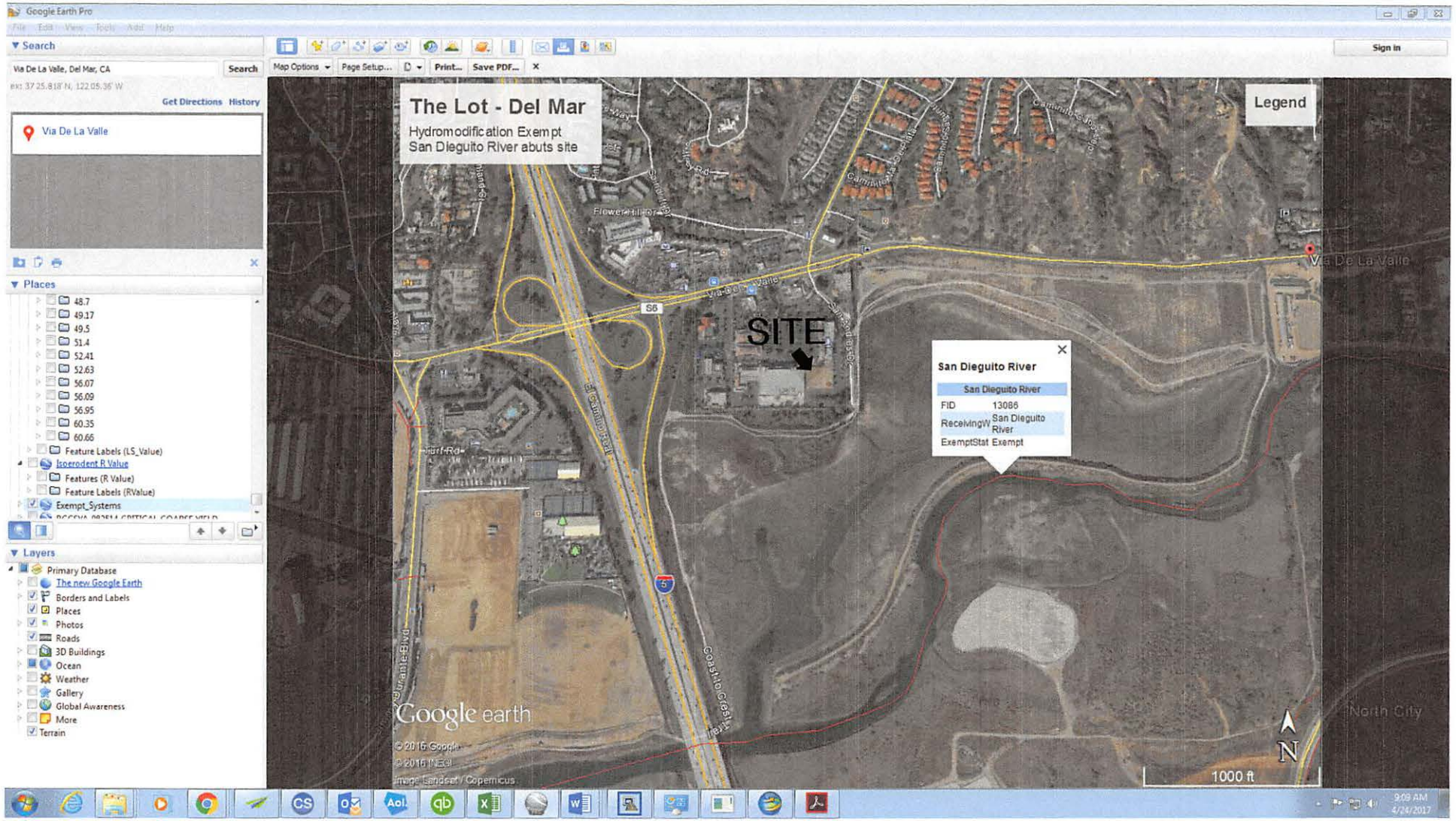
Conceptual Design and Sizing Approach for Site Design

1. Determine the areas where permeable pavement can be used in the site design to replace traditional pavement to reduce the impervious area and DCV. These permeable pavement areas can be credited toward reducing runoff generated through representation in storm water calculations as pervious, not impervious, areas but are not credited for storm water pollutant control. These permeable pavement areas should be designed as self-retaining with the appropriate tributary area ratio identified in the design criteria.
2. Calculate the DCV per Appendix B, taking into account reduced runoff from self-retaining permeable pavement areas.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design permeable pavement for storm water pollutant control only (no flow control required), the following steps should be taken:

Potential Critical Coarse Sediment Yield Area Map


Google Earth Pro
Search
Via De La Valle, Del Mar, CA
Search
Get Directions History
Via De La Valle
Places
Layers
Primary Database
Borders and Labels
Places
Photos
Roads
3D Buildings
Ocean
Weather
Gallery
Global Awareness
More
Terrain
Map Options
Page Setup...
Print...
Save PDF...
Sign In
The Lot - Del Mar
Hydromodification Exempt
San Dieguito River abuts site
Legend
SITE
San Dieguito River
San Dieguito River
FID 13086
ReceivingW San Dieguito River
ExemptStat Exempt
Via De La Valle
S5
Flower Hill Dr
Camino Del Mar
Coast Hwy
Google earth
© 2016 Google
Image Landsat / Copernicus
North City
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4/24/2017


The Lot - Del Mar
Hydromodification Exempt
San Dieguito River abuts site
Legend
100-YEAR FLOODPLAIN
LIMIT LINE
SITE
OUTLET
6.5'X 4' BOX CULVERT
PER DWG 24250-2-D
SAN DIEGUITO RIVER
Google earth
© 2016 Google
© 2016 INEGI
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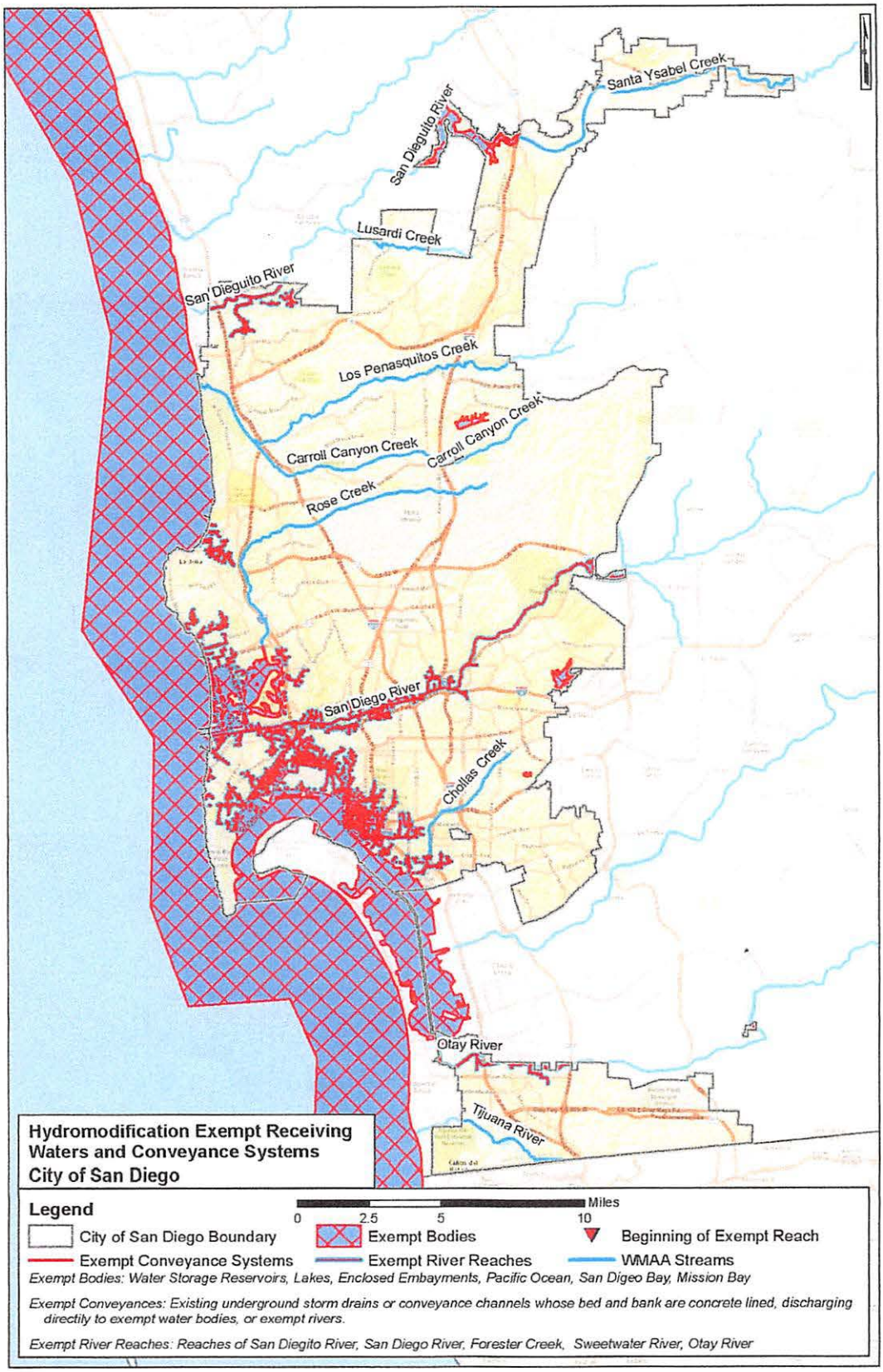

Figure H-G.2-2 Hydromodification Exempt Areas

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet* (Base Flood Elevation value where uniform within zone; elevation in feet*)

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 11
- 6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
- DX5510 × M1.5 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1326G

FIRM

FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1326 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY	060284	1326	G
SAN DIEGO, CITY OF	060295	1326	G
SOLANO BEACH, CITY OF	060725	1326	G

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

MAP NUMBER
06073C1326G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

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

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

The Hydromodification Management Exhibit must identify:

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

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☒Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	☐ Included ☒ 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)
- ☐ When applicable, frequency of biofiltration soil media replacement.
- ☐ 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 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

PR-1

Biofiltration with Partial Retention

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP PR-1 BIOFILTRATION WITH PARTIAL RETENTION

Biofiltration with partial retention facilities are vegetated surface water systems that filter water through vegetation and soil or engineered media prior to infiltrating into native soils, discharge via underdrain, or overflow to the downstream conveyance system. These BMPs have an elevated underdrain discharge point that creates storage capacity in the aggregate storage layer. Typical biofiltration with partial retention components include:

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

Normal Expected Maintenance

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

Non-Standard Maintenance or BMP Failure

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

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

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

PR-1
Biofiltration with Partial Retention

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

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

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

References

American Mosquito Control Association.
http://www.mosquito.org/
California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet PR-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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PR-1

Biofiltration with Partial Retention

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

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

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

PR-1

Biofiltration with Partial Retention

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

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

PR-1

Biofiltration with Partial Retention

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

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

PR-1

Biofiltration with Partial Retention

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

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

PR-1

Biofiltration with Partial Retention

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

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

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

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

INF-3

Permeable Pavement as Structural BMP

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP

Permeable pavement is pavement that allows for percolation through void spaces in the pavement surface into subsurface layers. The subsurface layers are designed to provide storage of storm water runoff so that outflows, primarily via infiltration into subgrade soils or release to the downstream conveyance system, can be at controlled rates. Permeable pavement as structural BMP usually receives runoff from a larger tributary area than permeable pavement as site design BMP (see SD-6B for permeable pavement as site design BMP). Pollutant control is provided via infiltration (retention). Flow control is provided by infiltration and/or an outlet control structure. Typical permeable pavement components include:

- Permeable surface layer
- Bedding layer for permeable surface
- Aggregate storage layer with optional underdrain(s)
- Optional final filter course layer over uncompacted existing subgrade
- Uncompacted native soils at the bottom of the facility
- Optional subsurface check dams at regular intervals when pavement is sloped (more closely spaced on steeper slopes)
- Optional outflow control structure for runoff released via underdrain(s)

Normal Expected Maintenance

Routine maintenance of permeable pavement includes: removal of materials such as trash and debris accumulated on the paving surface; vacuuming of the paving surface to prevent clogging; and flushing paving and subsurface gravel to remove fine sediment. If the BMP includes underdrains and/or an outflow control structure, check and clear these features. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If the permeable pavement area is not drained between storm events, or if runoff sheet flows across the permeable pavement area and flows off the permeable pavement area during storm events, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. During storm events up to the 85th percentile storm event (approximately 0.5 to 1 inch of rainfall in San Diego County), runoff should not flow off the permeable pavement area. The permeable pavement area is expected to have adequate hydraulic conductivity and storage such that rainfall landing on the permeable pavement and runoff from the surrounding drainage area will go directly into the pavement without ponding or overflow (in properly designed systems, the surrounding drainage area is not more than half as large as the permeable pavement area). Following the storm event, there should be no standing water (puddles) on the permeable pavement area.

If storm water is flowing off the permeable pavement during a storm event, or if there is standing water on the permeable pavement surface following a storm event, this is an indicator of clogging somewhere within the system. Poor drainage can result from clogging of the permeable surface layer, any of the subsurface components, or the subgrade soils. The specific cause of the drainage issue must be determined and corrected. Surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required. If poor drainage persists after flushing of the paving, subsurface gravel, and/or underdrain(s) when applicable, or if it is determined that the underlying soils do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

The runoff storage and infiltration surface area in this BMP are not readily accessible because they are subsurface. This means that clogging and poor drainage are not easily corrected. If the tributary area draining to the BMP includes unpaved areas, the sediment load from the tributary drainage area can be too high, reducing BMP function or clogging the BMP. All unpaved areas within the tributary drainage area should be stabilized with vegetation. Other pretreatment components to prevent transport of sediment to the paving surface, such as grass buffer strips, will extend the life of the subsurface components and infiltration surface. Along with proper stabilization measures and pretreatment within the tributary area, **routine maintenance, including preventive vacuum/regenerative air street sweeping, is key to preventing clogging**.

INF-3

Permeable Pavement as Structural BMP

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Preventive vacuum/regenerative air street sweeping	Pavement should be swept with a vacuum power or regenerative air street sweeper to maintain infiltration through paving surface	• Schedule/perform this preventive action at least twice per year.
Accumulation of sediment, litter, or debris on permeable pavement surface	Remove and properly dispose of accumulated materials. Inspect tributary area for exposed soil or other sources of sediment and apply stabilization measures to sediment source areas. Apply source control measures as applicable to sources of litter or debris.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Weeds growing on/through the permeable pavement surface	Remove weeds and add features as necessary to prevent weed intrusion. Use non-chemical methods (e.g., instead of pesticides, control weeds using mechanical removal, physical barriers, and/or physical changes in the surrounding area adjacent to pavement that will preclude weed intrusion into the pavement).	• Inspect monthly. • Remove any weeds found at each inspection.
Standing water in permeable paving area or subsurface infiltration gallery for longer than 24-96 hours following a storm event	This condition requires investigation of why infiltration is not occurring. If feasible, corrective action shall be taken to restore infiltration (e.g., pavement should be swept with a vacuum power or regenerative air street sweeper to restore infiltration rates, clear underdrains if underdrains are present). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Obstructed underdrain or outlet structure (when the BMP includes outflow control structure for runoff released from subsurface storage via underdrain(s))	Clear blockage.	• Inspect if standing water is observed for longer than 24-96 hours following a storm event. • Maintenance when needed.
Damage to structural components of subsurface infiltration gallery such as weirs or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.
Damage to permeable paving surface (e.g., cracks, settlement, misaligned paver blocks, void spaces between paver blocks need fill materials replenished)	Repair or replace damaged surface as appropriate.	• Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet INF-3.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

INF-3

Permeable Pavement as Structural BMP

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

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP PAGE 1 of 4			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris on permeable pavement surface Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials ☐ Inspect tributary area for exposed soil or other sources of sediment and apply stabilization measures to sediment source areas. Apply source control measures as applicable to sources of litter or debris ☐ Other / Comments:		
Weeds growing on/through the permeable pavement surface Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove weeds and add features as necessary to prevent weed intrusion ☐ Use non-chemical methods (e.g., instead of pesticides, control weeds using mechanical removal, physical barriers, and/or physical changes in the surrounding area adjacent to pavement that will preclude weed intrusion into the pavement). ☐ Other / Comments:		

INF-3

Permeable Pavement as Structural BMP

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

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP PAGE 2 of 4			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in permeable paving area or subsurface infiltration gallery for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ If feasible, take corrective action to restore infiltration (e.g., sweep pavement with a vacuum power or regenerative air street sweeper to restore infiltration rates, clear underdrains if underdrains are present). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction. ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the permeable surface layer, any of the subsurface components, or the underlying native soils. The specific cause of the drainage issue must be determined and corrected. If poor drainage persists after flushing of the paving, subsurface gravel, and/or underdrain(s) when applicable, or if it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

INF-3

Permeable Pavement as Structural BMP

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

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP PAGE 3 of 4			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed underdrain or outlet structure (when the BMP includes outflow control structure for runoff released from subsurface storage via underdrain(s)) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components of subsurface infiltration gallery such as weirs or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		
Damage to permeable paving surface (e.g., cracks, settlement, misaligned paver blocks, void spaces between paver blocks need fill materials replenished) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace damaged surface as appropriate ☐ Other / Comments:		

INF-3

Permeable Pavement as Structural BMP

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

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-3 PERMEABLE PAVEMENT AS STRUCTURAL BMP PAGE 4 of 4			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Preventive vacuum/regenerative air street sweeping Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Pavement should be swept with a vacuum power or regenerative air street sweeper to maintain infiltration through paving surface. ☐ Schedule/perform this preventive action at least twice per year. ☐ Other / Comments:		

THE CITY OF SAN DIEGO
RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

(THIS SPACE IS FOR THE RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:

This agreement is made by and between the City of San Diego, a municipal corporation [City] and

the owner or duly authorized representative of the owner [Property Owner] of property located at:

(PROPERTY ADDRESS)

and more particularly described as:

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):

_____

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s):

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):_____

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)_____.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):

_____
(Owner Signature)

_____
(Print Name and Title)

_____
(Company/Organization Name)

_____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

_____
(City Control engineer Signature

_____
(Print Name)

_____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDMENTS PER CIVIL CODE SEC. 1180 ET.SEQ

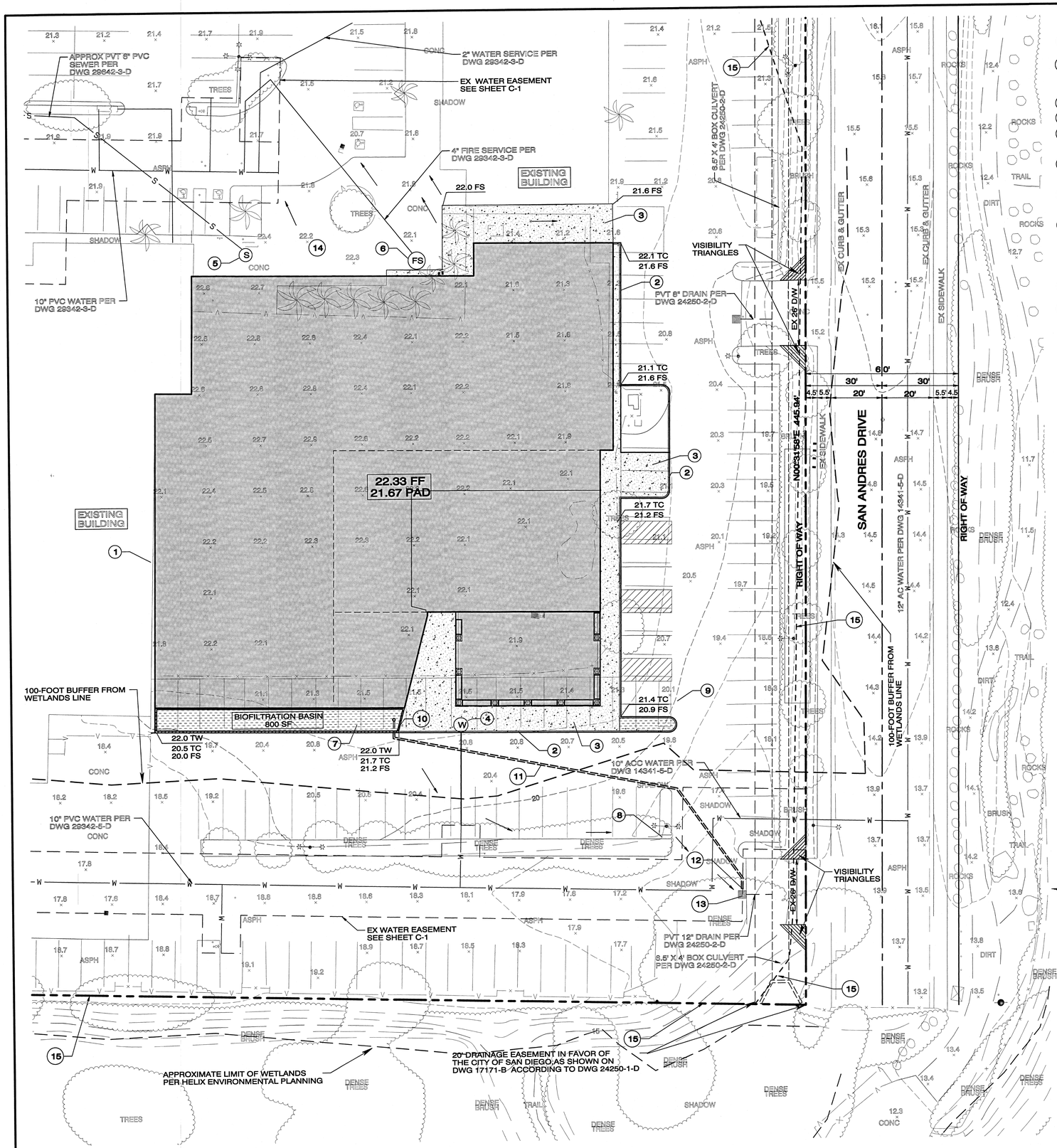
ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

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.



CONSTRUCTION NOTES

1. ROOF DRAIN, VENT, GAS SERVICE AND OTHER IMPROVEMENTS EXIST ALONG NEIGHBORING BUILDING. FINAL DESIGN SHALL INCORPORATE ALLOWANCES FOR THESE IMPROVEMENT.
2. PROPOSED PRIVATE 6" CURB PER G-1
3. PROPOSED PERVIOUS CONCRETE (TYPICAL)
4. EX 2" WATER SERVICE PER DWG 29342-5-D TO BE USED FOR DOMESTIC SERVICE. EXISTENCE TO BE VERIFIED
5. EX 6" SEWER LATERAL PER DWG 29342-3-D TO BE USED FOR SEWER LATERAL. EXISTENCE TO BE VERIFIED
6. EX 4" FIRE SERVICE PER DWG 29342-3-D TO BE USED FOR FIRE SERVICE. EXISTENCE TO BE VERIFIED.
7. BIOFILTRATION BASIN (BMP-1) 800 SF MINIMUM
   22.0 TOP OF BASIN WALL
   21.5 TOP OF PONDING (OVERFLOW)
   21.0 TOP OF SOIL LAYER
   19.0 TOP OF GRAVEL LAYER
   18.0 BOTTOM OF GRAVEL LAYER
   18.25 I.E. 8" PVC UNDERDRAIN
8. EXISTING CONCRETE CHANNEL THROUGH PARKING LOT ISLAND
9. RE-STRIPE OF PARKING STRIPES
10. BASIN SUBDRAIN/OVERFLOW JOINS 8" PVC DRAIN
11. 166'~ 8" PVC DRAIN @ 3% TO EXISTING SOUTHERLY DRIVEWAY CATCH BASIN
12. 8" PVC DRAIN TO CONNECT TO EX CATCH BASIN
    Q100 = 2.13 CFS
    V100 = 8.9 FPS
13. EXISTING PRIVATE CATCH BASIN CONNECTED TO CITY OF SAN DIEGO STORM DRAIN
14. EXISTING CONCRETE TO REMAIN
15. FEMA ZONE "A" FLOODWAY BOUNDARY LINE FIRM MAP NO. 06073C1326G, MAY 16, 2012
16. 100-FOOT ESL WETLAND BUFFER ZONE BOUNDARY

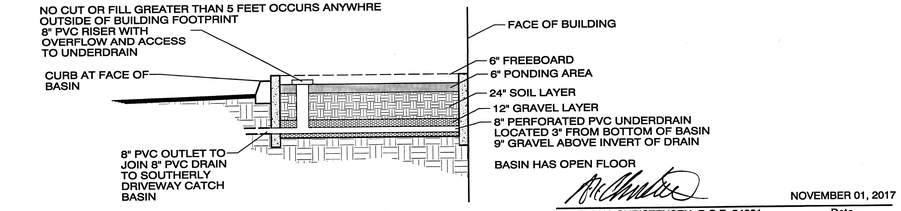
GRADING DATA

AREA OF SITE - 14.946 AC
AREA OF SITE TO BE GRADED: 34,510 SF (0.792 AC)
PERCENT OF SITE TO BE GRADED: 5.4% (ENTIRE SITE PREVIOUSLY GRADED)
AREA OF SITE WITH SLOPES GREATER THAN 25%: 0 S.F.

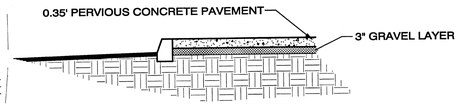
AMOUNT OF CUT - 1,350 C.Y.
AMOUNT OF FILL - 750 C.Y.
AMOUNT OF IMPORT - 600 C.Y.
MAXIMUM FILL - < 2'
MAXIMUM CUT - 3' VERTICAL IN BASIN AREA
MAXIMUM HEIGHT OF FILL SLOPE - NONE
MAXIMUM HEIGHT OF CUT SLOPE - NONE
RETAINING WALL: NONE

EARTHWORK CALCULATIONS ARE APPROXIMATE TO PAD

NO CUT OR FILL GREATER THAN 5 FEET OCCURS ANYWHRE OUTSIDE OF BUILDING FOOTPRINT



BIOFILTRATION BASIN DETAIL
NOT TO SCALE



PERVIOUS CONCRETE DETAIL
NOTE: NOT TO SCALE

ASSUMES A MINIMUM INFILTRATION RATE OF SOIL OF 0.025 IN/HR WITH A 36 HR DRAWDOWN TIME. IF AT TIME OF CONSTRUCTION INFILTRATION RATE IS LESS THAN THE MIMIMUM, AN UNDERDRAIN WILL BE REQUIRED.

THICKNESSES DETERMINED USING CALTRANS PERVIOUS PAVEMENT DESIGN GUIDANCE MANUAL (2016) METHOD

SCALE 1" = 20'

0 20 40 60 80

NOTES

1. UNDERGROUND UTILITIES ARE SHOWN AT RECORD LOCATIONS AS OBTAINED FROM CITY OF SAN DIEGO IMPROVEMENT PLANS. ACTUAL STRUCTURES AND LOCATION WILL NEED TO BE VERIFIED IN THE FIELD BY CONTRACTOR AND/OR UTILITY SPECIALISTS.
2. THE SOURCE OF THE TOPOGRAPHIC INFORMATION SHOWN HEREON IS FROM SURVEY BY CHRISTENSEN ENGINEERING & SURVEYING, DATED 04-12-17.
3. THE SUBJECT PROPERTY IS SERVED BY CITY OF SAN DIEGO SANITARY SEWER AND WATER MAINS.
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5. AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR ANY PRIVATE IMPROVEMENTS WITHIN PUBLIC EASEMENTS (PRIVATE 8" PVC DRAIN WITHIN WATER AND DRAINAGE EASEMENT.
6. NO ESL, INCLUDING FEMA FLOODWAYS EXIST ONSITE.
7. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.
8. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSRY TO COMPY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
9. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN PART 2 CONSTRUCTION BMP STANDARDS CHAPTER 4 OF THE CITY'S STORM WATER STANDARDS.
10. NO OBSTRUCTION, INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT. PLANT MATERIAL, OTHER THAN TREES, WITHIN THE PUBLIC RIGHT-OF-WAY THAT IS LOCATED WITHIN VISIBILITY AREAS SHALL NTO EXCEED 24 INCHES IN THEIGHT, MEASURED FROM THE TOP OF THE ADJACENT CURB.
11. NO APPROVED IMPROVEMENTS OR LANDSCAPING, INCLUDING PRIVATE UTILITIES, GRADING AND ENHANCED PAVING, SHALL BE INSTALLED IN OR OVER WATER EASEMENT PRIOR TO THE APPLICANT OBTAINING AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT.
12. NO STRUCTURES OR LANDSCAPING SHALL BE INSTALLED IN OR OVER ANY WATER EASEMENT THAT WOULD INHIBIT VEHICULAR ACCESS TO REPLACE A SECTION OF MAIN OR PROVIDE ACCESS TO ANY APPURTENANCE OR ISOLATED SECTION OF MAIN.
13. THE OWNER/PERMITTEE SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO CITY OF SAN DIEGO WATER FACILITES IN THE VICINITY OF THE PROJECT SITE, DUE TO THE CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT. IN ACCORDANCE WITH MUNICIPAL CODE SECTION 142.0607. IN THE EVENT THAT ANY SUCH FACILITY LOSES INTEGRITY THEN, THE OWNER/PERMITTEE SHALL REPAIR OR RECONSTRUCT ANY DAMAGED PUBLIC WATER FACILITY IN A MANNER ACCEPTABLE TO THE PUBLIC UTILITES DIRECTOR AND THE CITY ENGINEER.
14. DRIVEWAY CURB CUTS SHALL BE RECONSTRUCTED ALONG SAN ANDRES DRIVE TO CURRENT CITY STANDARDS WITH COMMERCIAL CONCRETE DRIVEWAYS PER SDG-163.

ANTONY K. CHRISTENSEN, R.C.E. 54021 — NOVEMBER 01, 2017 (Date)

REGISTERED PROFESSIONAL ENGINEER — Antony K. Christensen — No. 54021 — Exp. 12-31-17 — CIVIL — STATE OF CALIFORNIA

Owners:

ADOLFO FASTLICHT
CARLOS WELLMAN
7611 FAY AVENUE
LA JOLLA, CA 92037

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

2673 VIA DE LA VALLE
DEL MAR, CA 92014

Project Name:

THE LOT - DEL MAR

Revision 4:
Revision 3:
Revision 2: 11-01-17 ADDRESS CITY COMMENTS
Revision 1: 07-23-17 ADDRESS CITY COMMENTS
Original Date: APRIL 24, 2017

Sheet Title:

PRELIMINARY GRADING PLAN

Sheet of Sheets

C-2

A2017-30

ATTACHMENT 5
DRAINAGE REPORT

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

Preliminary Drainage Study

"The Lot – Del Mar"

Portion of Parcel 1, PM No. 3594
2673 Via de la Valle
Del Mar, California 92014

Prepared for:
Adolfo Fastlicht
Carlos Wellman
7611 Fay Avenue
La Jolla, CA 92037

Prepared by:
Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126
(858) 271-9901

April 24, 2017
Revised July 24, 2017
Revised November 06, 2017

PTS No. 537664

Introduction

This project proposes the development of a portion (0.792 ac) of this shopping center (that was previously developed) with a theater and café. Since the previous improvements have been demolished the area of imperviousness increases from 0.125 ac (15.8%) to 0.678 ac 85.6%). This project involves the removal of some of the existing parking lot and replacement with pervious paving and the new building and a biofiltration basin to treat new impervious area runoff.

The attached drainage area maps are from a topographic survey by Christensen Engineering & Surveying dated April 12, 2017. The site, in its existing pre-construction condition, drains southwesterly and southeasterly to two existing catch basins located in the existing parking lot. Following the construction this same general trend continues with a small area of runoff flowing to a more northerly driveway catch basin and the remainder flowing to the southerly driveway catch basin (roof and biofiltration basin by 8" PVC drain). All runoff from the site was previously conveyed to these catch basins when the subject development area was previously improved. The total runoff increases from 1.28 cfs to 2.42 cfs. All runoff, before and after development flows to a City of San Diego 6.5' x 4' box culvert that discharges to the San Dieguito River. Should the runoff exceed the capacity of the box culvert it will flow to the terminus of San Andres and continue to flow to the San Dieguito River. Therefore, the increase in runoff will have no adverse effect on the public storm drain system.

Section 404 of CWA regulates the discharge of dredged or fill material into waters of the United States. Section 404 is regulated by the Army Corps of Engineers. Section 401 of CWA requires that the State provide certification that any activity authorized under Section 404 is in compliance with effluent limits, the state's water quality standards, and any other appropriate requirements of state law. Section 401 is administered by the State Regional Water Quality Control Board. The project does not require a Federal CWA Section 404 permit nor Section 401 Certification because it does not cause dredging or filling in waters of the United States and is in compliance with the State Water Quality Standards. See separate SWQMP.

Since the project discharges by a hardened conveyance system to the San Dieguito River (an exempt waterbody) it is exempt from hydromodification requirements.

The Rational Method was used to calculate the anticipated flow for the 100-year storm return frequency event using the method outlined in the City of San Diego Drainage Design Manual.

Antony K. Christensen
RCE 54021
Exp. 12-31-17
JN A2017-30

11-06-17
Date

Calculations

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration

$Tc = 1.8\ (1.1-C)\ (D)^{1/2} / S^{1/3}$

Since the difference in elevation is 2' (22'-20') and the distance traveled is 275' (S=0.7%). C=0.85.

Tc = 8.4 minutes

From table on Page 83

I_{100} = 3.6 inches

2. Coefficient Determination

The site is a commercial development (shopping center.
From Page 82

Pre-Construction:
A portion of the site was previous developed and those improvements have been removed. A portion of the site is still improved.

Pre-construction the site will be considered vacant

C= 0.45

Post construction:
From Page 82 for Commercial

C = 0.85

3. *Volume calculations*

Q = CIA

Areas of Drainage

The same area of the site will be used to compare Pre and Post Construciton runoff.

Pre-Construction

Area of westerly site flowing to westerly catch basin in parking area	W = 0.395 Acre
Area of easterly site flowing to southerly driveway catch basin	E = 0.397 Acre

Post-Construction

Area draining from roofs and biofiltration basin that flows by 8" PVC drain to southerly driveway catch basin	PC-A = 0.696 Acre
Area draining from southerly pervious paving that flows to southerly driveway catch basin	PC-B = 0.060 Acre
Area draining from northerly pervious paving that flows to northerly driveway catch basin	PC-C = 0.036 Acre

Pre-Construction

Q_{100W} = (0.45) (3.6) (0.395)
Q_{100E} = (0.45) (3.3) (0.397)

Q_{100W} = 0.64 cfs
Q_{100E} = 0.64 cfs

Post-Construction
$Q_{100PC-A}$ = (0.85) (3.6) (0.696)
$Q_{100PC-B}$ = (0.85) (3.6) (0.060)
$Q_{100PC-C}$ = (0.85) (3.6) (0.036)

$Q_{100PC-A}$ = 2.13 cfs
$Q_{100PC-B}$ = 0.18 cfs
$Q_{100PC-C}$ = 0.11 cfs

4. Discussion

The site, in its existing pre-construction condition, drains southwesterly and southeasterly to two existing catch basins located in the existing parking lot. Following the construction this same general trend continues with a small area of runoff flowing to a more northerly driveway catch basin and the remainder flowing to the southerly driveway catch basin. All runoff from the site was previously conveyed to these catch basins, when the subject development area was previously improved. The total runoff increases from 1.28 cfs to 2.42 cfs. All runoff, before and after development flows to a City of San Diego 6.5' x 4' box culvert drain that discharges to the San Dieguito River. Should the runoff exceed the capacity of the box culvert it will flow to the terminus of San Andres and continue to flow to the San Dieguito River. Therefore, the increase in runoff will have no adverse effect on the public storm drain system

Type of conveyance is a: 8" PVC
Diameter of conveyance equals .67 Feet
Slope of conveyance equals 3 %
Roughness equals .01
Flow quantity equals 2.764797 CFS
Area equals .3525653 Square Feet
Velocity equals 7.841943 FPS

Type of conveyance is a: 8" PVC DRAIN
Diameter of conveyance equals .666 Feet
Slope of conveyance equals 3 %
Roughness equals .01
Flow quantity equals 2.130424 CFS
Area equals .2396793 Square Feet
Velocity equals 8.886874 FPS
Depth of flow equals .5189976 Feet

APPENDIX

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
	D
Residential:	
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

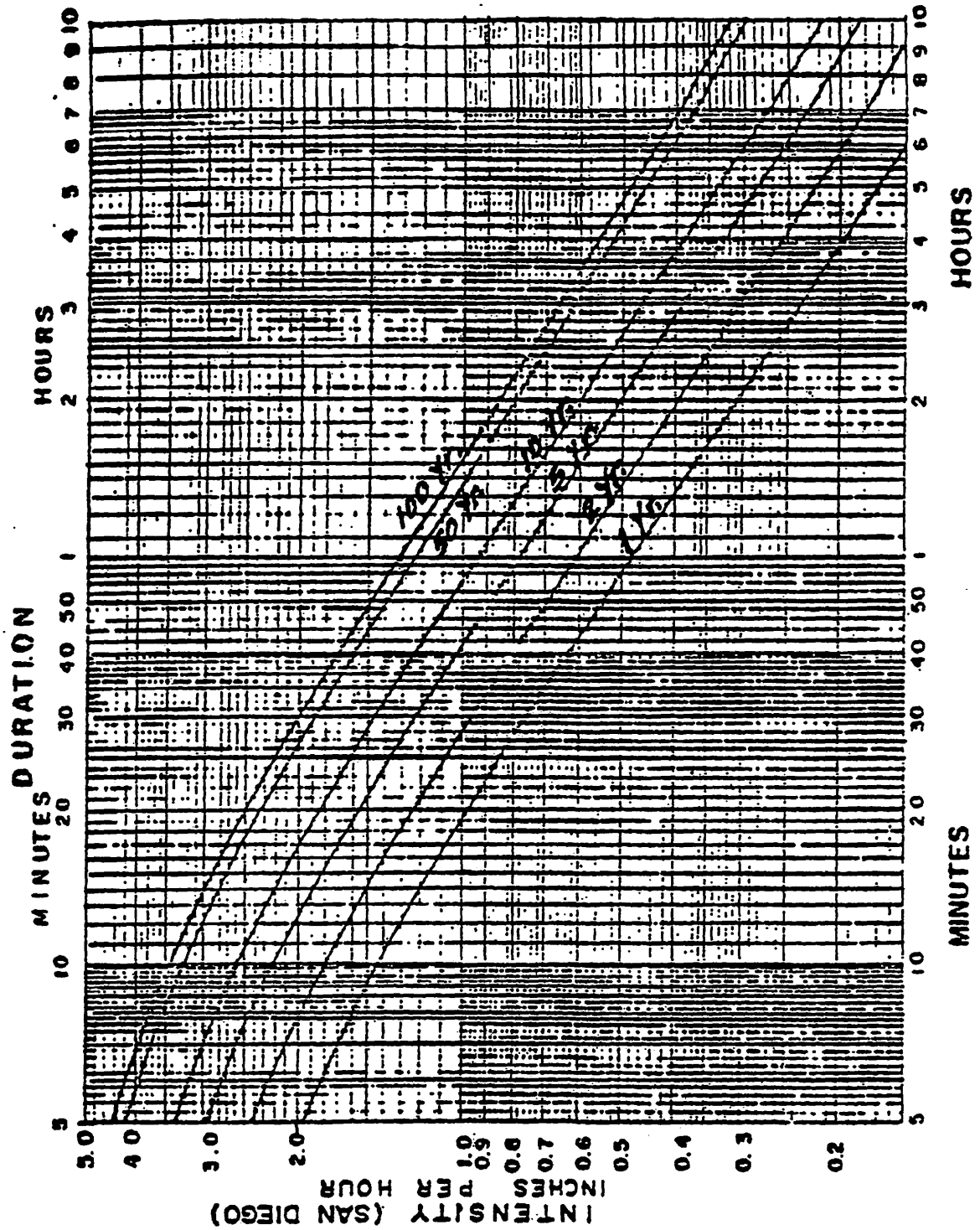
(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$



ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

RAINFALL

INTENSITY - DURATION - FREQUENCY

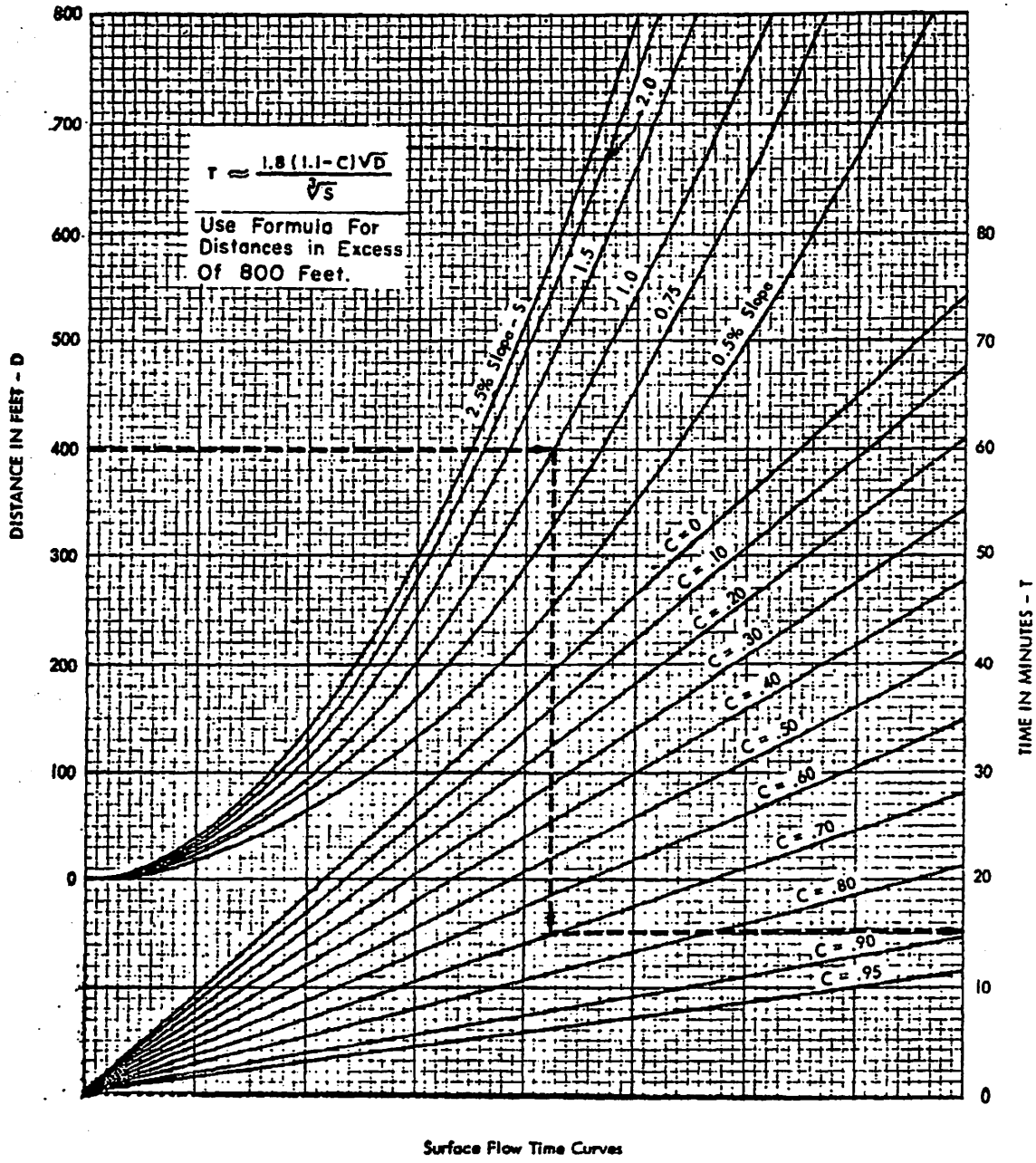
CURVES

for

COUNTY OF SAN DIEGO

APPENDIX I

URBAN AREAS OVERLAND TIME OF FLOW CURVES

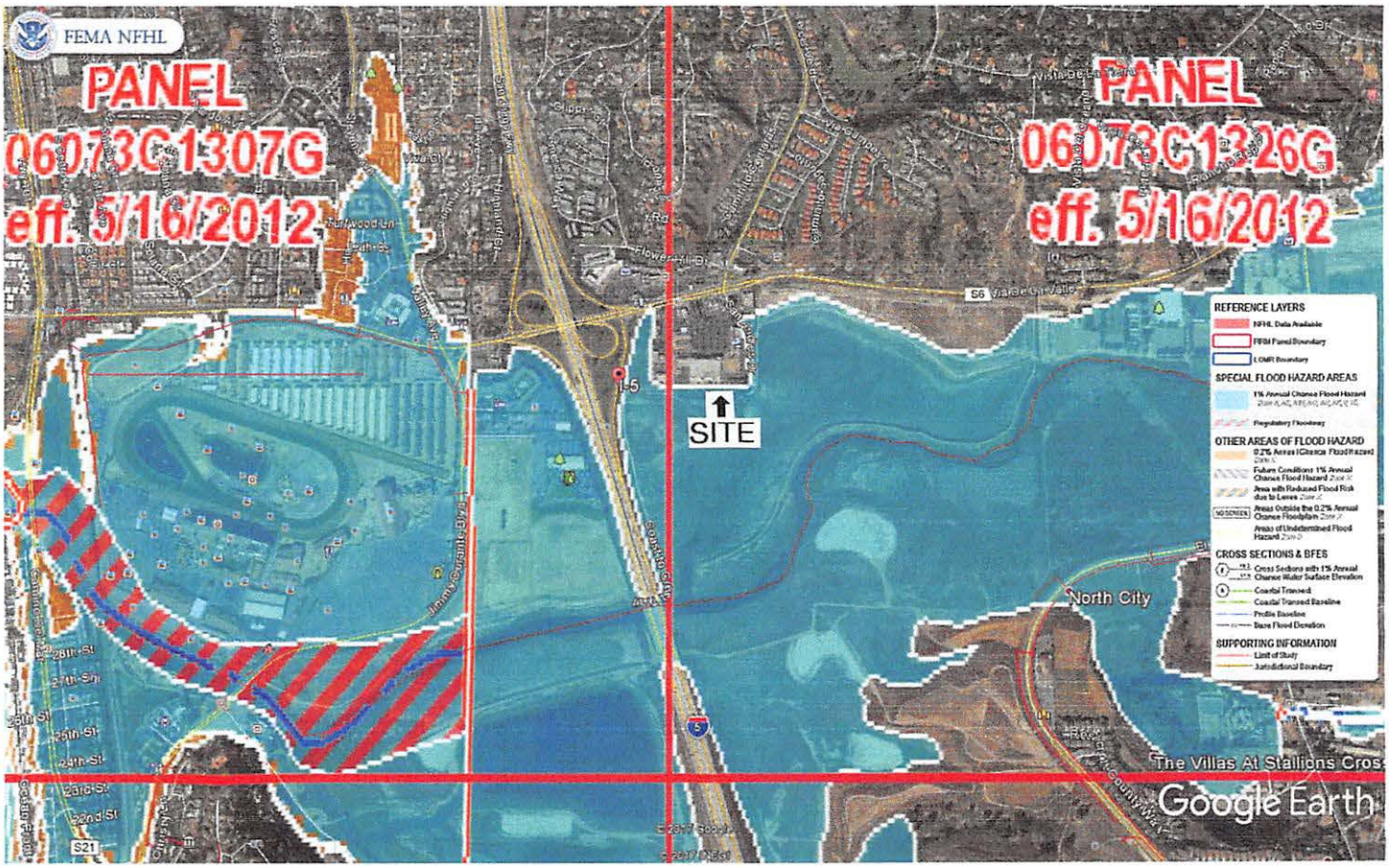


Surface Flow Time Curves

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.
SLOPE = 1.0 %
COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES



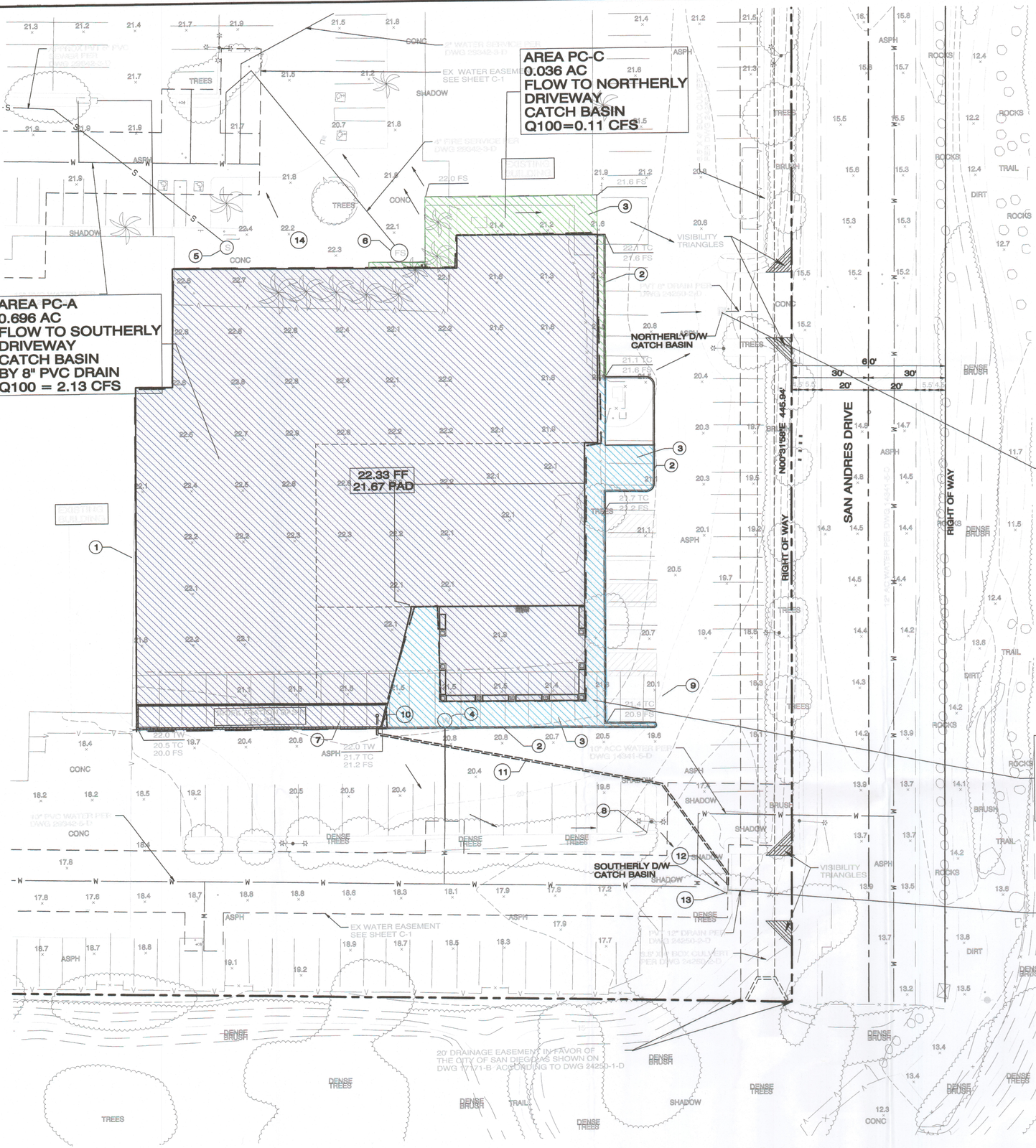
Google Earth

miles 1
km 1

DRAINAGE AREA MAPS

PRE-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP



CONSTRUCTION NOTES

1. ROOF DRAIN, VENT, GAS SERVICE AND OTHER IMPROVEMENTS EXIST ALONG NEIGHBORING BUILDING. FINAL DESIGN SHALL INCORPORATE ALLOWANCES FOR THESE IMPROVEMENT.
2. PROPOSED PRIVATE 6" CURB PER G-1
3. PROPOSED PERVIOUS CONCRETE (TYPICAL)
4. EX 2" WATER SERVICE PER DWG 29342-5-D TO BE USED FOR DOMESTIC SERVICE. EXISTENCE TO BE VERIFIED
5. EX 6" SEWER LATERAL PER DWG 29342-3-D TO BE USED FOR SEWER LATERAL. EXISTENCE TO BE VERIFIED
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AMOUNT OF IMPORT - 600 C.Y.
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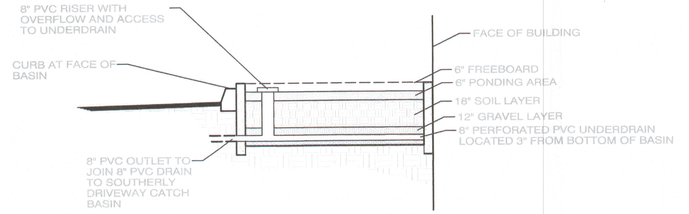
MAXIMUM CUT - 3' VERTICAL IN BASIN AREA
MAXIMUM HEIGHT OF FILL SLOPE - NONE
MAXIMUM HEIGHT OF CUT SLOPE - NONE
RETAINING WALL: NONE

EARTHWORK CALCULATIONS ARE APPROXIMATE TO PAD

NO CUT OR FILL GREATER THAN 5 FEET OCCURS ANYWHRE OUTSIDE OF BUILDING FOOTPRINT



BIOFILTRATION BASIN DETAIL
NOT TO SCALE

JULY 23, 2017
ANTONY K. CHRISTENSEN, R.C.E. 54021 — Date

SCALE 1" = 20'
0 20 40 60 80

Owners:

ADOLFO FASTLICHT
CARLOS WELLMAN
7611 FAY AVENUE
LA JOLLA, CA 92037

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

2673 VIA DE LA VALLE
DEL MAR, CA 92014

Project Name:

THE LOT - DEL MAR

Revision 4:
Revision 4:
Revision 3:
Revision 3:
Revision 2:
Revision 2:
Revision 1: 07-23-17 ADDRESS CITY COMMENTS
Revision 1:

Original Date: APRIL 24, 2017

Sheet Title:

PRELIMINARY GRADING PLAN

Sheet of Sheets

C-2

A2017-30

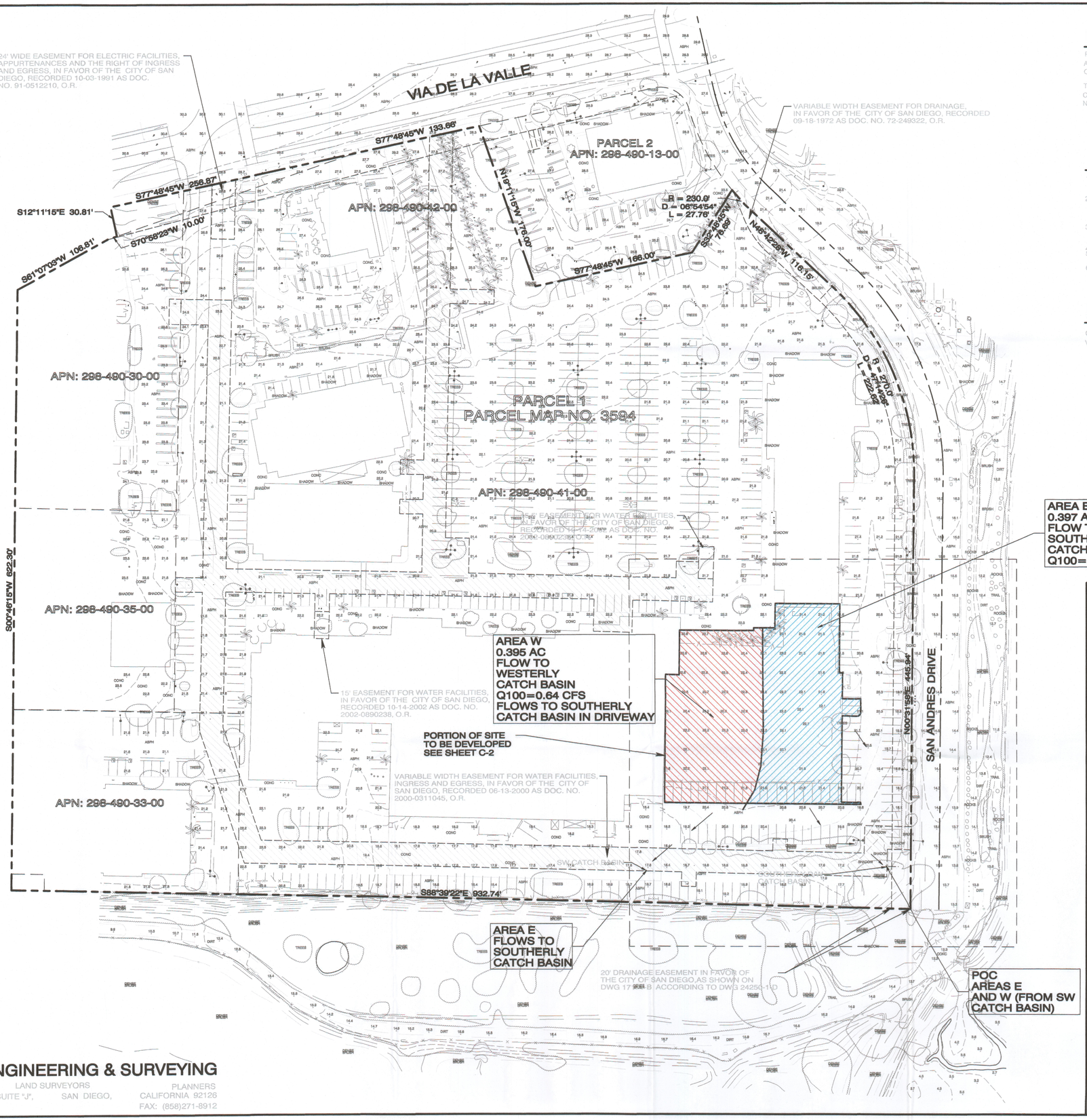
POST-DEVELOPMENT DRAINAGE AREA MAP

PRE- CONSTRUCTION DRAINAGE AREA MAP

N

SCALE: 1" = 50'

CONTOUR INTERVAL: 1'



LEGAL DESCRIPTION

PARCEL 1, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS SHOWN AT PAGE 3594 OF PARCEL MAPS FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, FEBRUARY 28, 1975.

TOGETHER WITH THAT PORTION OF VIA DE LA VALLE AS VACATED BY RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SAN DIEGO, RECORDED NOVEMBER 23, 1976 AS INSTRUMENT NO. 76-392737 IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO AND STATE OF CALIFORNIA.

NOTES

1. EASEMENTS, AGREEMENTS, DOCUMENTS AND OTHER MATTERS WHICH AFFECT THIS PROPERTY MAY EXIST, BUT CANNOT BE PLOTTED. CURRENT TITLE REPORT NOT PROVIDED
2. THE PRECISE LOCATION OF UNDERGROUND UTILITIES COULD NOT BE DETERMINED IN THE FIELD. PRIOR TO ANY EXCAVATION UTILITY COMPANIES WILL NEED TO MARK-OUT THE UTILITY LOCATIONS.
3. THE ADDRESS FOR THE SUBJECT PROPERTY IS 2673 VIA DE LA VALLE, DEL MAR, CA 92014.
4. THE ASSESSOR PARCEL NUMBER FOR THE SUBJECT PROPERTY IS 298-490-41.
5. THE TOTAL AREA OF THE SUBJECT PARCEL IS TO BE DETERMINED.
6. EASEMENT IN FAVOR OF THE CITY OF SAN DIEGO HAVE BEEN PLOTTED BASED ON TITLE REPORT DATED FEBRUARY 25, 2015 BY CHICAGO TITLE COMPANY, ORDER NO. 12201900-996-US0. OTHER EASEMENTS HAVE NOT BEEN PLOTTED PENDING CURRENT TITLE REPORT.

BENCHMARK

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE NORTHWESTERLY CORNER OF VIA DE LA VALLE AND DE LA VALLE PLACE, ELEVATION 24.34' MEAN SEA LEVEL (N.G.V.D. 1929).

BASIS OF BEARINGS

IS GRID NORTH BASED UPON GPS OBSERVATIONS.

CHRISTENSEN ENGINEERING & SURVEYING
CIVIL ENGINEERS
7888 SILVERTON AVENUE,
TELEPHONE: (858)271-9901
LAND SURVEYORS
SUITE "J", SAN DIEGO,
PLANNERS
CALIFORNIA 92126
FAX: (858)271-8912

Prepared By:
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Project Address:
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DEL MAR, CA 92014

Project Name:
THE LOT

Revision 5:
Revision 4:
Revision 3:
Revision 2: 07-23-17 ADDRESS CITY COMMENTS
Revision 1: 04-21-17 ADDED EASEMENTS FAVORING CITY OF SAN DIEGO

Original Date: APRIL 12, 2017

Sheet Title:
TOPOGRAPHIC MAP

Sheet 1 Of 1

C-1

JN 2017-90

ATTACHMENT 6
GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements

CHRISTIAN WHEELER
ENGINEERING

August 3, 2017

Boffo Cinemas, LLC
7611 Fay Avenue
La Jolla, California 92037
Attention: Adolfo Fastlicht

CWE 2170315.02

Subject: **Report of Geotechnical Infiltration Feasibility Study**
The LOT Del Mar, llc, 2673 Via de la Valle, Del Mar, California

Reference: Christensen Engineering and Surveying, Preliminary Grading Plan, dated April 24, 2017

Ladies and Gentlemen:

In accordance with your request and our proposal dated May 18, 2017, we have prepared this report to present the results of our geotechnical infiltration feasibility study at the subject site. In general, the purpose of our investigation was to provide design infiltration rates based on percolation rates measured in the field. We understand that the subject project will consist of the construction of a single-story, high-bay movie theatre complex. Based on the Preliminary Grading Plan, provided by Christensen Engineering and Surveying (CES), the proposed biofiltration basin will be located at a depth of approximately 30 inches below existing grades.

FINDINGS

SITE DESCRIPTION

The subject site is a vacant irregular-shaped lot located at 2673 Via de la Valle, Del Mar, California. The lot is located at the southeastern portion of a shopping center and is surrounded by commercial structures and associated paved parking and driveways. Topographically, the lot is near flat-lying. Topographically, the site is relatively flat-lying with existing ground surface elevations ranging between approximately 21 and 22 feet, based on the survey conducted by CES on April 4, 2017. The elevations presented in this report reference the National Geodetic Vertical Datum of 1929 (NGVD 1929).

FIELD INVESTIGATION

The subsurface exploration program consisted of three Cone Penetration Tests (CPTs) and three four inch diameter hand-auger borings. Two percolation test borings were also excavated within the site as part of the subsurface exploration program. The borings were logged in detail with emphasis on describing the soil profile. The approximate locations of the borings are shown on Plate No. 1. Logs of the explorations are presented in Appendix A of this report.

GEOLOGIC SETTING AND SOIL DESCRIPTION

Based on the results of our subsurface explorations and review of pertinent, readily available geologic literature, we have determined that the areas to support the proposed biofiltration basins are underlain by artificial fill primarily consisting of silty sands (SM).

GROUNDWATER

Groundwater was measured within our Cone Penetration Tests at approximate depth of 16 feet below the existing grade. Based on the preliminary grading plan, these depths correspond to an approximate elevation of 5 feet.

The Storm Water Standards BMP Design Manual (2016) states that the vertical distance from the base of the infiltration basin to the seasonal high groundwater mark must be greater than 10 feet. This vertical distance may be reduced at the discretion of the approval agency if the groundwater basin does not support beneficial uses and the groundwater quality is maintained. It is our opinion that the seasonal high groundwater level at the site is at approximately 14 feet below existing grade. The encountered groundwater is not expected to have any beneficial usage.

INFILTRATION RATE DETERMINATION

FIELD MEASUREMENTS

Percolation testing was performed within the two borings that were advanced in the proposed biofiltration basin area on July 14, 2017. The six-inch-diameter borings, designated as PT-1 and PT-2, were advanced to the depth of 3 and 3.1 feet below existing grades respectively, and cleaned of all loose material. The bottom elevations of the borings correspond to the anticipated bottom elevations of the proposed infiltration basins. In each of the borings, a 3-inch diameter perforated pipe was set in the excavation and surrounded by ¾-inch gravel to prevent caving. The approximate locations of the percolation borings are shown on Plate No. 1.

The field percolation rates were determined the following day by using the falling head test method. The initial water level was established by adding water to the percolation borings. Percolation rates were monitored and recorded every 30 minutes over a period of 6 hours until the infiltration rates stabilized. Measurements were taken using a water level meter (Solinst, Model 101) with an accuracy of measurement of 0.005 foot (0.06 inch). To account for the use of gravel placed around the perforated pipe, an adjustment factor of 0.51 was used in the calculations. The gravel adjusted percolation rates and calculated infiltration rates are presented in Table I.

TABLE I: FIELD PERCOLATION AND INFILTRATION RATES

Test No.	Location	Soil Underlying BMP	Depth of Testing	Gravel Adjusted Percolation Rate	Infiltration Rate
PT-1	Southern PL	Artificial Fill – Silty Sand (SM)	3 feet	1.84 inches per hour	0.24 inches per hour
PT-2	Southern PL	Artificial Fill – Slightly Silty Sand (SM)	3.1 feet	4.65 inches per hour	0.57 inches per hour

Infiltration and percolation are two related but different processes describing the movement of moisture through soil. Infiltration is the downward (one dimensional) movement of water into soil and porous or fractured rock. Percolation testing measures the three dimensional movement of water into soil and porous or fractured rock (typically through the walls and bottom of a borehole). The direct measurement yielded by a percolation test tends to overestimate the infiltration rate, except perhaps in cases where an infiltration basin is similarly dimensioned to the borehole. As such, adjustments of the measured percolation rates were converted into infiltration rates using the Porchet Method. The spreadsheet used for the conversion is included in Appendix C of this report.

The average field infiltration rate of the fill material in the area of the proposed basin is 0.4 inches per hour.

FACTOR OF SAFETY

The City of San Diego Storm Water Standards Best Management Practices (BMP) Design Manual states that "a maximum factor of safety of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified. If the site passes the feasibility analysis at a factor of safety of 2.0, then infiltration must be investigated, but a higher factor of safety may be selected at the discretion of the design engineer."

Using a factor of safety of 2.0 will reduce the field infiltration rate will be approximately 0.2 inches per hour. According to the City of San Diego Storm Water Standards BMP Design Manual the infiltration rate at the subject site correspond to a partial infiltration criteria.

GEOTECHNICAL CRITERIA FOR INFILTRATION BASINS

GENERAL

Based on the current Storm Water Standards BMP Design Manual, certain geotechnical criteria need to be addressed when assessing the feasibility and desirability of the use of infiltration basins for a project site. Those criteria, Per Section C.2 of the manual, are addressed below.

C2.1 SOIL AND GEOLOGIC CONDITIONS

Site soil and geologic conditions influence the rate at which water can physically enter the soils. Based on the conditions observed in our subsurface explorations, the existing soils beneath the proposed infiltration basins consist of artificial fill. The artificial fill at the site primarily consists of silty sands (SM).

C2.2 SETTLEMENT AND VOLUME CHANGE

Settlement and volume change can occur when water is introduced below grade. Based on the soil conditions observed in subsurface explorations and laboratory testing, the site is underlain by artificial fill that has a low to moderate collapse potential upon wetting. This can be mitigated by a combination of remedial grading and incorporation of impermeable liners or cut-off walls.

C2.3 SLOPE STABILITY

Infiltration of water has the potential to increase the risk of failure in nearby slopes. The site is relatively flat and in our opinion the risk of slope instability is very low.

C2.4 UTILITY CONSIDERATIONS

Utilities are either public or private infrastructure components that include underground pipelines, vaults, and wires/conduit, and above ground wiring and associated structures. Infiltration of water can pose a risk to subsurface utilities, as well as increase the risk of geotechnical hazards that can occur within the utility trenches when water is introduced. Care should be taken when planning proposed utility trench and infiltration basin siting. Mitigation will be provided to reduce the potential for water flow into offsite utility trenches.

C2.5 GROUNDWATER MOUNDING

Groundwater mounding occurs when infiltrated water creates a rise in the groundwater table beneath the facility. Groundwater mounding can affect nearby subterranean structures and utilities. Based on the anticipated depth to groundwater, the potential for groundwater mounding is low.

C2.6 RETAINING WALL AND FOUNDATIONS

Infiltration of water can result in potential increase in lateral earth pressures and potential reduction in soil strength. Retaining walls and foundations can be negatively impacted by these changes in soil conditions. This should be taken into account when designing the storm water basins, retaining walls and foundations for the site.

CONCLUSIONS AND RECOMMENDATIONS

Based on a review of our field study and our experience with similar projects, we anticipate that, given that the recommendations contained herein are followed, infiltration of storm water utilizing the proposed onsite biofiltration basin would not result in soil piping, daylight water seepage, or slope instability for the property or areas down-gradient from the site.

Field infiltration rates within the soils below the proposed biofiltration basin fell within the partial infiltration criteria. The infiltration criterion was referenced from Storm Water Standards BMP Design Manual. Using a factor of safety of 2.0, the average infiltration rate of 0.2 inches per hour can be used for the planning phase.

Where the basin is located within 10 feet of a retaining wall or settlement-sensitive surface improvement we recommended that a cut-off wall or impermeable liner be constructed around the perimeter of the BMP. The cut-off wall or impermeable liner should extend a minimum of 5 feet below proposed grade, at least 2 feet below the lowest adjacent existing or proposed footing, whichever is greater.

It should be recognized that routine inspection and maintenance of the biofiltration basin is necessary to prevent clogging and failure. A maintenance plan should be specified by the designer and followed by the owner during the entire lifetime of the BMP device.

A completed and signed "Worksheet C.4-1: Categorization of Infiltration Feasibility Condition" for the subject project is included in Appendix B of this report. In addition, Part A of Worksheet D.5.1

"Factor of Safety and Design Infiltration Rate Worksheet," has been completed and is included in Appendix D of this report. The BMP designer will complete Part B of the worksheet and assign the appropriate factor of safety. It should be noted that the D.5-1 worksheet typically only is provided for full infiltration sites.

It should be noted that it is not our intent to review the civil engineering plans, notes, details, or calculations, when prepared, to verify that the engineer has complied with any particular storm water design standards. It is the responsibility of the designer to properly prepare the storm water plan based on the municipal requirements considering the planned site development and infiltration rates.

LIMITATIONS

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on limited percolation testing, an evaluation of the subsurface soil conditions encountered within subsurface explorations, and the assumption that the infiltration rates and soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the biofiltration basin may be influenced by undisclosed or unforeseen variations in the soil conditions that may occur in the unexplored areas. Any conditions encountered during site development, that deviate from the ones described herein, should be brought to the attention of the geotechnical engineer so that modifications can be made if necessary. In addition, this office should be advised of any changes in the project scope, proposed site grading or storm water basin design so that it may be determined if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

If you should have any questions regarding this report, please do not hesitate to contact this office. This opportunity to be of professional service is sincerely appreciated.

Respectfully submitted,

CHRISTIAN WHEELER ENGINEERING

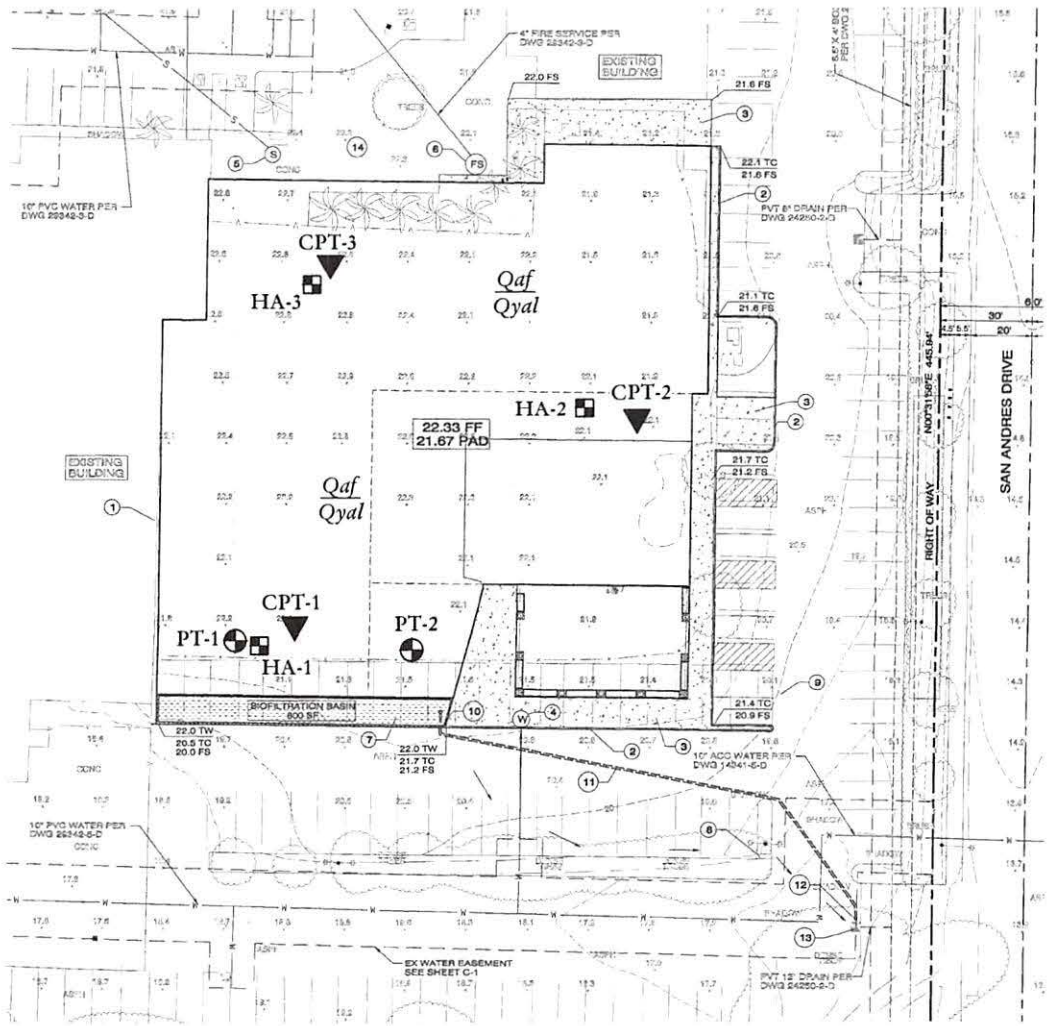
Troy S. Wilson, CEG #2551

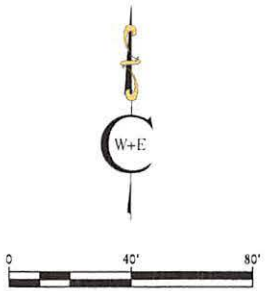
Daniel B. Adler, RCE #36037

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
TROY S. WILSON
No. 2551
STATE OF CALIFORNIA

DBA:az;tsw
ec: CWellman@SunroadEnterprises.com
TheLOTent.com
AltaByDesign.com





SCALE: 1" = 40'

CWE LEGEND	
CPT-3	CONE PENETROMETER TEST LOCATION
PT-2	PERCOLATION TEST LOCATION
HA-3	HAND AUGER TEST LOCATION
Qaf / Qyal	ARTIFICIAL FILL OVER YOUNGER ALLUVIUM

SITE PLAN AND GEOTECHNICAL MAP

THE LOT DEL MAR, LLC
2673 VIA DE LA VALLE
DEL MAR, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2170315.02
BY:	DBA/SD	PLATE NO.:	1

CHRISTIAN WHEELER ENGINEERING

Appendix A

CPT and Boring Logs

LOG OF HAND AUGER HA-1

Date Logged:	7/14/17	Equipment:	Hand Auger
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
SPT	Standard Penetration Test	DR	Drive Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential	SD	Sample Density

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Artificial Fill (Qaf):** Light brown, damp, medium dense, fine- to medium-grained, SILTY SAND with gravel-size rock.							
0.5											
1				Moist, medium dense to dense, fine- to medium-grained, SILTY SAND.							
1.5											
2											
2.5											
3			SM/ SP	Light brown, moist, medium dense to dense, fine- to medium-grained, slightly SILTY SAND.							
3.5				Test trench terminated at 3 feet. No groundwater or seepage encountered.							
4											
4.5											
5											
5.5											
6											
6.5											
7											
7.5											

Notes:

Symbol Legend

- ▽ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- ⁘ Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

THE LOT DEL MAR, LLC
2673 VIA DE LA VALLE
DEL MAR, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2170315.02
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF HAND AUGER HA-2

Date Logged:	7/14/17	Equipment:	Hand Auger
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
SPT	Standard Penetration Test	DR	Drive Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential	SD	Sample Density

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Artificial Fill (Qaf):** Light brown, damp, medium dense, fine- to medium-grained, SILTY SAND with gravel-size rock.							
0.5											
1											
1.5				Moist, medium dense, fine- to medium-grained, SILTY SAND.							
2											
2.5											
3			SM	Brown to dark brown, moist, medium dense, fine- to medium-grained, CLAYEY SAND.							
3.5											
4			SM/ SP	Light greenish-brown and orange, moist, medium dense, fine- to medium-grained, slightly SILTY SAND.							
4.5											
5				Test trench terminated at 5 feet. No groundwater or seepage encountered.							
5.5											
6											
6.5											
7											
7.5											

Notes:

Symbol Legend

- ▽ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- ⁘ Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

THE LOT DEL MAR, LLC
2673 VIA DE LA VALLE
DEL MAR, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2170315.02
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF HAND AUGER HA-3

Date Logged:	7/14/17	Equipment:	Hand Auger
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
SPT	Standard Penetration Test	DR	Drive Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential	SD	Sample Density

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Artificial Fill (Qaf):** Light brown, damp, medium dense, fine- to medium-grained, SILTY SAND with gravel-size rock.							
0.5											
1				Moist, medium dense to dense, fine- to medium-grained, SILTY SAND.							
1.5											
2											
2.5			CL	Dark brown, moist, stiff, SANDY CLAY, about 3 inches thick.							
			SM/ SP	Light brown, moist, medium dense to dense, fine- to medium-grained, slightly SILTY SAND.							
3			SC	Dark brown, moist, medium dense to dense, fine- to medium-grained, CLAYEY SAND.							
3.5											
4											
4.5			SM/ SP	Light grayish-brown and orange, moist, medium dense to dense, fine- to medium-grained, slightly SILTY SAND.							
5				Test trench terminated at 5 feet. No groundwater or seepage encountered.							
5.5											
6											
6.5											
7											
7.5											

Notes:

Symbol Legend

- ▽ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- ⁇ Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

THE LOT DEL MAR, LLC
2673 VIA DE LA VALLE
DEL MAR, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2170315.02
BY:	SRD	FIGURE NO.:	A-3

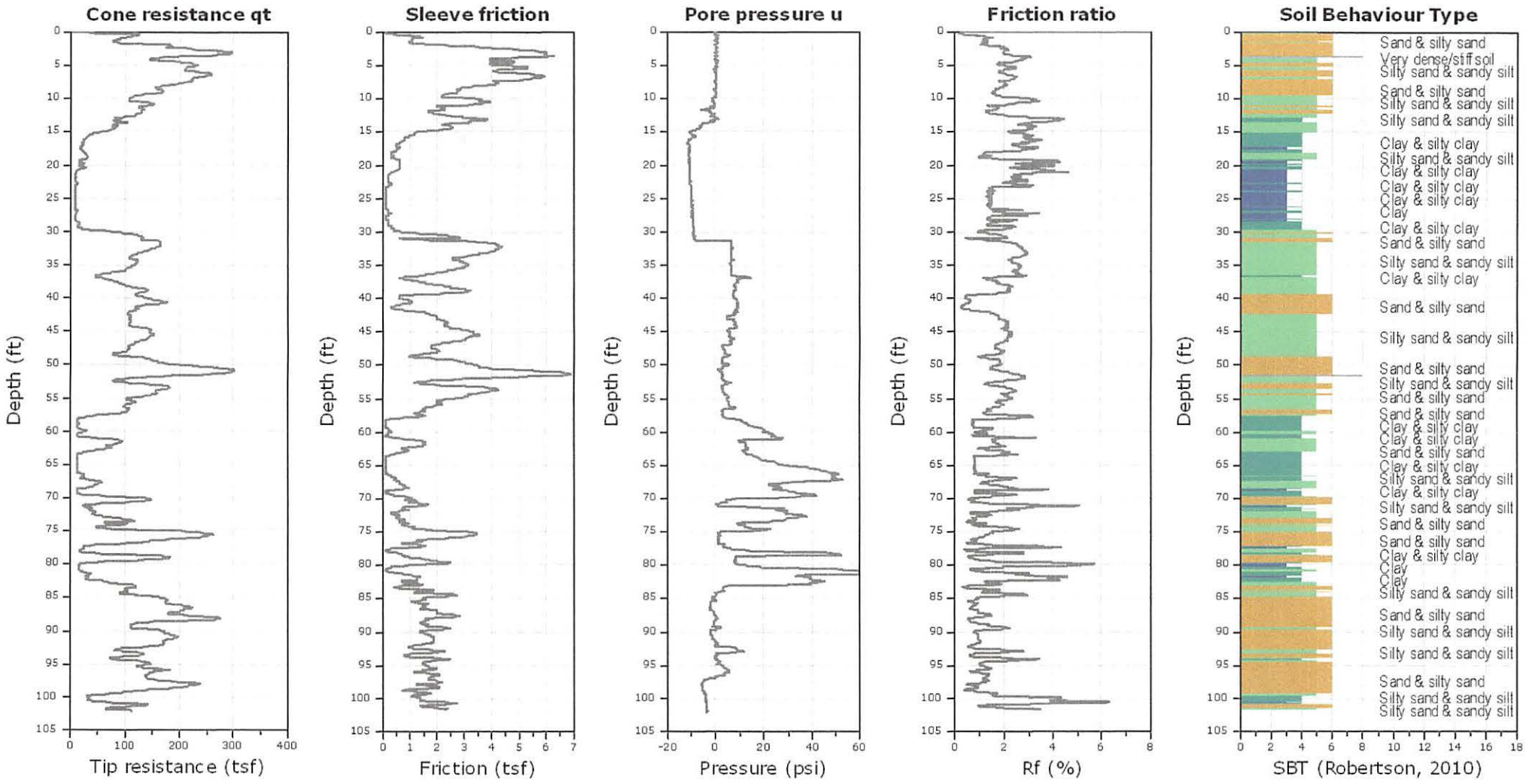
CHRISTIAN WHEELER ENGINEERING

Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

CPT-1

Project: **Christian Wheeler Engineering/Del Mar "The Lot"**
Location: **2689 Via De La Valle Del Mar, CA**

Total depth: 102.05 ft, Date: 7/14/2017
Cone Type: Vertek

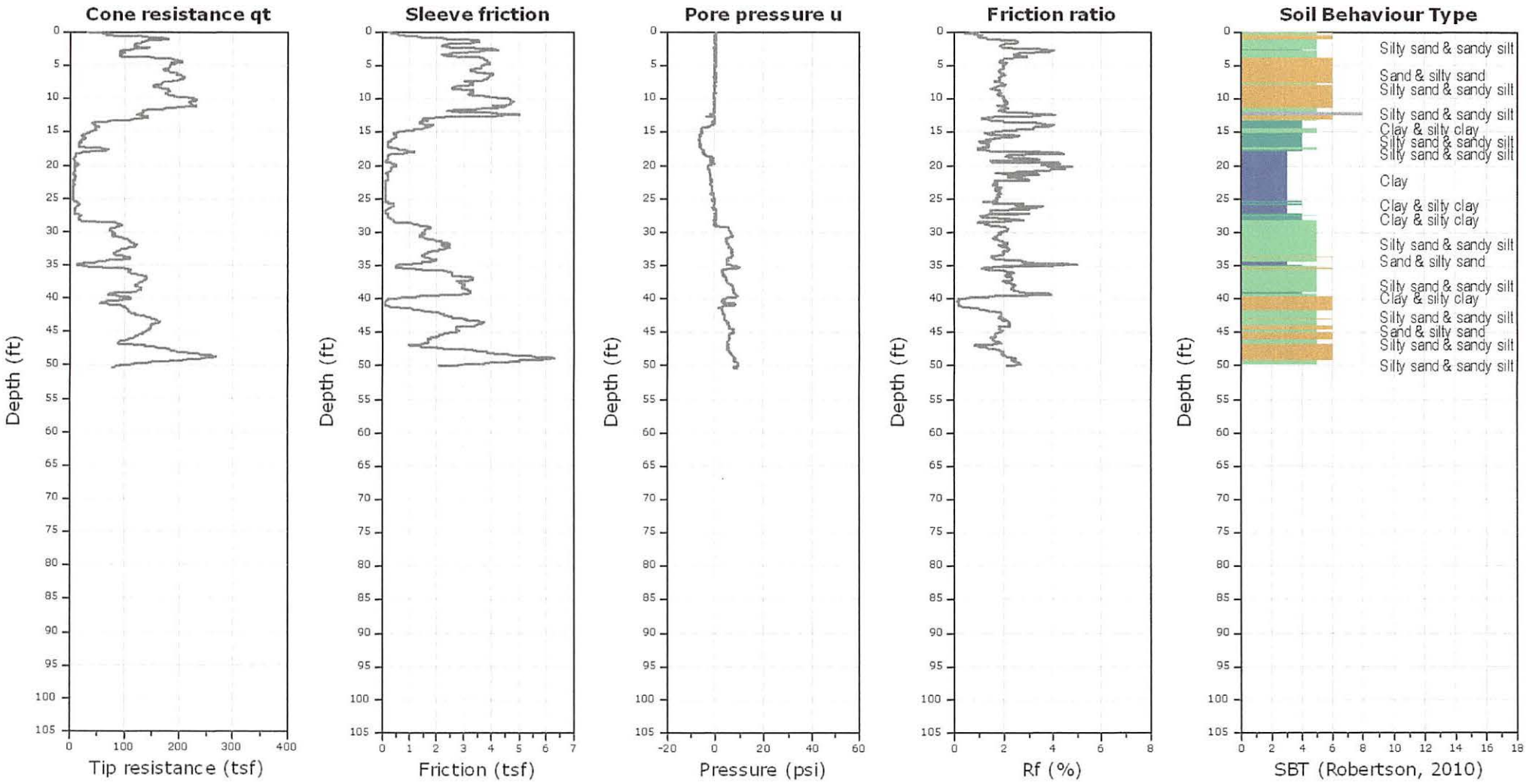


Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

CPT-2

Project: **Christian Wheeler Engineering/Del Mar "The Lot"**
Location: **2689 Via De La Valle Del Mar, CA**

Total depth: 50.33 ft, Date: 7/14/2017
Cone Type: Vertek

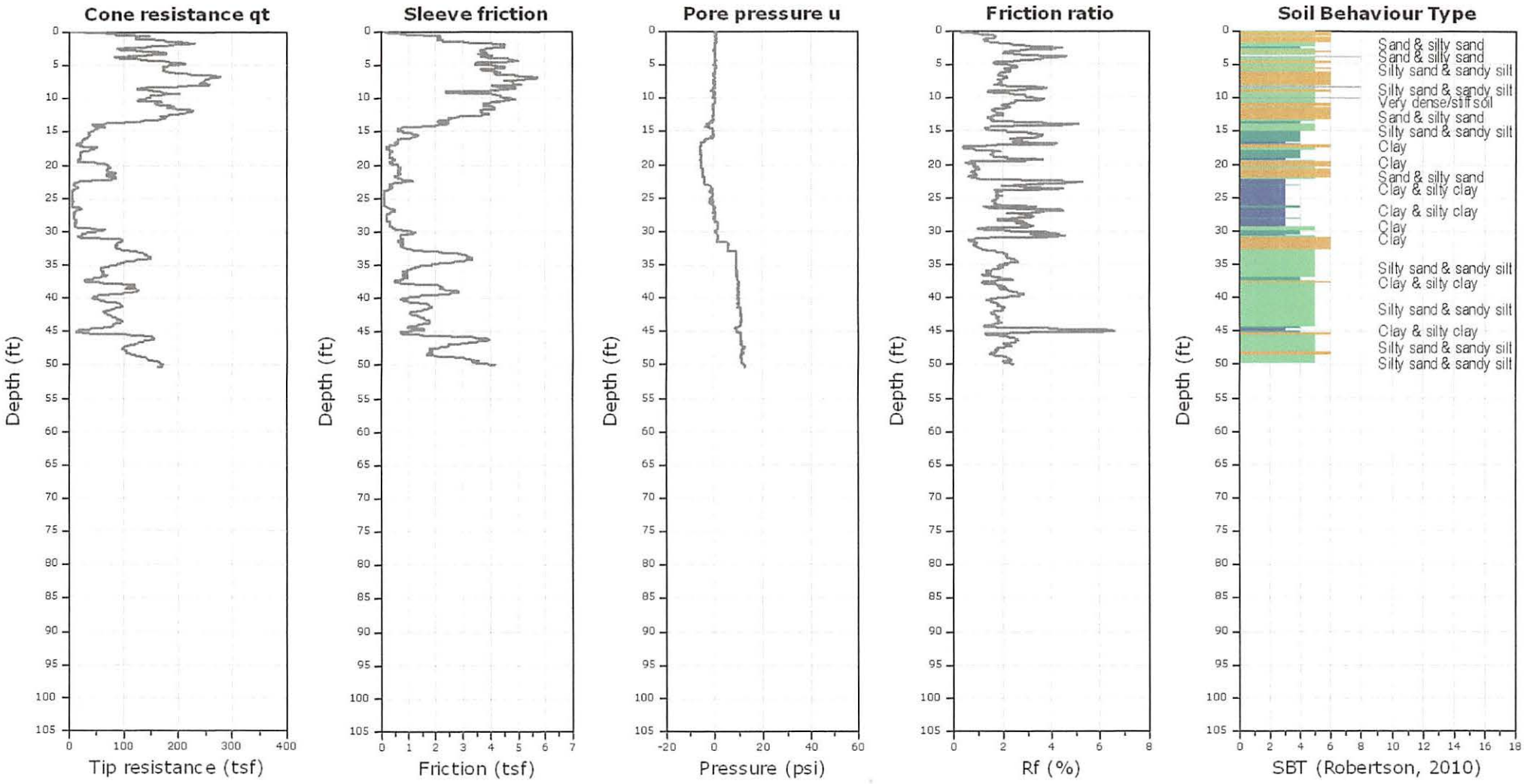


Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

CPT-3

Project: **Christian Wheeler Engineering/Del Mar "The Lot"**
Location: **2689 Via De La Valle Del Mar, CA**

Total depth: 50.35 ft, Date: 7/14/2017
Cone Type: Vertek



Appendix B

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
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.		X
An infiltration rate assessment has been performed for the soils beneath the subject site as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2170315.02). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, the average infiltration rate for the soils at the subject site is 0.2 inches per hour.			
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.	X	
An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level. C.2.1 A site specific geotechnical investigation was performed. C.2.2 The underlying fill and younger alluvium are expected to have a low to moderate potential for hydro collapse and consolidation. Recommendations have been provided to mitigate for this condition. C.2.3 The site is relatively flat and in our opinion the risk of slope instability is very low. C.2.4 A vertical liner will be used to prevent lateral migration into nearby utility trenches. C.2.5 Based on the anticipated depth to groundwater, the potential for groundwater mounding is low. C.2.6 Where the BMP is located within 10 feet of a structure, retaining wall or settlement sensitive improvement we recommended that a cut-off wall or impermeable liner be constructed around the perimeter of the BMP. The cut-off wall or impermeable liner should extend a minimum of 5 feet below proposed grade, and at least 2 feet below the lowest adjacent existing or proposed footing, whichever is greater.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Based on our review of items presented in Appendix C.3, we anticipate that infiltration rates greater than 0.5 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. C.3.1 The subgrade soil does not appear to be suitable for full onsite infiltration. We have no knowledge of groundwater or soil contamination onsite or down-gradient from the site. C.3.2 The seasonal high groundwater table is estimated to be approximately 14 feet below existing grade. C.3.3 No groundwater monitoring wells are known to be located within the subject site. C.3.4 The site was not previously utilized for industrial purposes. C.3.5 We recommend that infiltration activities be coordinated with the applicable groundwater management agency. C.3.6 There does not appear to be a high risk of causing potential water balance issues. C.3.7 We are not aware of any water rights downstream of the project.			
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.	X	
Provide basis: There does not appear to be a high risk of causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters by allowing infiltration greater than 0.5 inches per hour.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*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 City Engineer 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.	X	

An infiltration rate assessment has been performed for the soils beneath the subject site as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2170315.02). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, the average infiltration rate for the soils at the subject site is 0.2 inches per hour.

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.	X	

An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration in any appreciable quantity can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level.

C.2.1 A site specific geotechnical investigation was performed.

C.2.2 The underlying fill and younger alluvium are expected to have a low to moderate potential for hydro collapse and consolidation. Recommendations have been provided to mitigate for this condition.

C.2.3 The site is relatively flat and in our opinion the risk of slope instability is very low.

C.2.4 A vertical liner will be used to prevent lateral migration into nearby utility trenches.

C.2.5 Based on the anticipated depth to groundwater, the potential for groundwater mounding is low.

C.2.6 Where the BMP is located within 10 feet of a structure, retaining wall or settlement sensitive improvement we recommended that a cut-off wall or impermeable liner be constructed around the perimeter of the BMP. The cut-off wall or impermeable liner should extend a minimum of 5 feet below proposed grade, and at least 2 feet below the lowest adjacent existing or proposed footing, whichever is greater.

Worksheet C.4-1 Page 4 of 4			
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.	X	

Provide basis:
Based on our review of items presented in Appendix C.3, we anticipate that infiltration in any appreciable quantity can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level.

C.3.1 We have no knowledge of groundwater or soil contamination onsite or down-gradient from the site.
C.3.2 The seasonal high groundwater table is estimated to be approximately 14 feet below existing grade.
C.3.3 No groundwater monitoring wells are known to be located within the subject site.
C.3.4 We have no knowledge of a previous industrial use.
C.3.5 We recommend that infiltration activities be coordinated with the applicable groundwater management agency.
C.3.6 There does not appear to be a high risk of causing potential water balance issues.
C.3.7 We do not know of any water rights downstream of the project.

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.	X	

We did not perform a study regarding water rights. However, these rights are not typical in the San Diego area.

Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	Partial Infiltration

*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 City Engineer to substantiate findings

Appendix C

Porchet Method- Percolation to Infiltration Conversion Spreadsheet

Percolation to Infiltration Rate Conversion (Porchet Method)

Proposed Movie Theater Complex, 2673 Via De La Valle, Del Mar, CA

CWE 2170315.02

Test #	Gravel Adjustment Factor	Effective Radius (inches) r	Depth of Hole Below Existing Grade (inches)	Time Interval (min.) Δt	Height of pipe above surface (feet)	Initial Water Depth without correction (feet)	Final Water Depth without correction (feet)	Initial Water Height with correction (inches) H_o	Final Water Height with correction (inches) H_f	Change in head (inches) ΔH	Average Head Height (inches) H_{avg}	Gravel Adjusted Percolation Rate (inch/hour)	Tested Infiltration Rate (inch/hour) I_t
PT-1	0.51	3	36	30	2.00	4.08	4.23	11.04	9.24	1.80	10.14	1.84	0.24
PT-2	0.51	3	37	30	1.90	3.90	4.28	13.00	8.44	4.56	10.72	4.65	0.57

"Initial and final water depth without correction" are measurements taken from top of pipe if pipe is sticking out of ground (most cases)

"Initial and final water height with correction" factors in the height of pipe above surface, and provides measurement of water above bottom of pipe

If measurements are taken from grade "Height of pipe above surface" = 0

Gravel Adjustment Factor:

4-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.51 - 3/4 inch gravel with 8 inch diameter hole
0.56 - 3/4 inch gravel with 7 inch diameter hole
0.64 - 3/4 inch gravel with 6 inch diameter hole

3-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.44 - 3/4 inch gravel with 8 inch diameter hole
0.47 - 3/4 inch gravel with 7 inch diameter hole
0.51 - 3/4 inch gravel with 6 inch diameter hole

Porchet Method - Tested Percolation Rate Conversion to Tested Infiltration Rate

$$I_t = \frac{\Delta H \, 60 \, r}{\Delta t \, (r + 2H_{avg})}$$

I_t = tested infiltration rate, inches per hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

Appendix D

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design InfiltrationRate Worksheet			Worksheet D.5-1		
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	.5
		Predominant soil texture	0.25	2	.5
		Site soil variability	0.25	1	.25
		Depth to groundwater / impervious layer	0.25	2	.5
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.75
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/resiliency	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					0.2
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$					

Supporting Data

This worksheet has been completed assuming that the infiltration will occur within the artificial fill at the subject site. Percolation testing has been performed using the borehole falling head test method. The measured field percolation rates are presented in Appendix C of the report.